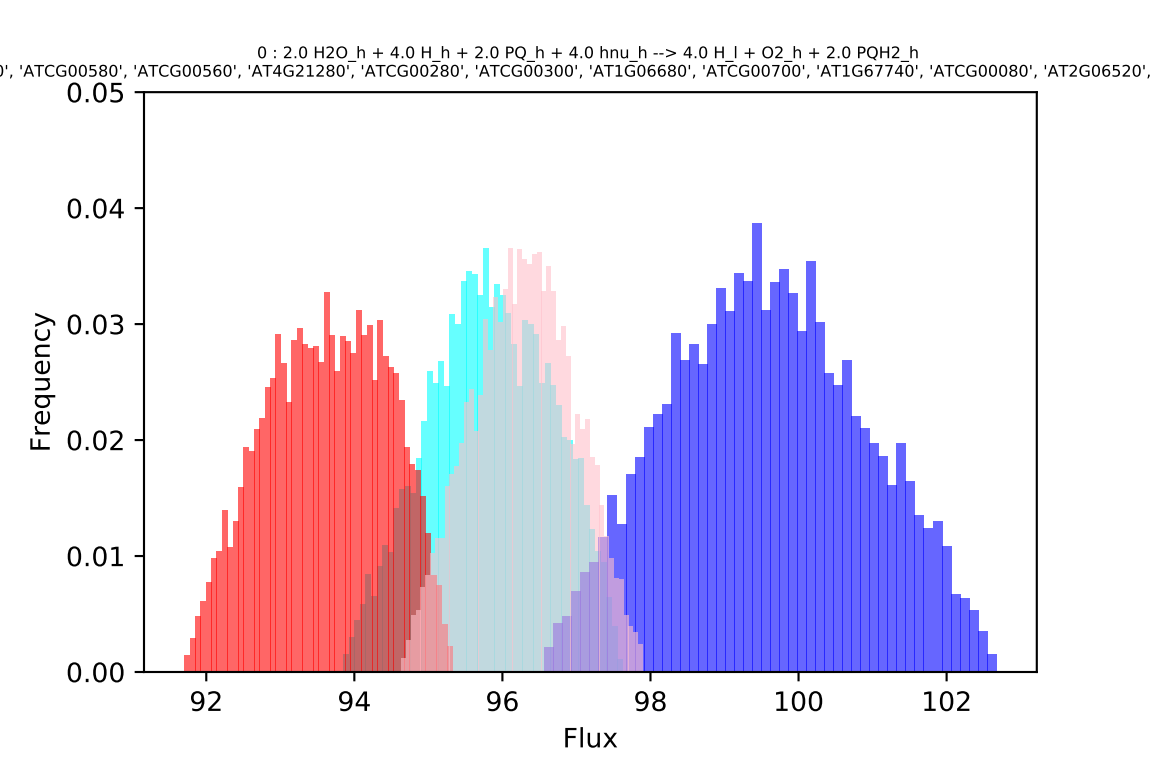
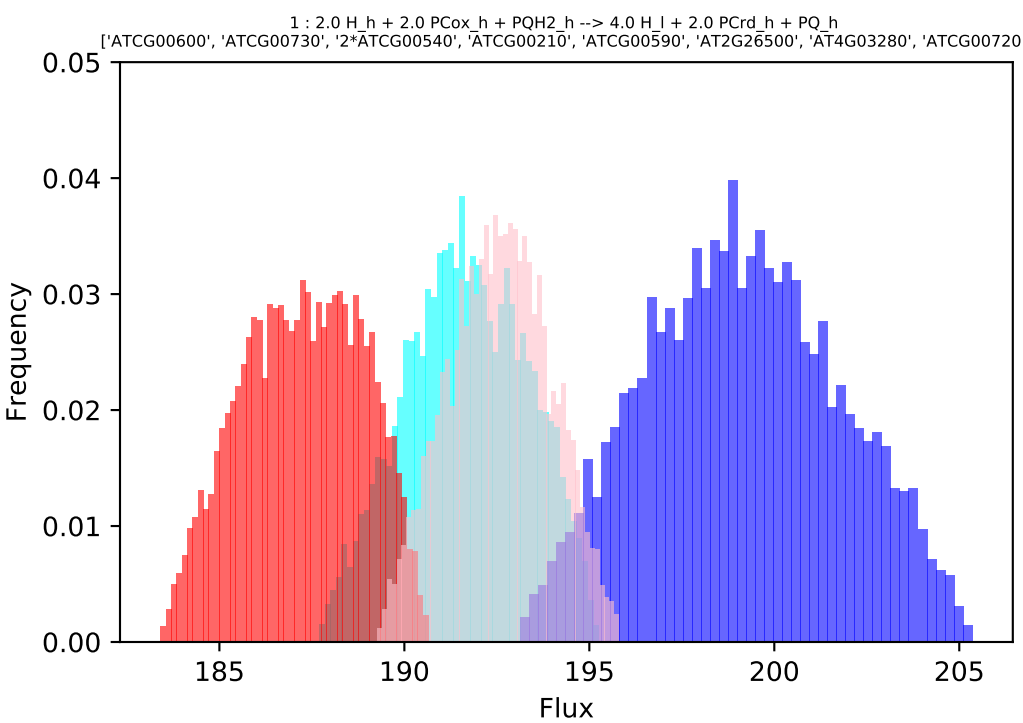
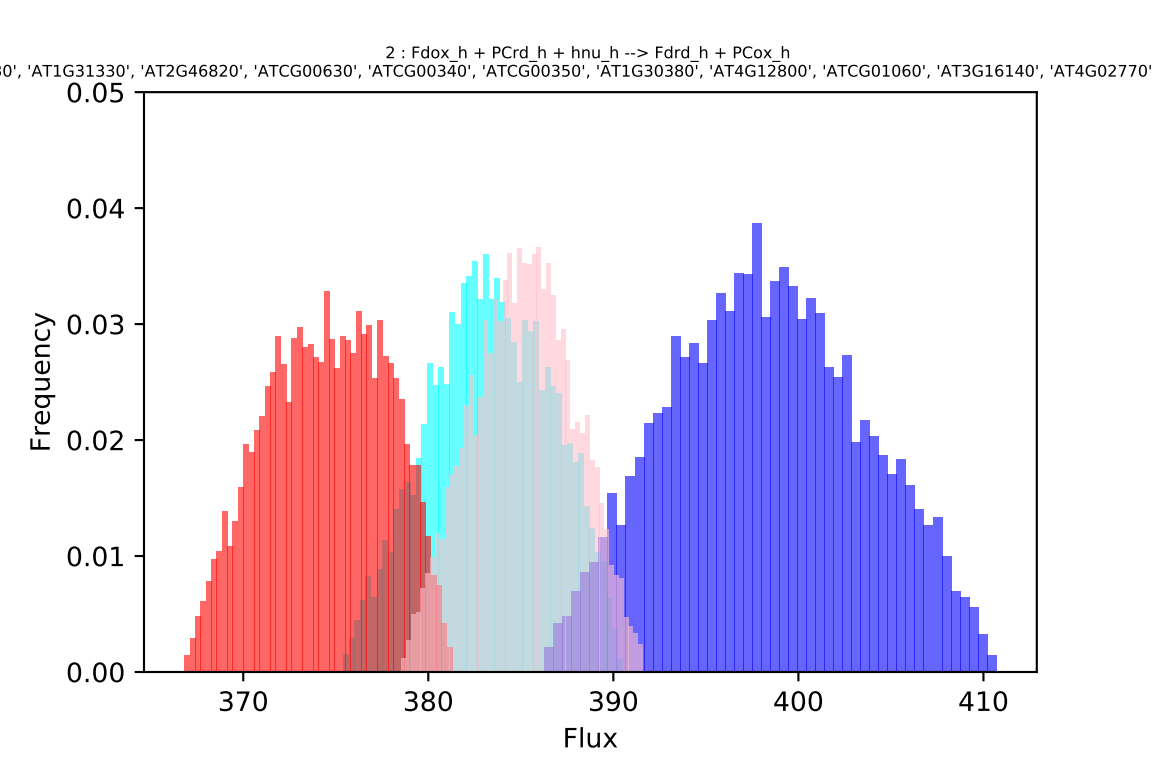
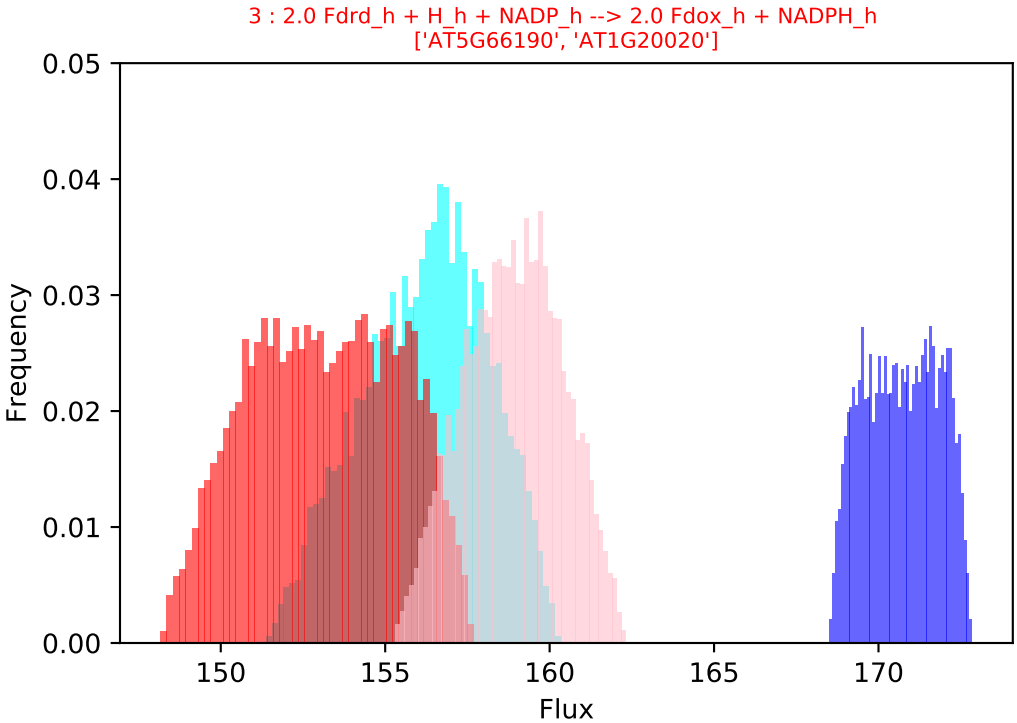
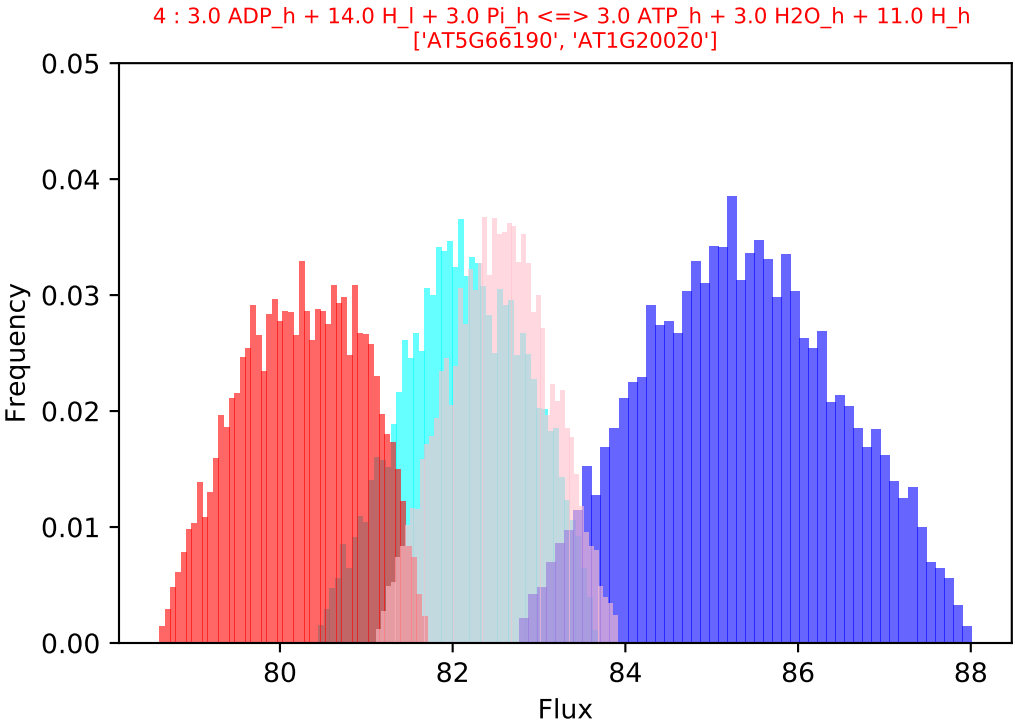
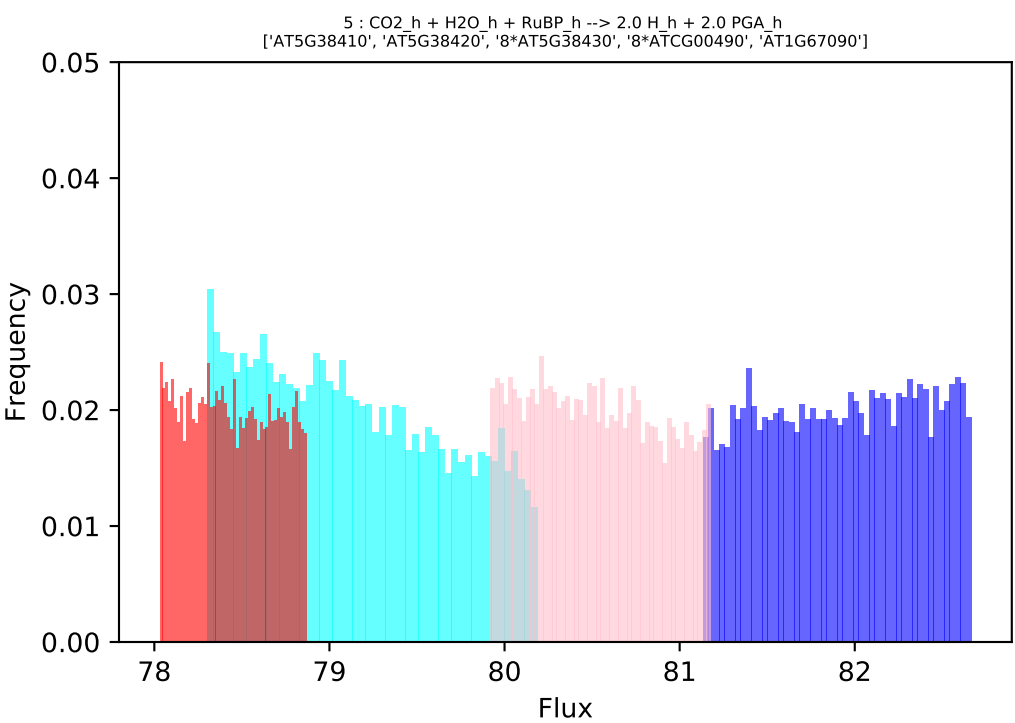

0 : 2.0 H2O_h + 4.0 H_h + 2.0 PQ_h + 4.0 hnu_h --> 4.0 H_l + O2_h + 2.0 PQH2_h
', 'ATCG00580', 'ATCG00560', 'AT4G21280', 'ATCG00280', 'ATCG00300', 'AT1G06680', 'ATCG00700', 'AT1G67740', 'ATCG00080', 'AT2G06520',
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
92
94
96
98
100
102
Flux

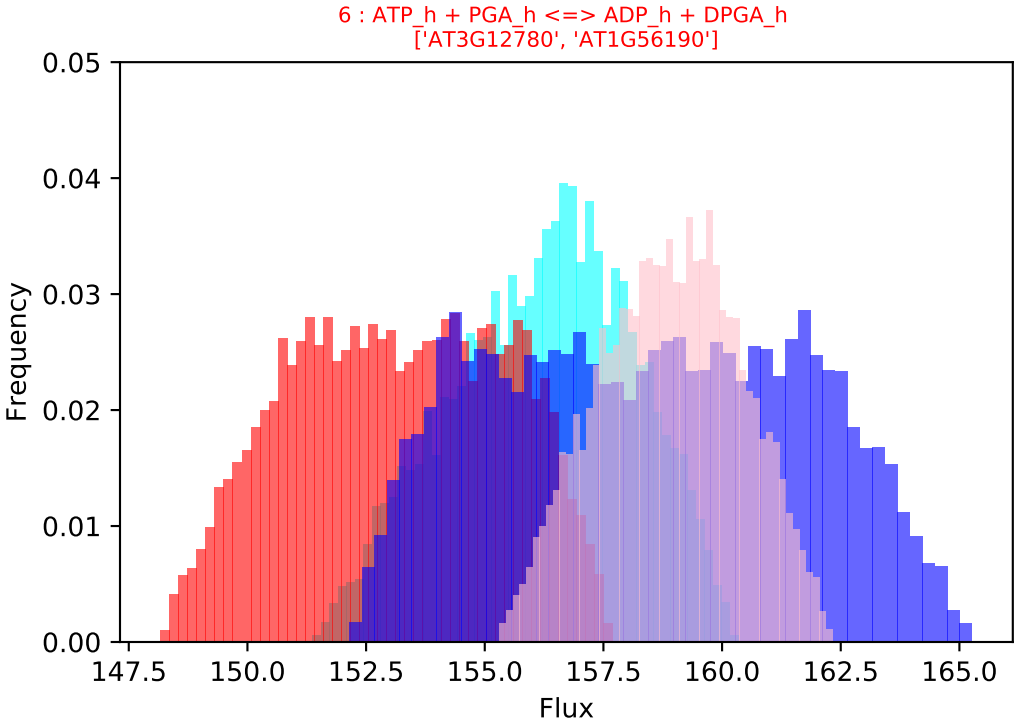

1 : 2.0 H_h + 2.0 PCox_h + PQH2_h --> 4.0 H_l + 2.0 PCrd_h + PQ_h
['ATCG00600', 'ATCG00730', '2*ATCG00540', 'ATCG00210', 'ATCG00590', 'AT2G26500', 'AT4G03280', 'ATCG00720']
Frequency
0.05
0.04
0.03
0.02
0.01
0.00
185
190
195
200
205
Flux

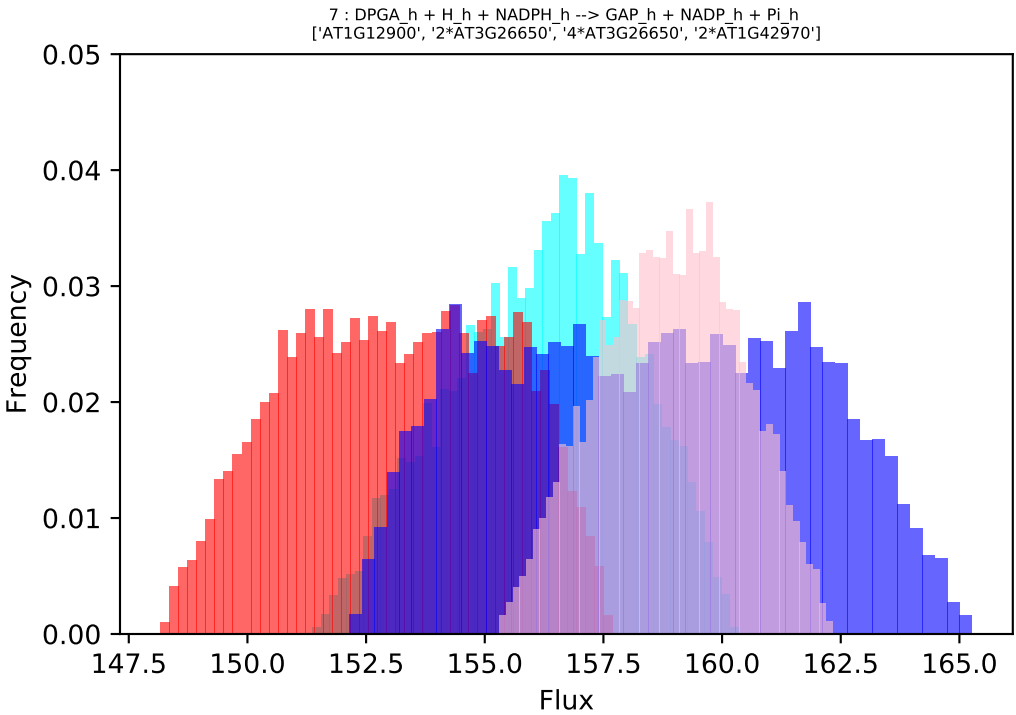

2 : Fdox_h + PCrd_h + hnu_h --> Fdrd_h + PCox_h
30', 'AT1G31330', 'AT2G46820', 'ATCG00630', 'ATCG00340', 'ATCG00350', 'AT1G30380', 'AT4G12800', 'ATCG01060', 'AT3G16140', 'AT4G02770'
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
370
380
390
400
410
Flux

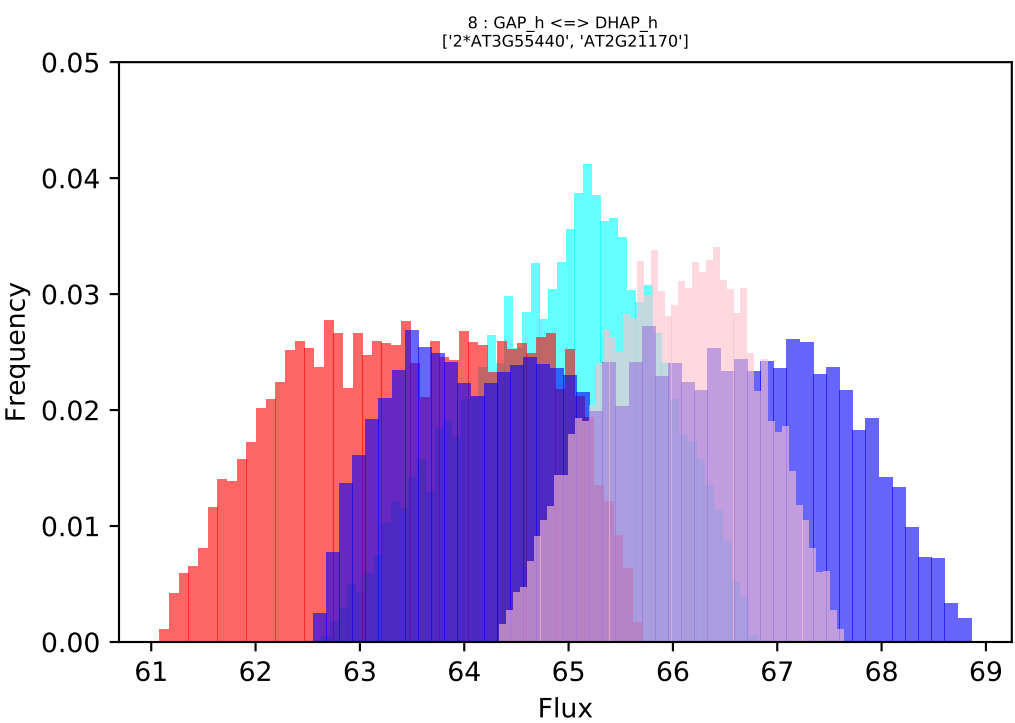

3 : 2.0 Fdrd_h + H_h + NADP_h --> 2.0 Fdox_h + NADPH_h
['AT5G66190', 'AT1G20020']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
150
155
160
165
170
Flux

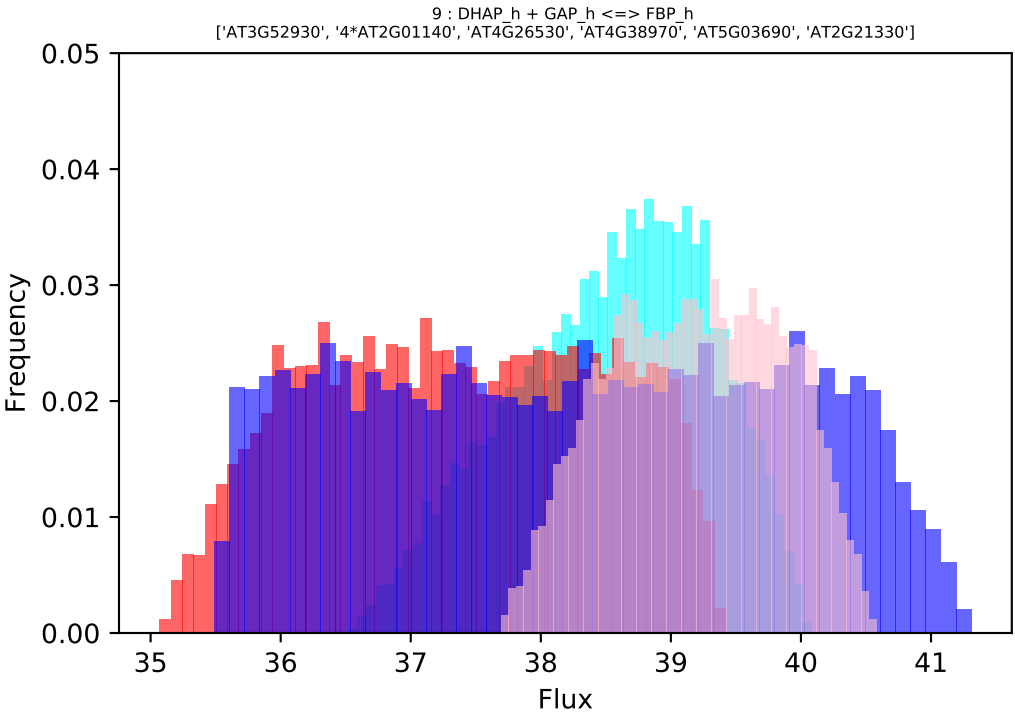

4 : 3.0 ADP_h + 14.0 H_l + 3.0 Pi_h <=> 3.0 ATP_h + 3.0 H2O_h + 11.0 H_h
['AT5G66190', 'AT1G20020']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
80
82
84
86
88
Flux

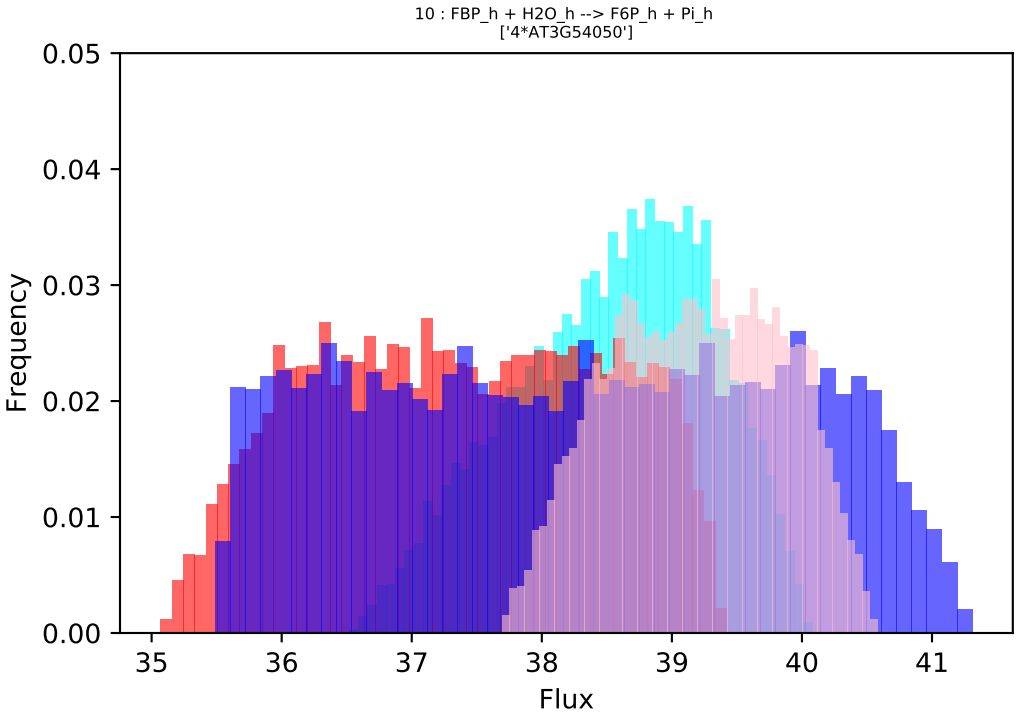

5 : CO2_h + H2O_h + RuBP_h --> 2.0 H_h + 2.0 PGA_h
['AT5G38410', 'AT5G38420', '8*AT5G38430', '8*ATCG00490', 'AT1G67090']
Frequency
0.05
0.04
0.03
0.02
0.01
0.00
78
79
80
81
82
Flux

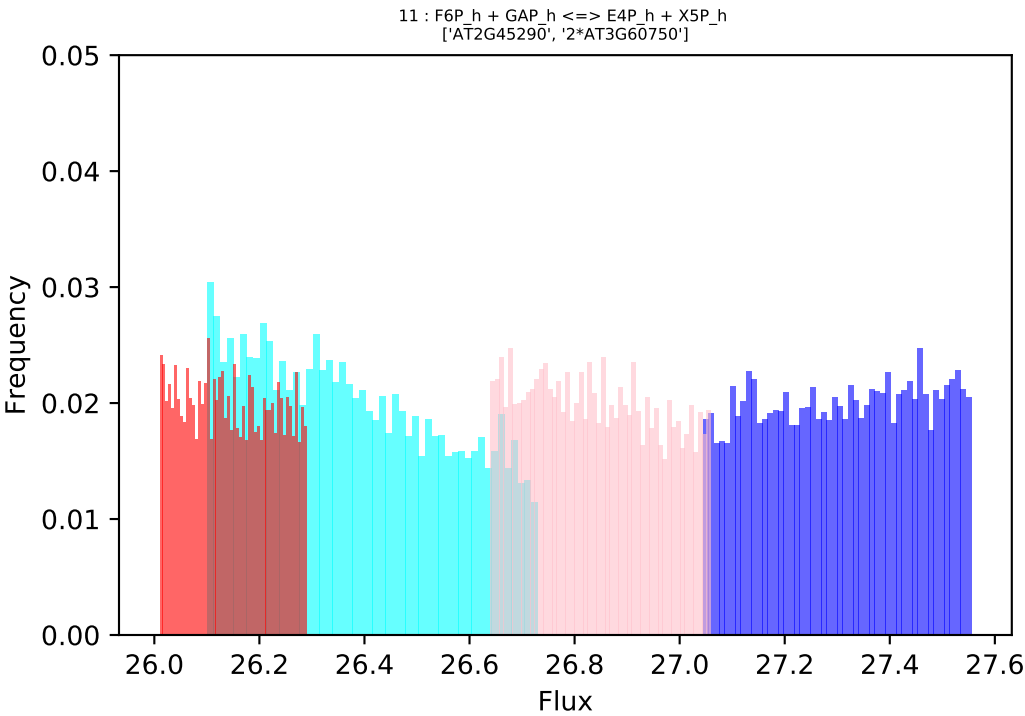

6 : ATP_h + PGA_h <=> ADP_h + DPGA_h
['AT3G12780', 'AT1G56190']
Frequency
Flux
0.05
0.04
0.03
0.02
0.01
0.00
147.5
150.0
152.5
155.0
157.5
160.0
162.5
165.0

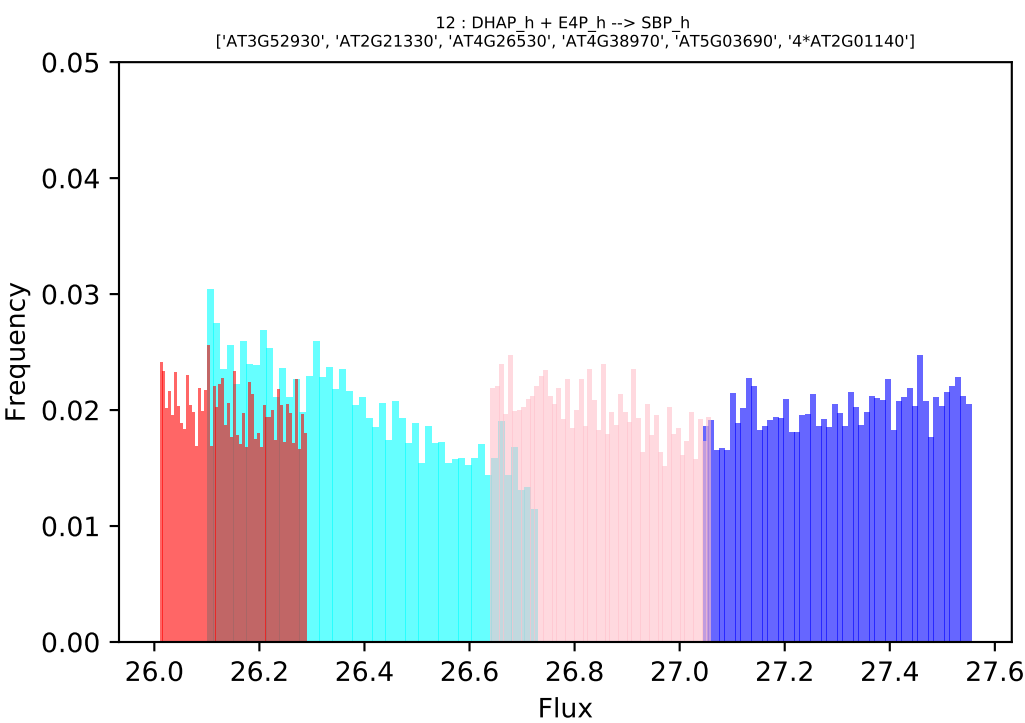

7 : DPGA_h + H_h + NADPH_h --> GAP_h + NADP_h + Pi_h
['AT1G12900', '2*AT3G26650', '4*AT3G26650', '2*AT1G42970']
Frequency
Flux
0.00
0.01
0.02
0.03
0.04
0.05
147.5
150.0
152.5
155.0
157.5
160.0
162.5
165.0

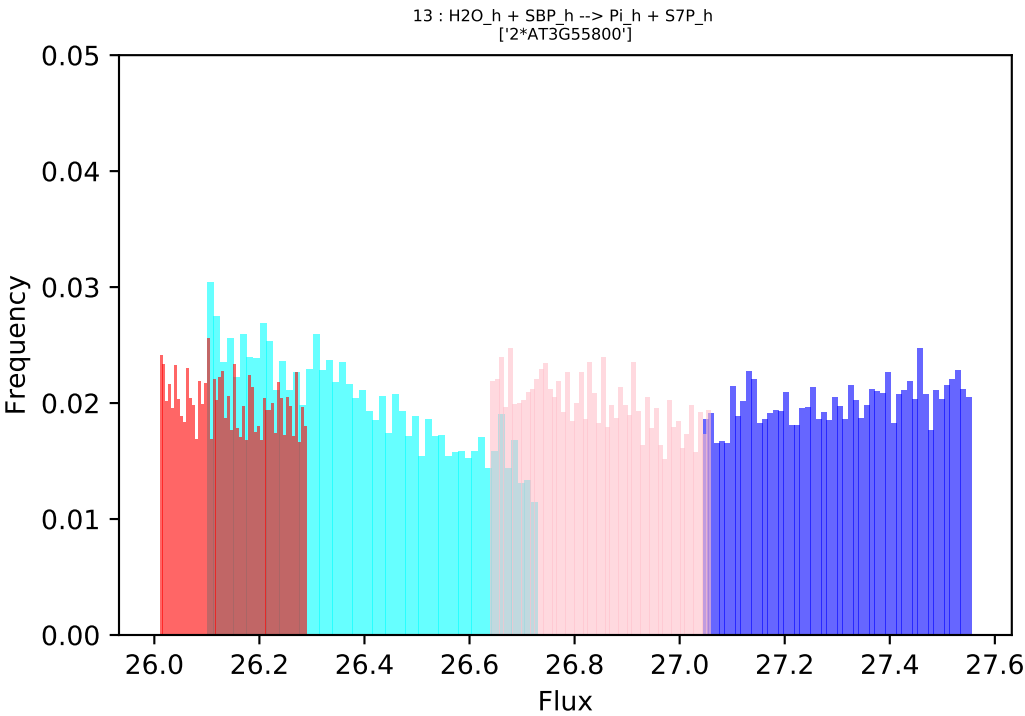

8 : GAP_h <=> DHAP_h
['2*AT3G55440', 'AT2G21170']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
61
62
63
64
65
66
67
68
69
Flux

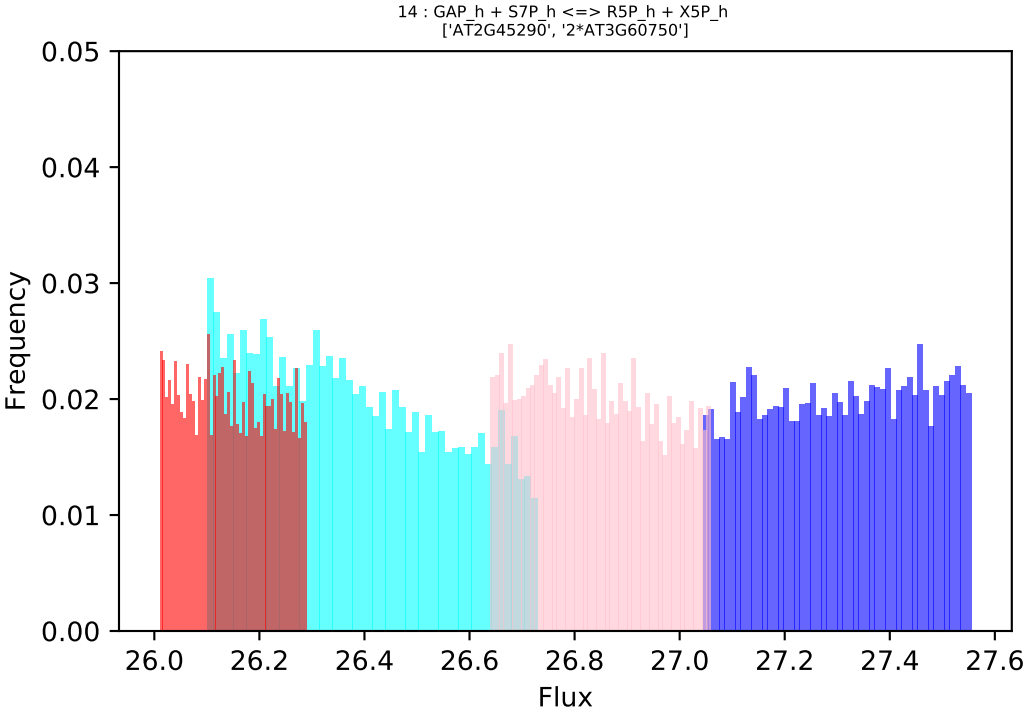

9 : DHAP_h + GAP_h <=> FBP_h
['AT3G52930', '4*AT2G01140', 'AT4G26530', 'AT4G38970', 'AT5G03690', 'AT2G21330']
Frequency
0.05
0.04
0.03
0.02
0.01
0.00
35
36
37
38
39
40
41
Flux

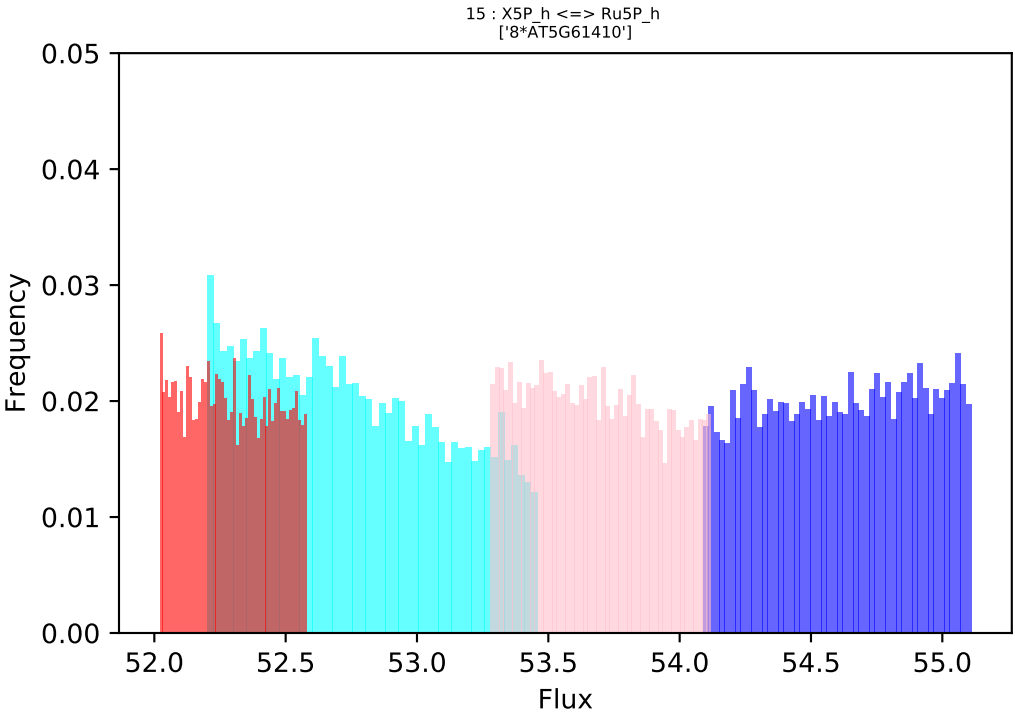

10 : FBP_h + H2O_h --> F6P_h + Pi_h
['4*AT3G54050']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
35
36
37
38
39
40
41
Flux

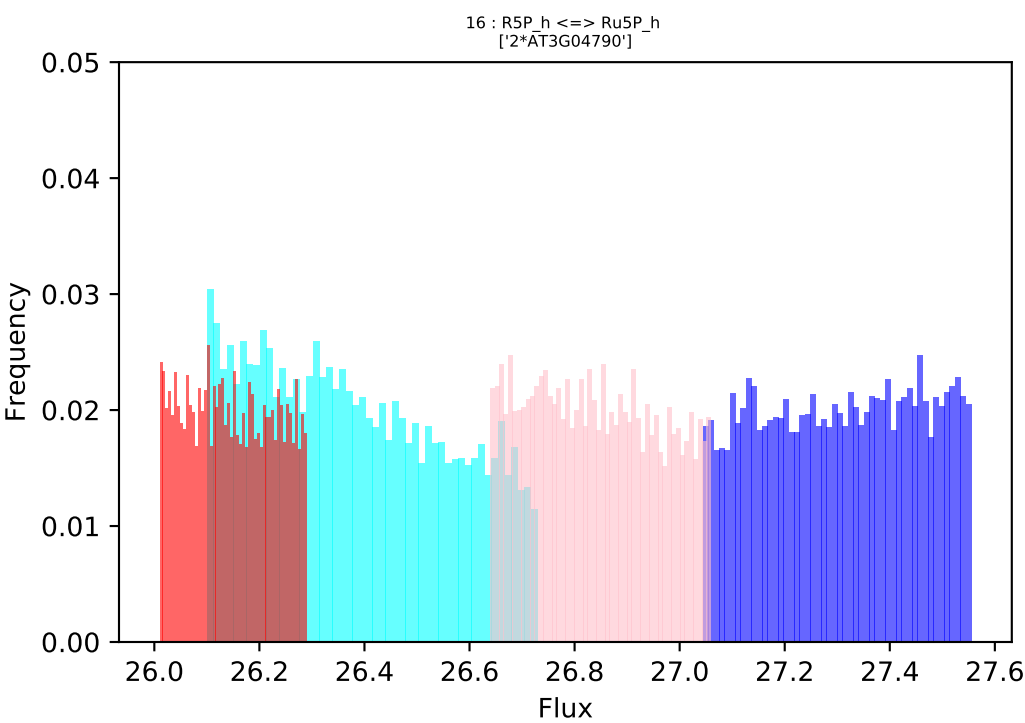

11 : F6P_h + GAP_h <=> E4P_h + X5P_h
['AT2G45290', '2*AT3G60750']
Frequency
Flux
0.00
0.01
0.02
0.03
0.04
0.05
26.0
26.2
26.4
26.6
26.8
27.0
27.2
27.4
27.6

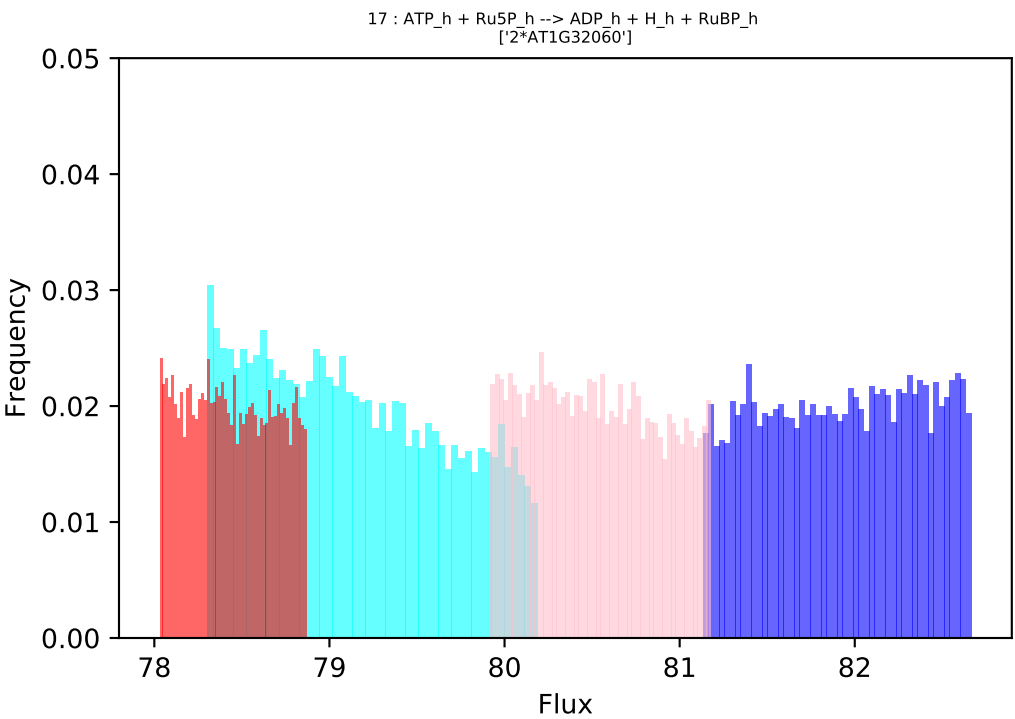

12 : DHAP_h + E4P_h --> SBP_h
['AT3G52930', 'AT2G21330', 'AT4G26530', 'AT4G38970', 'AT5G03690', '4*AT2G01140']
Frequency
0.05
0.04
0.03
0.02
0.01
0.00
26.0
26.2
26.4
26.6
26.8
27.0
27.2
27.4
27.6
Flux

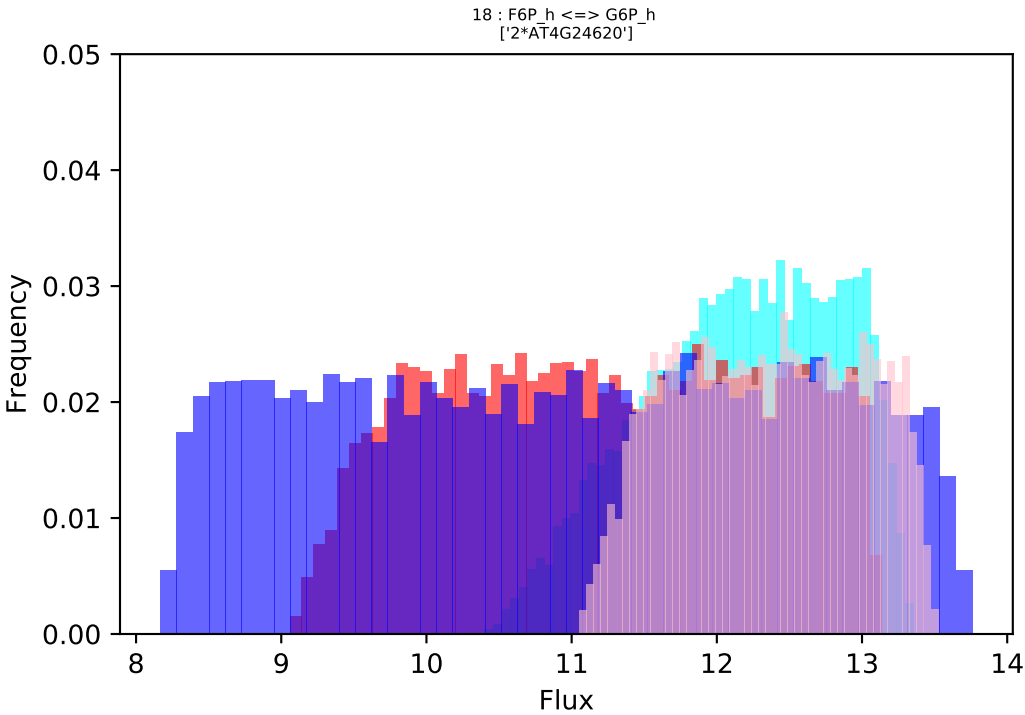

13 : H2O_h + SBP_h --> Pi_h + S7P_h
['2*AT3G55800']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
26.0
26.2
26.4
26.6
26.8
27.0
27.2
27.4
27.6
Flux

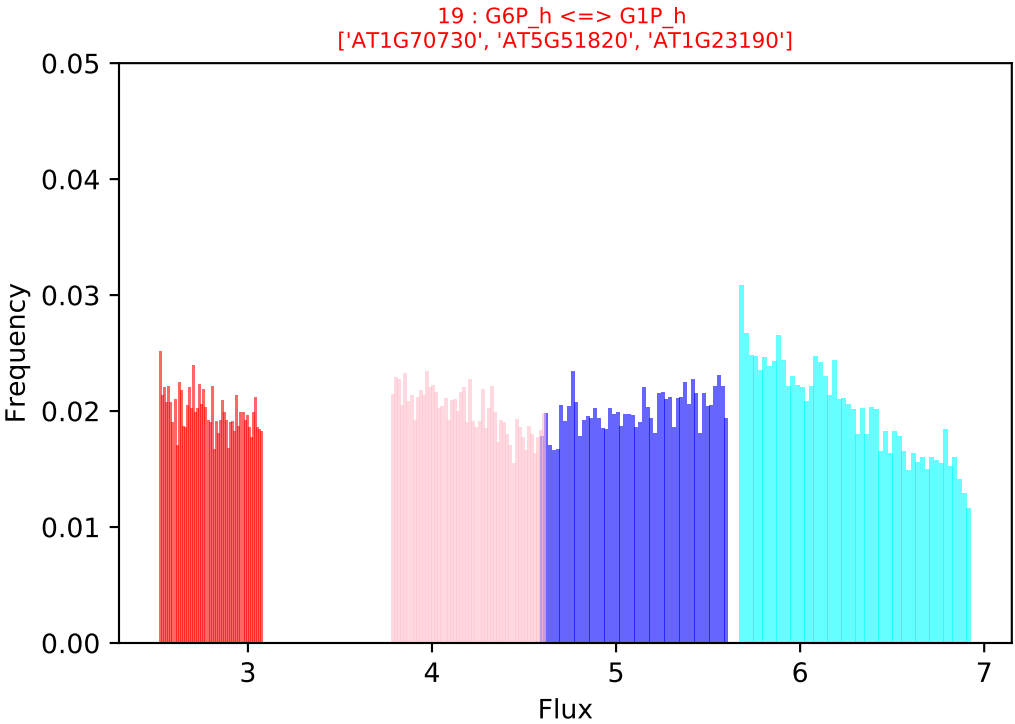

14 : GAP_h + S7P_h <=> R5P_h + X5P_h
['AT2G45290', '2*AT3G60750']
Frequency
Flux
0.00
0.01
0.02
0.03
0.04
0.05
26.0
26.2
26.4
26.6
26.8
27.0
27.2
27.4
27.6

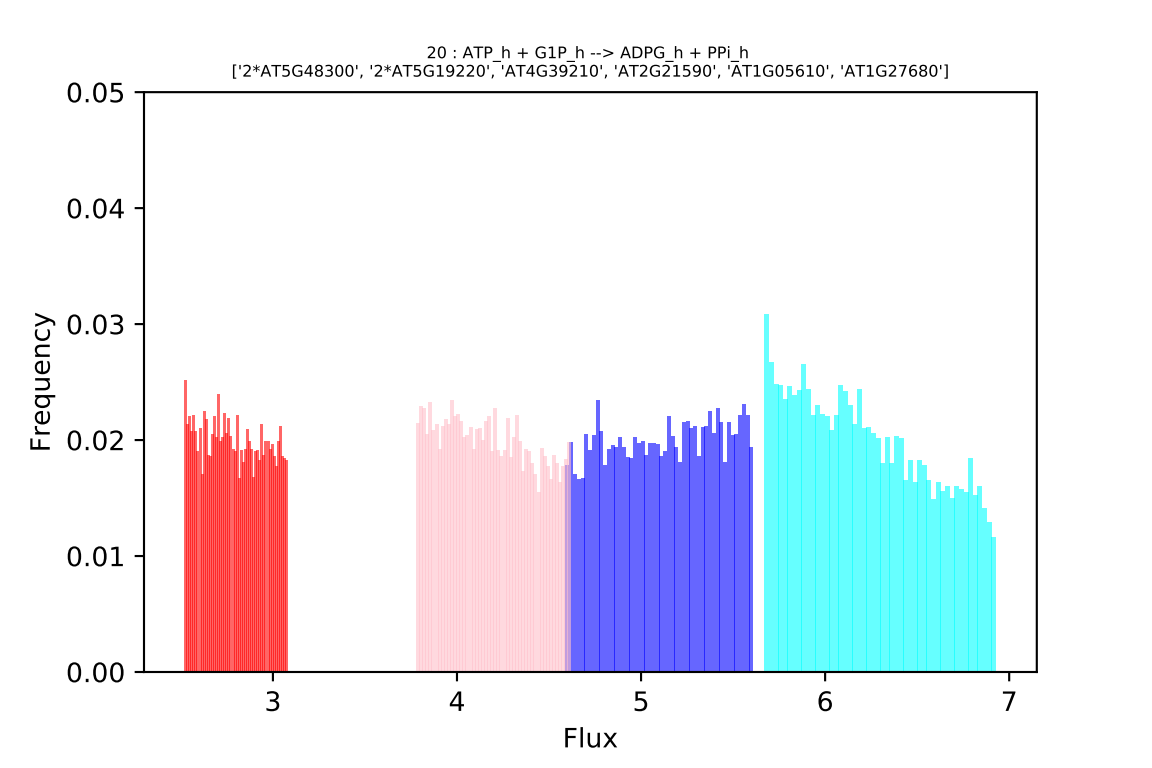

15 : X5P_h <=> Ru5P_h
['8*AT5G61410']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
52.0
52.5
53.0
53.5
54.0
54.5
55.0
Flux

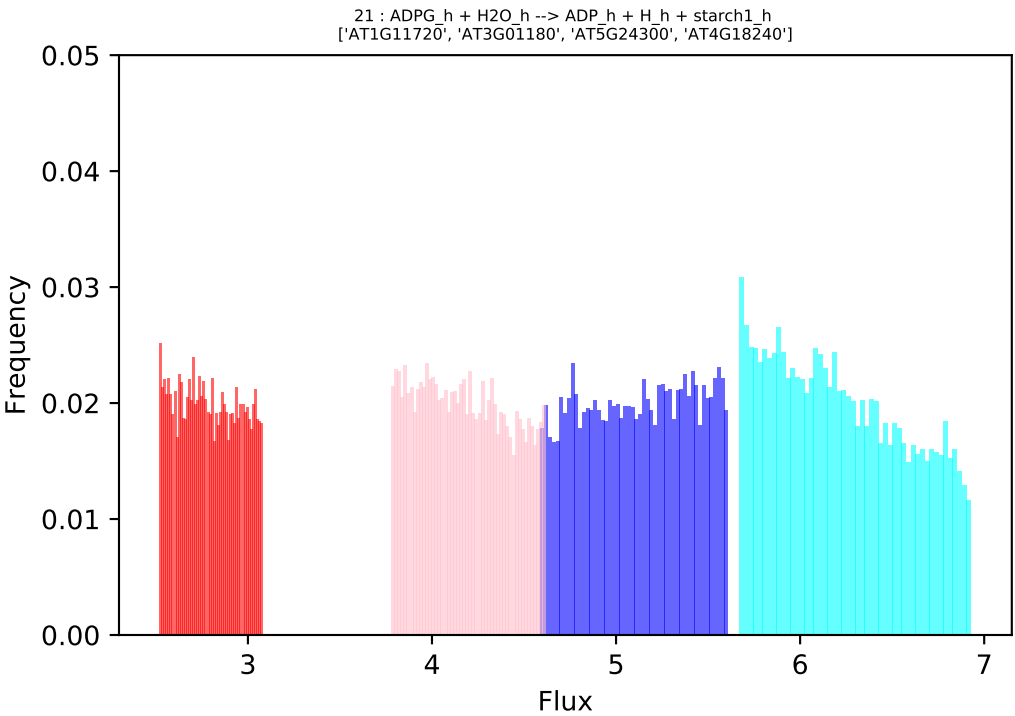

16 : R5P_h <=> Ru5P_h
['2*AT3G04790']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
26.0
26.2
26.4
26.6
26.8
27.0
27.2
27.4
27.6
Flux

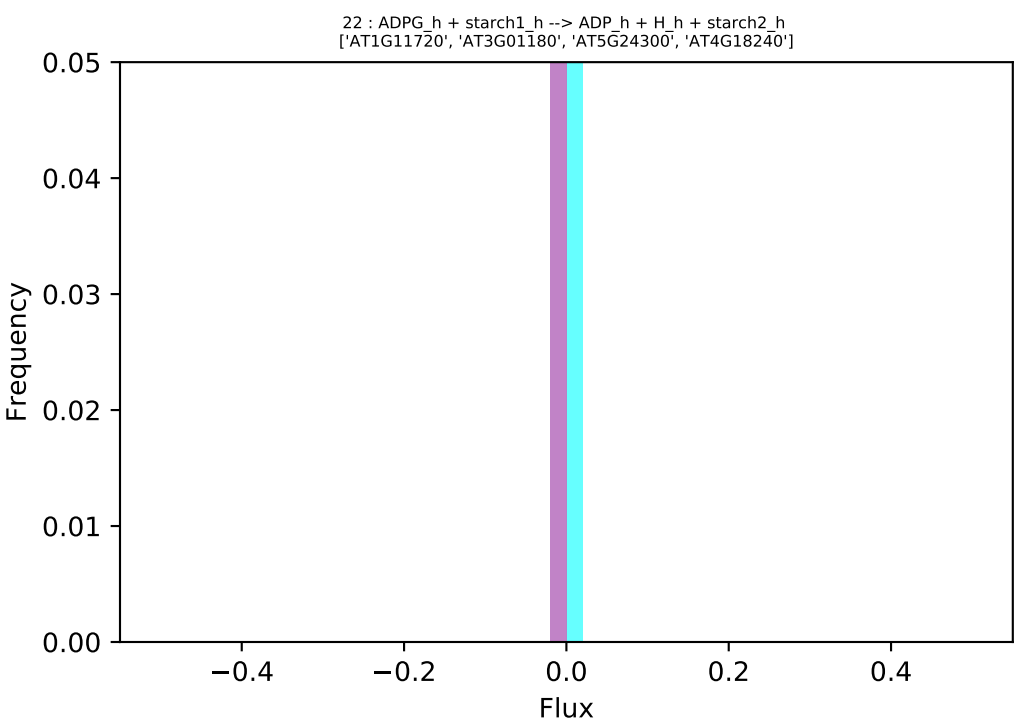

17 : ATP_h + Ru5P_h --> ADP_h + H_h + RuBP_h
['2*AT1G32060']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
78
79
80
81
82
Flux

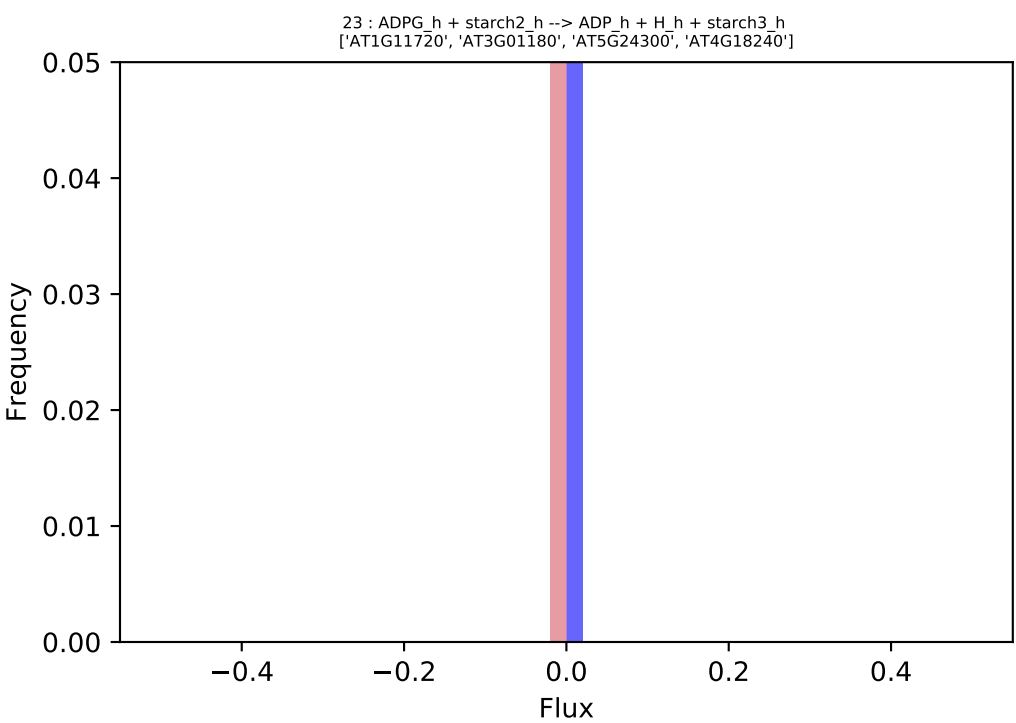

18 : F6P_h <=> G6P_h
['2*AT4G24620']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
8
9
10
11
12
13
14
Flux

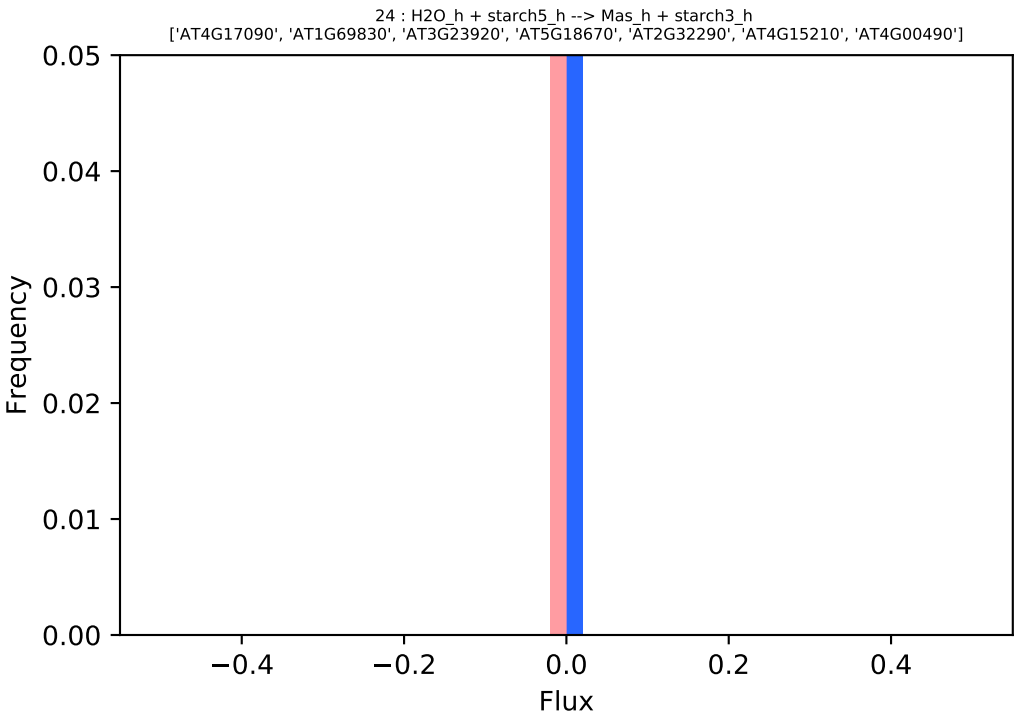

19 : G6P_h <=> G1P_h
['AT1G70730', 'AT5G51820', 'AT1G23190']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
3
4
5
6
7
Flux

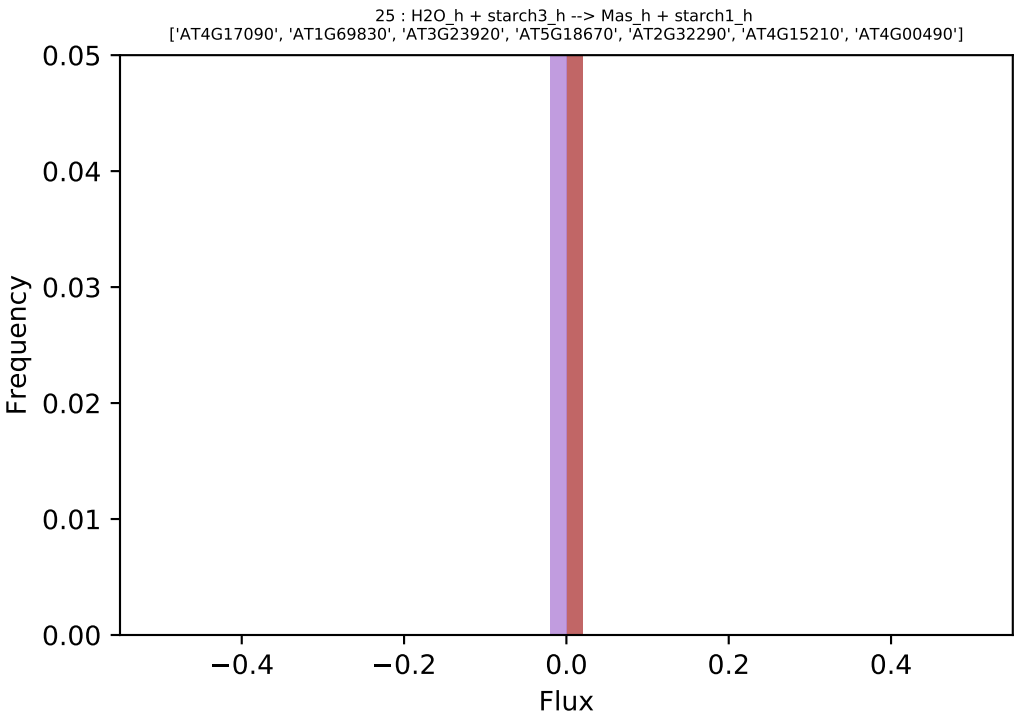

20 : ATP_h + G1P_h --> ADPG_h + PPi_h
['2*AT5G48300', '2*AT5G19220', 'AT4G39210', 'AT2G21590', 'AT1G05610', 'AT1G27680']
Frequency
0.05
0.04
0.03
0.02
0.01
0.00
3
4
5
6
7
Flux

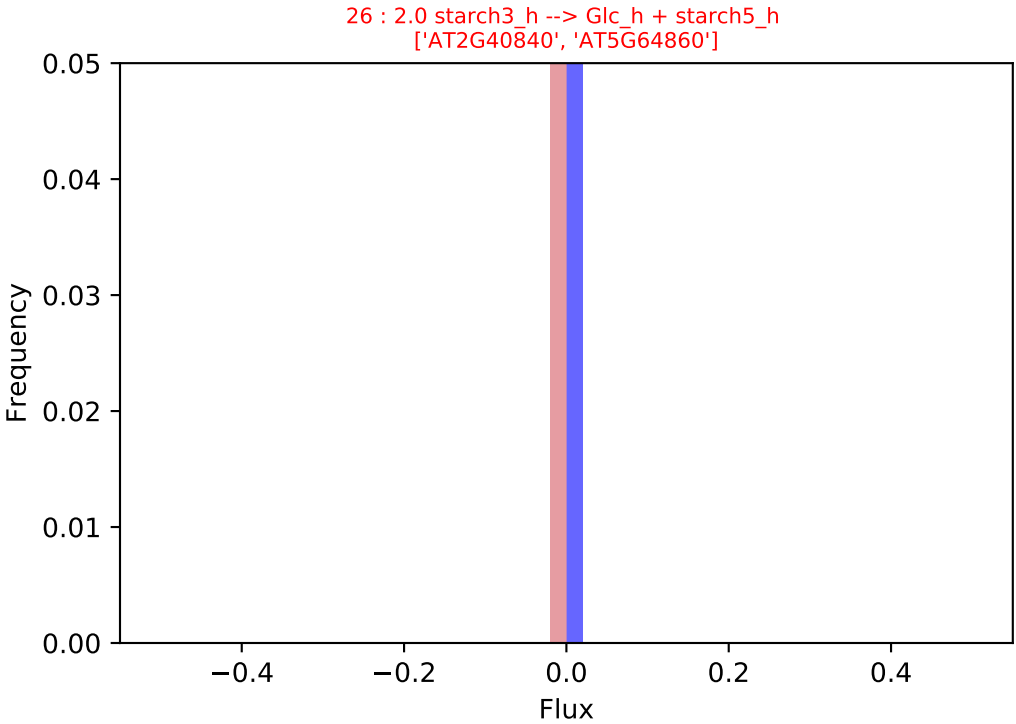

21 : ADPG_h + H2O_h --> ADP_h + H_h + starch1_h
['AT1G11720', 'AT3G01180', 'AT5G24300', 'AT4G18240']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
3
4
5
6
7
Flux

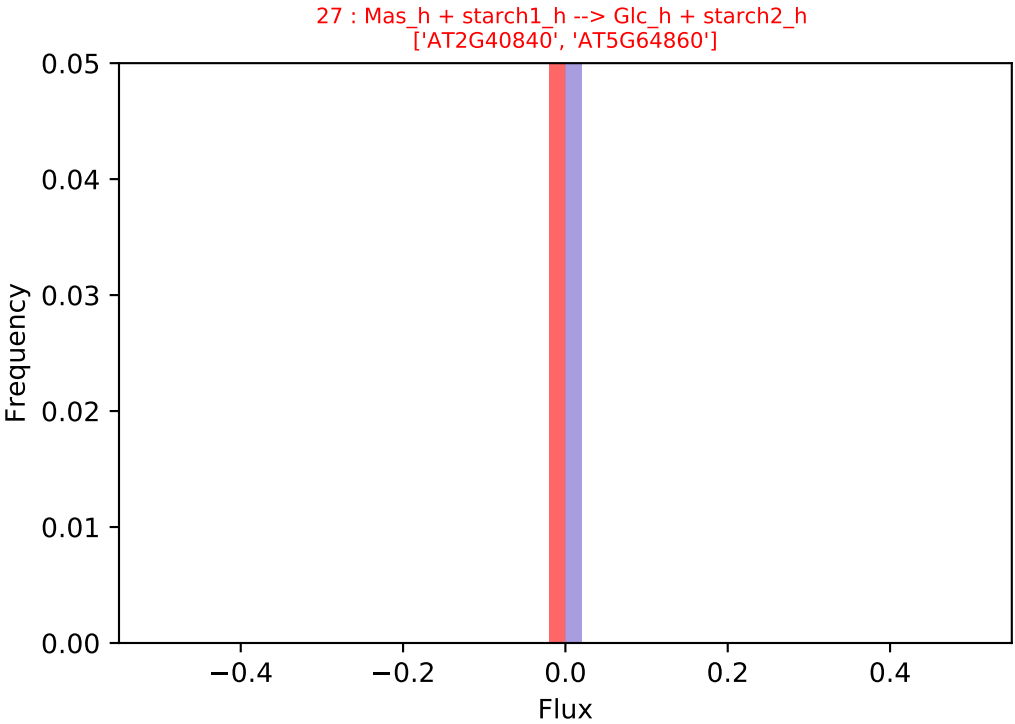

22 : ADPG_h + starch1_h --> ADP_h + H_h + starch2_h
['AT1G11720', 'AT3G01180', 'AT5G24300', 'AT4G18240']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

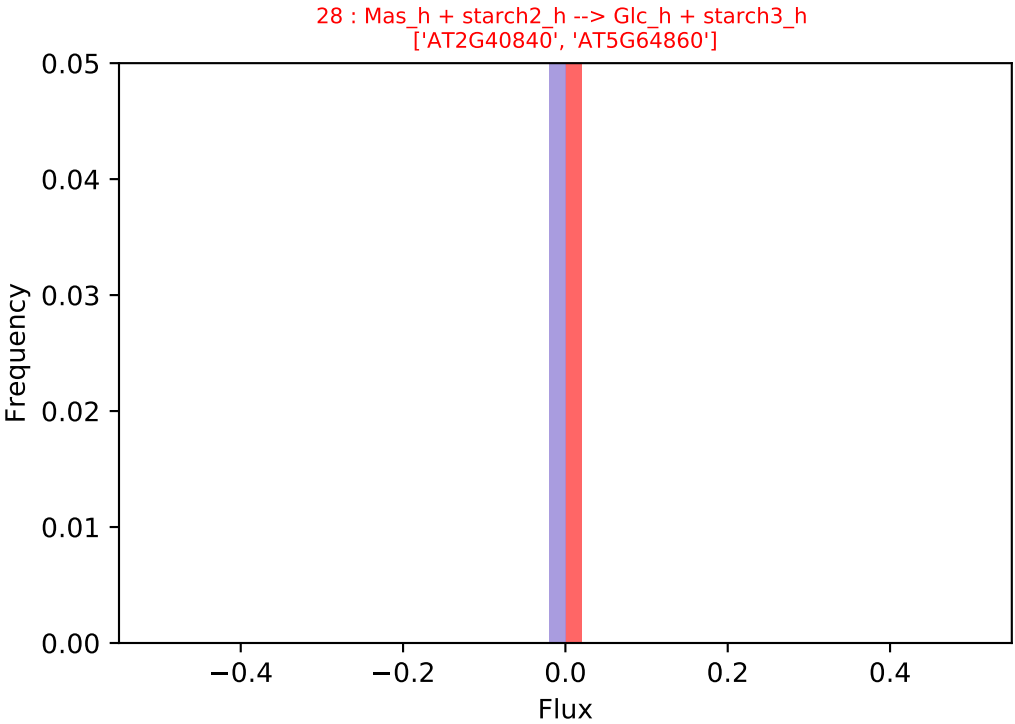

23 : ADPG_h + starch2_h --> ADP_h + H_h + starch3_h
['AT1G11720', 'AT3G01180', 'AT5G24300', 'AT4G18240']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

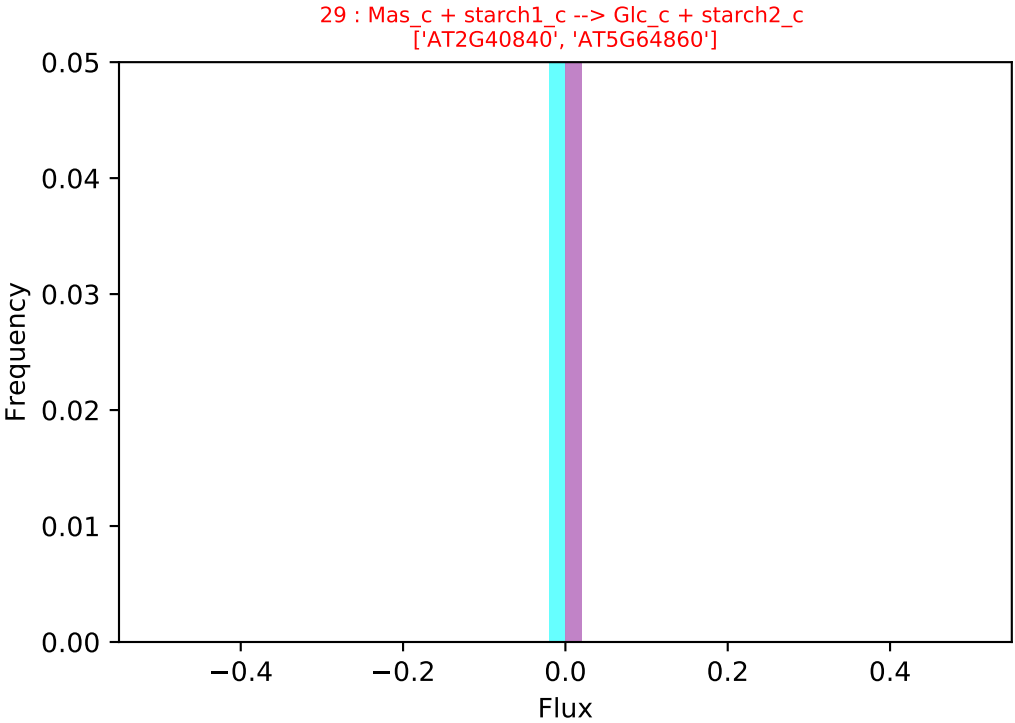

24 : H2O_h + starch5_h --> Mas_h + starch3_h
['AT4G17090', 'AT1G69830', 'AT3G23920', 'AT5G18670', 'AT2G32290', 'AT4G15210', 'AT4G00490']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

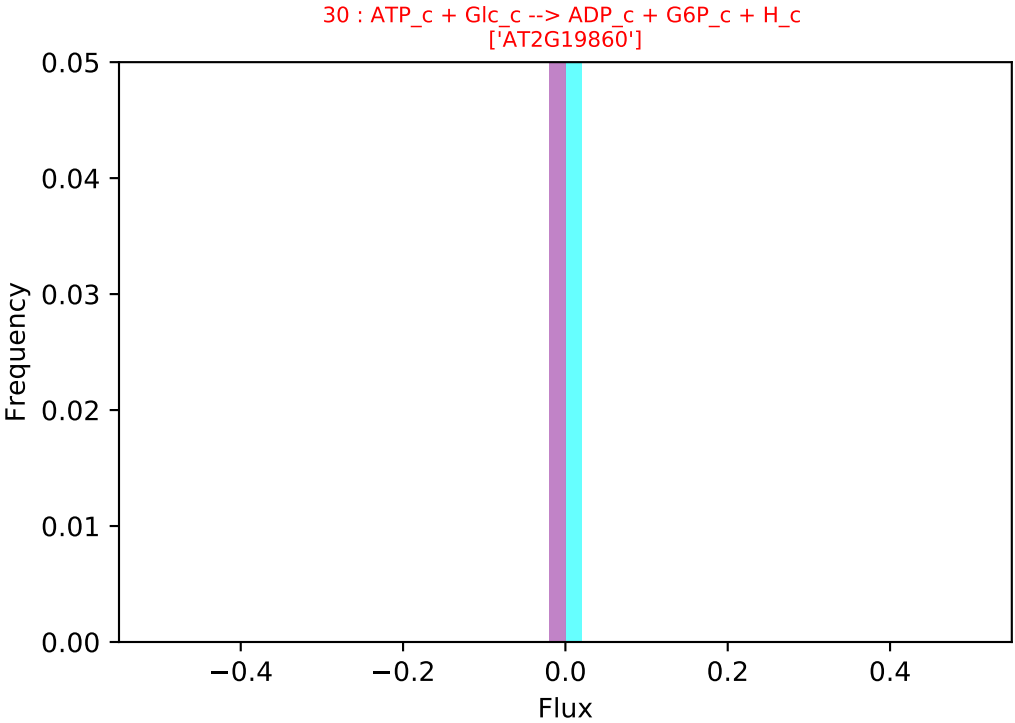

25 : H2O_h + starch3_h --> Mas_h + starch1_h
['AT4G17090', 'AT1G69830', 'AT3G23920', 'AT5G18670', 'AT2G32290', 'AT4G15210', 'AT4G00490']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

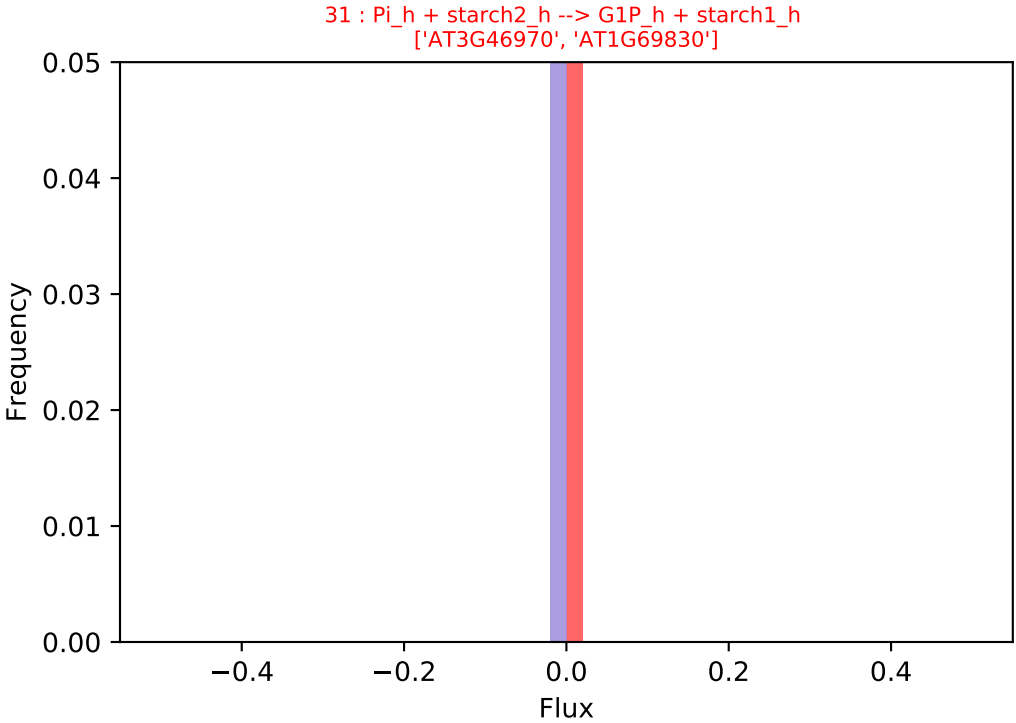

26 : 2.0 starch3_h --> Glc_h + starch5_h
['AT2G40840', 'AT5G64860']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

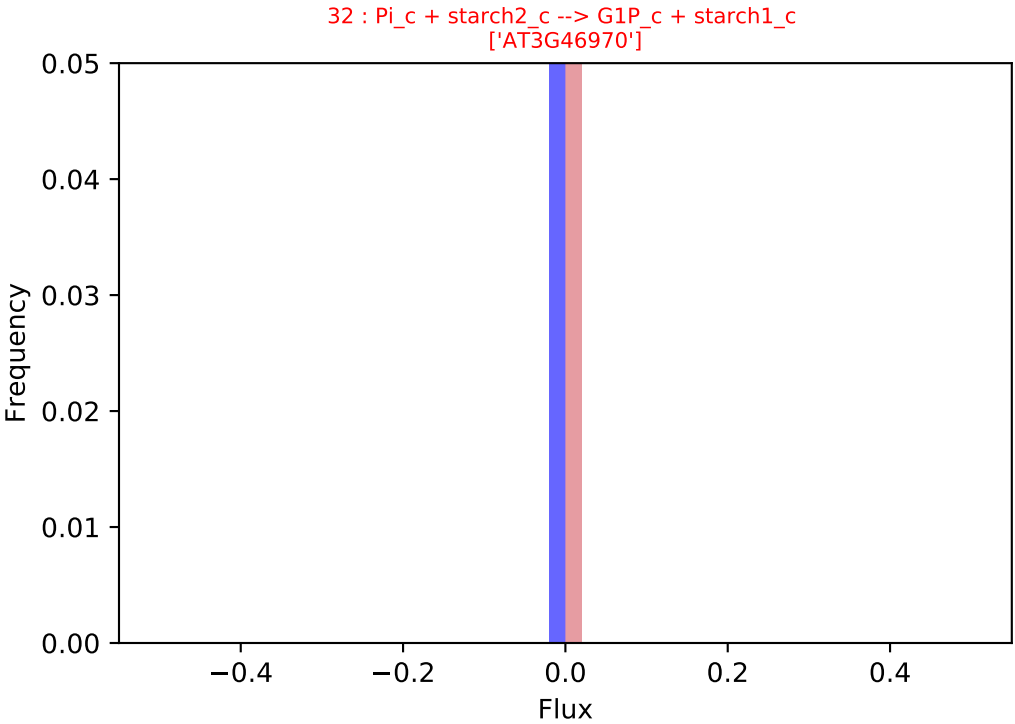

27 : Mas_h + starch1_h --> Glc_h + starch2_h
['AT2G40840', 'AT5G64860']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

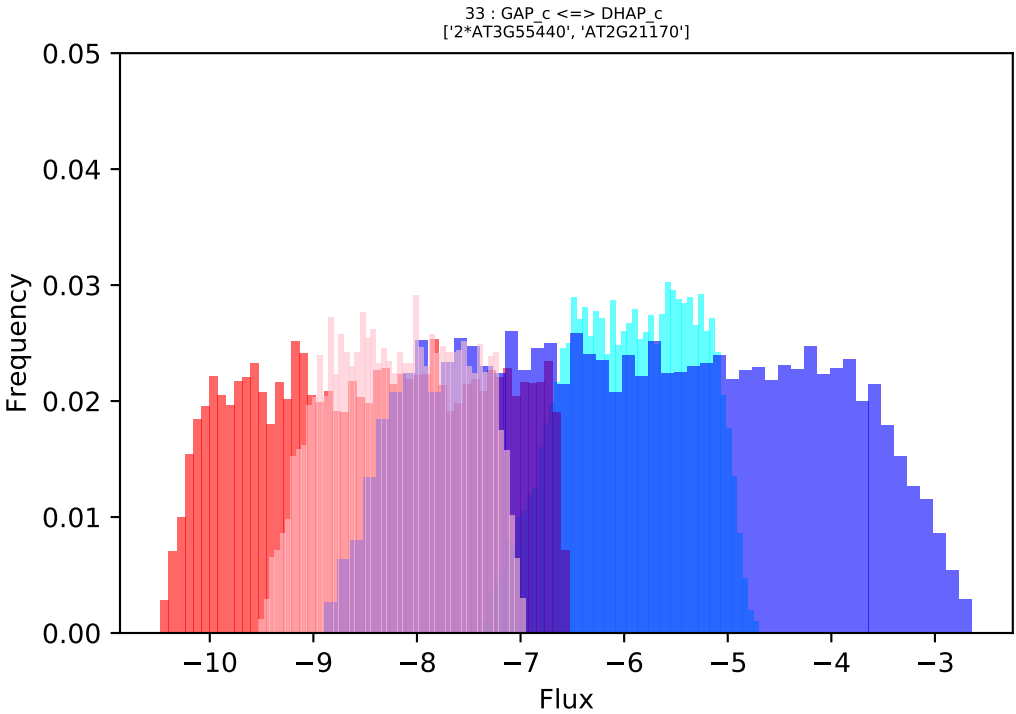

28 : Mas_h + starch2_h --> Glc_h + starch3_h
['AT2G40840', 'AT5G64860']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

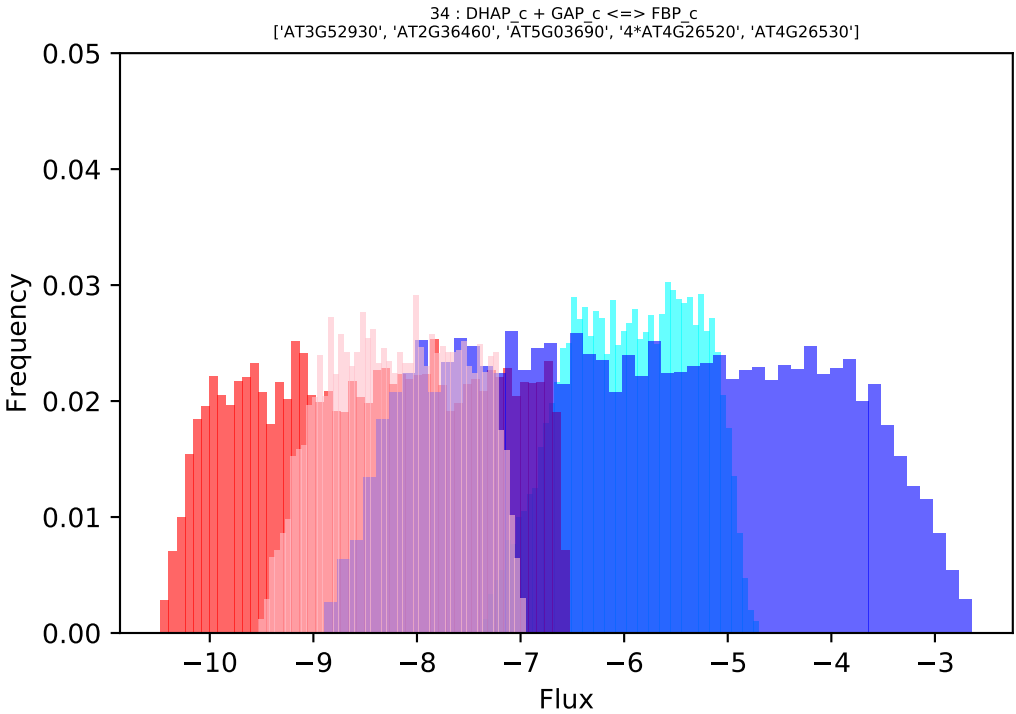

29 : Mas_c + starch1_c --> Glc_c + starch2_c
['AT2G40840', 'AT5G64860']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

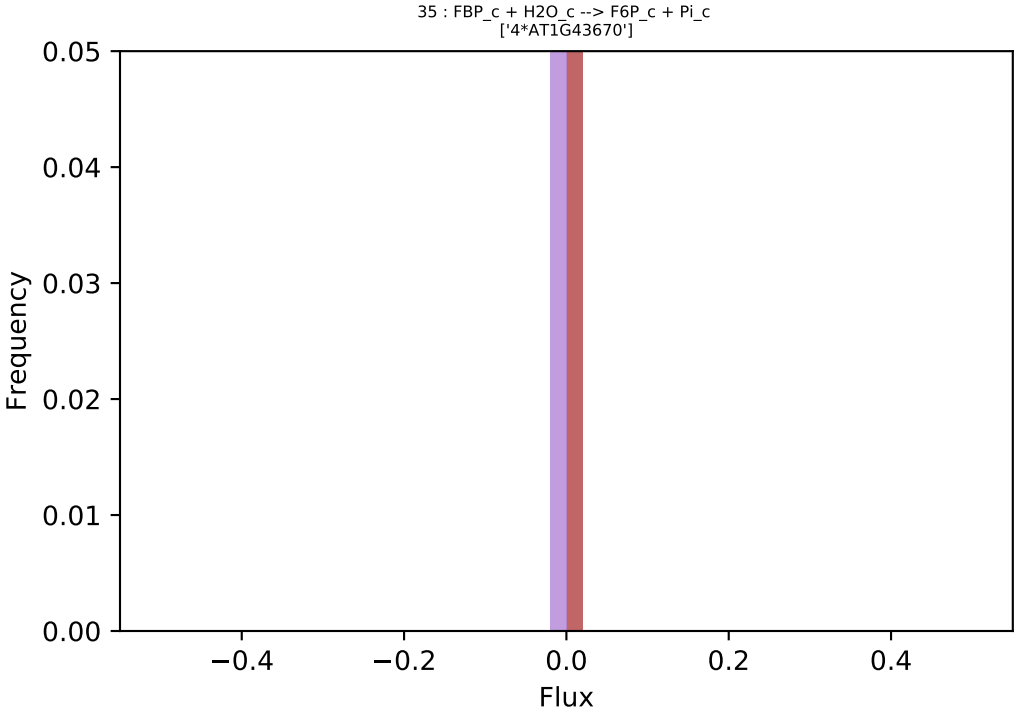

30 : ATP_c + Glc_c --> ADP_c + G6P_c + H_c
['AT2G19860']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

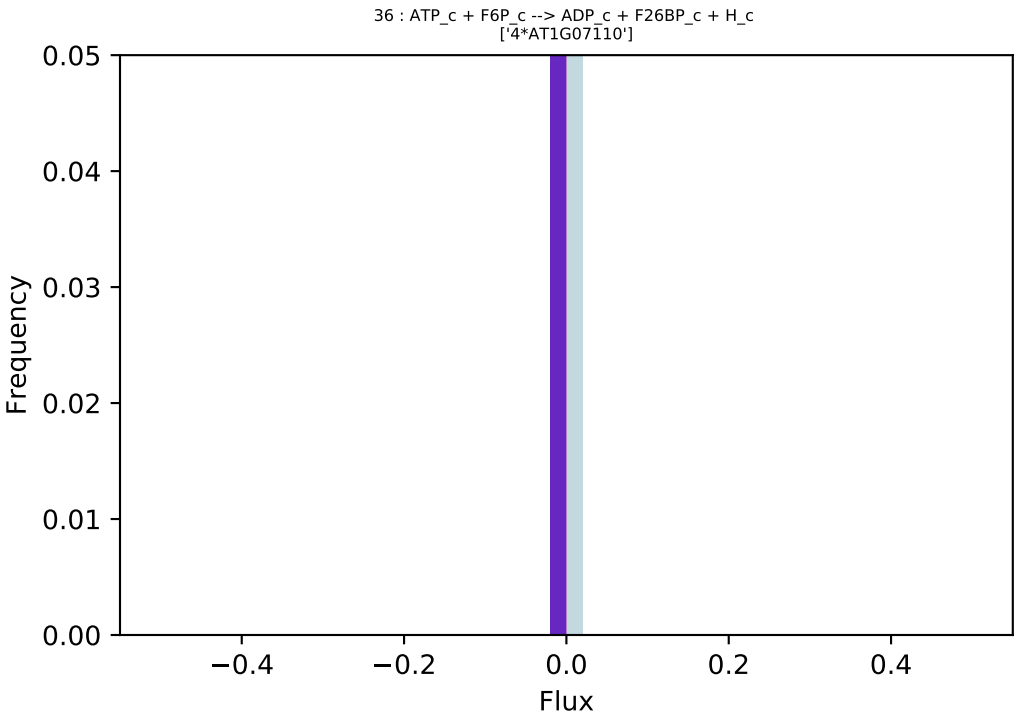

31 : Pi_h + starch2_h --> G1P_h + starch1_h
['AT3G46970', 'AT1G69830']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

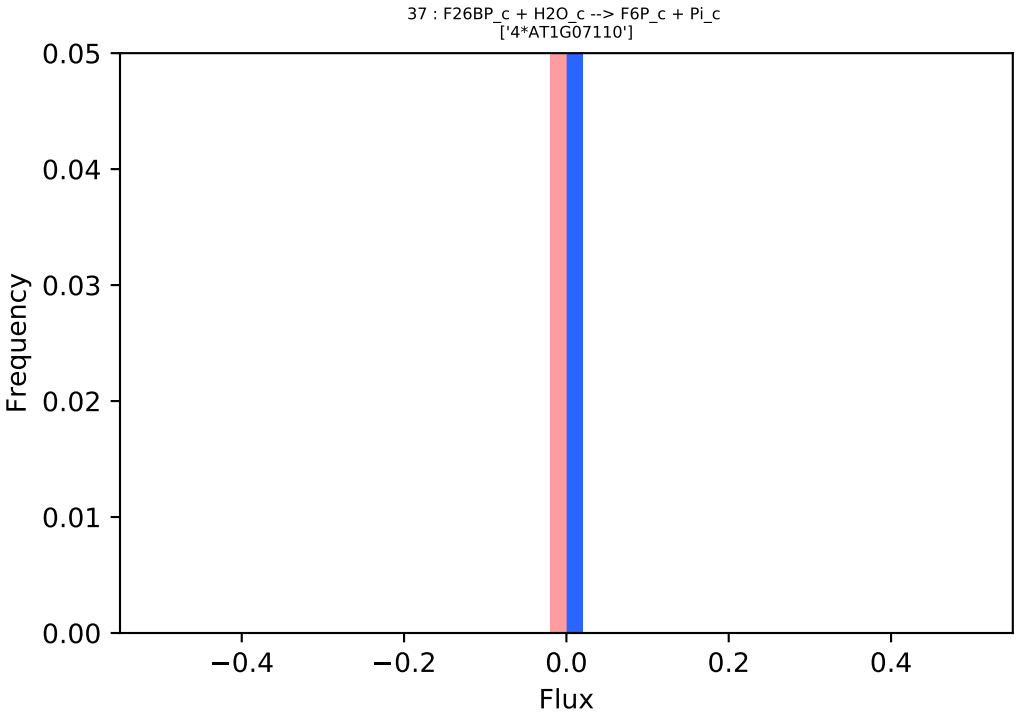

32 : Pi_c + starch2_c --> G1P_c + starch1_c
['AT3G46970']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

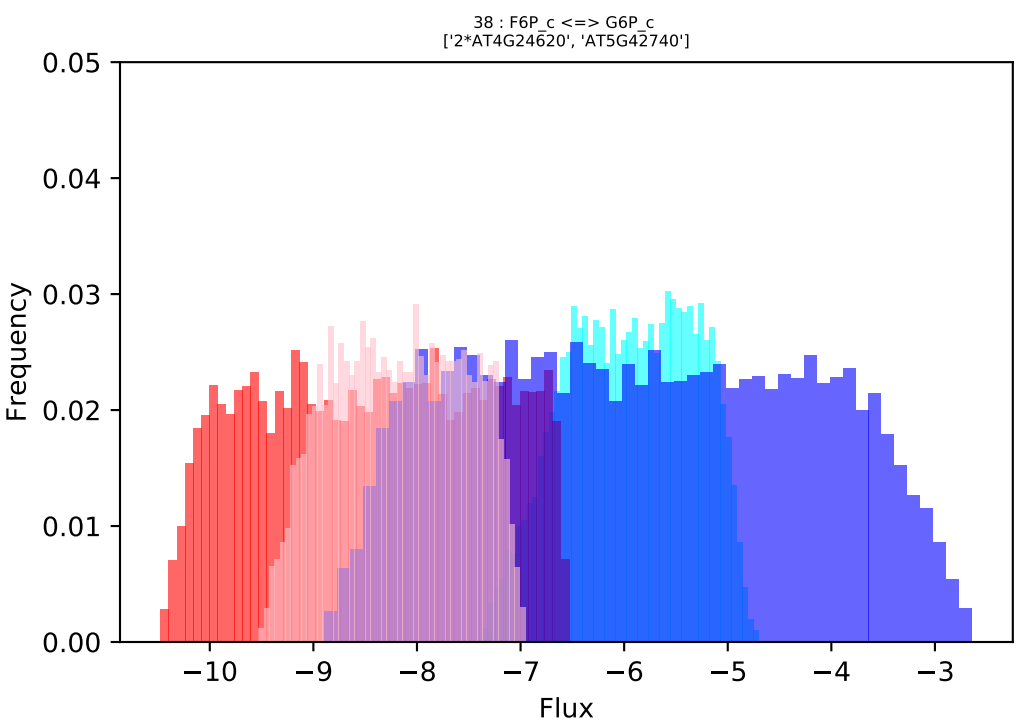

33 : GAP_c <=> DHAP_c
['2*AT3G55440', 'AT2G21170']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−10
−9
−8
−7
−6
−5
−4
−3
Flux

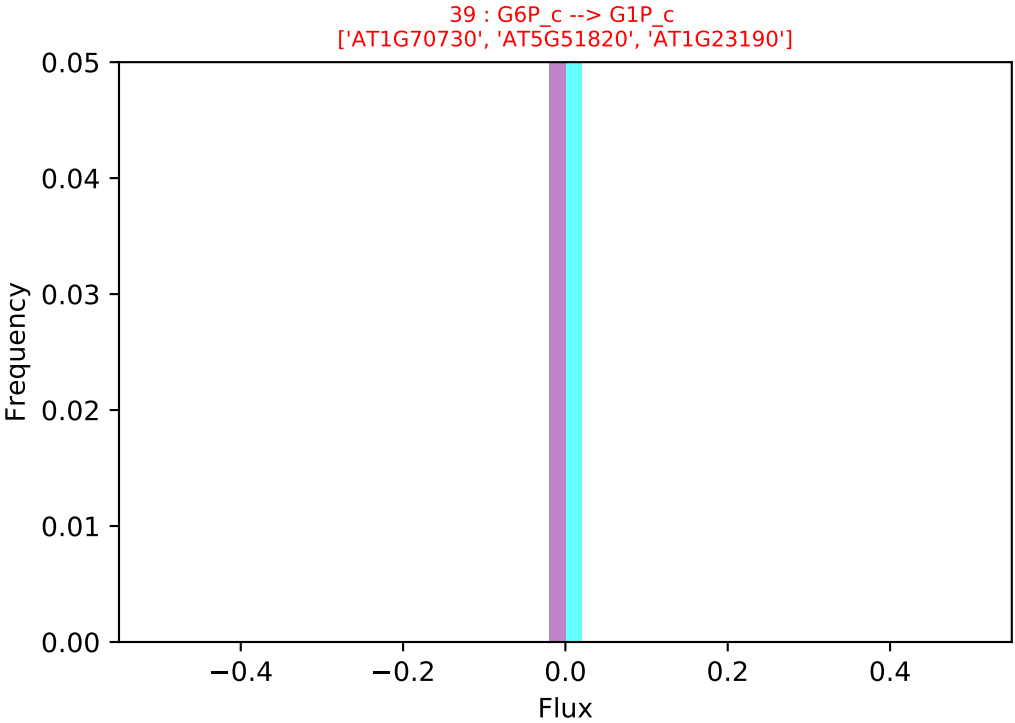

34 : DHAP_c + GAP_c <=> FBP_c
['AT3G52930', 'AT2G36460', 'AT5G03690', '4*AT4G26520', 'AT4G26530']
Frequency
0.05
0.04
0.03
0.02
0.01
0.00
−10
−9
−8
−7
−6
−5
−4
−3
Flux

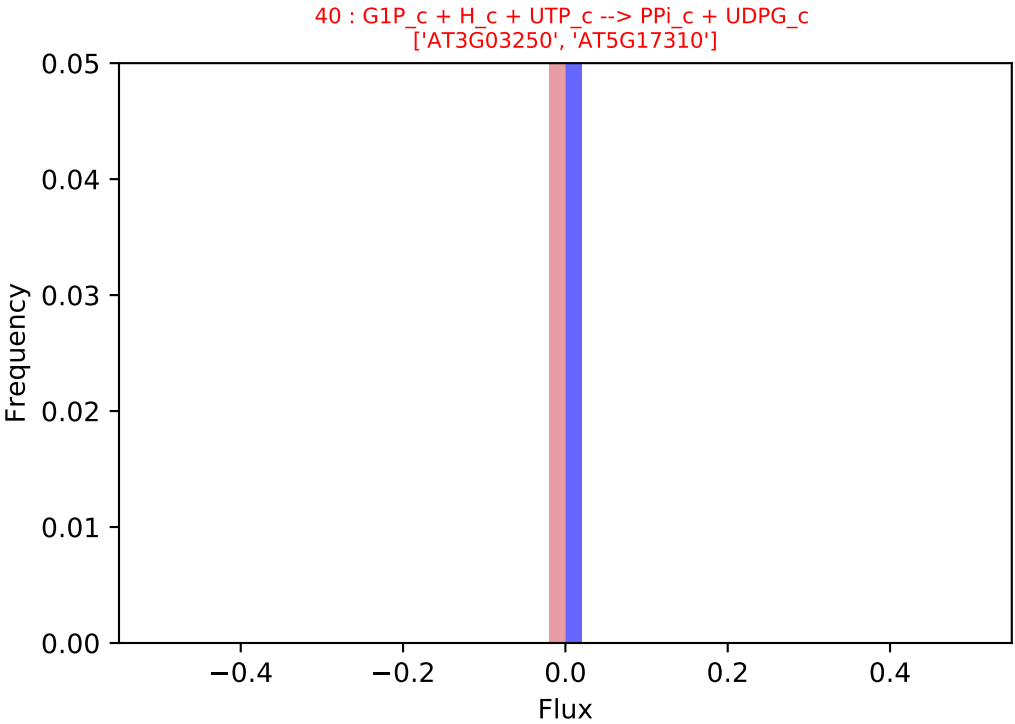

35 : FBP_c + H2O_c --> F6P_c + Pi_c
['4*AT1G43670']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

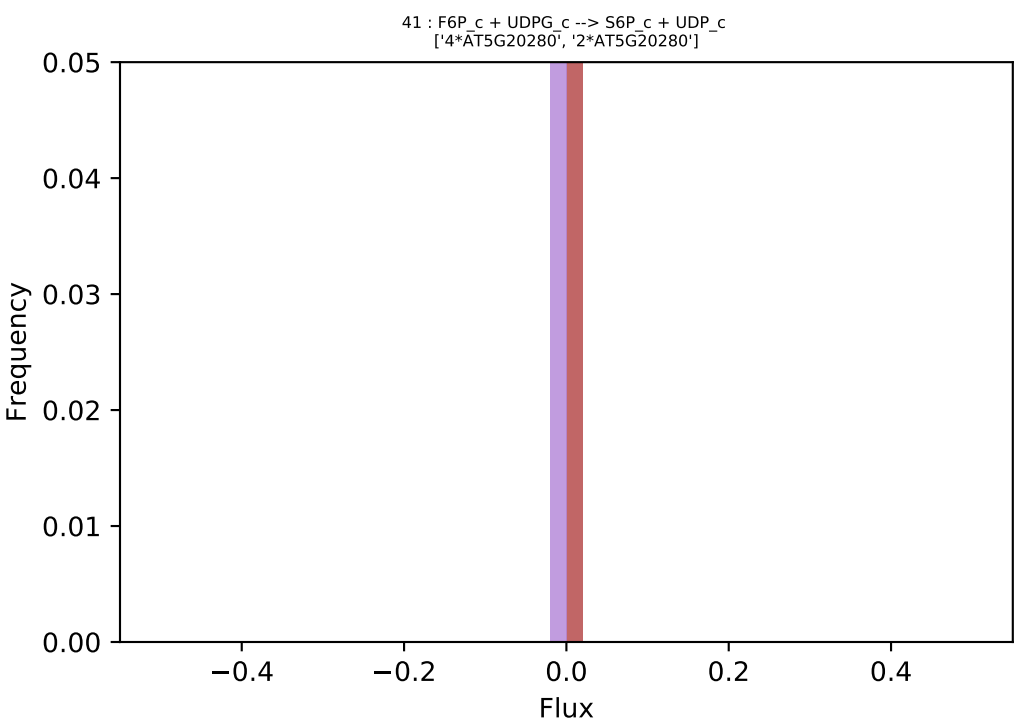

36 : ATP_c + F6P_c --> ADP_c + F26BP_c + H_c
['4*AT1G07110']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

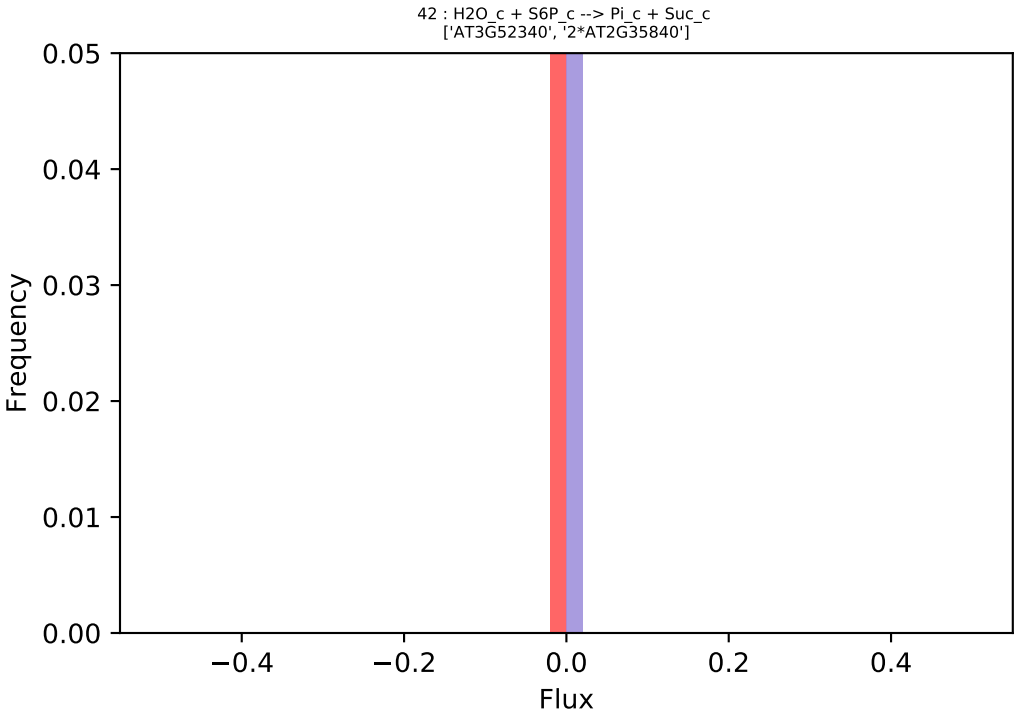

37 : F26BP_c + H2O_c --> F6P_c + Pi_c
['4*AT1G07110']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

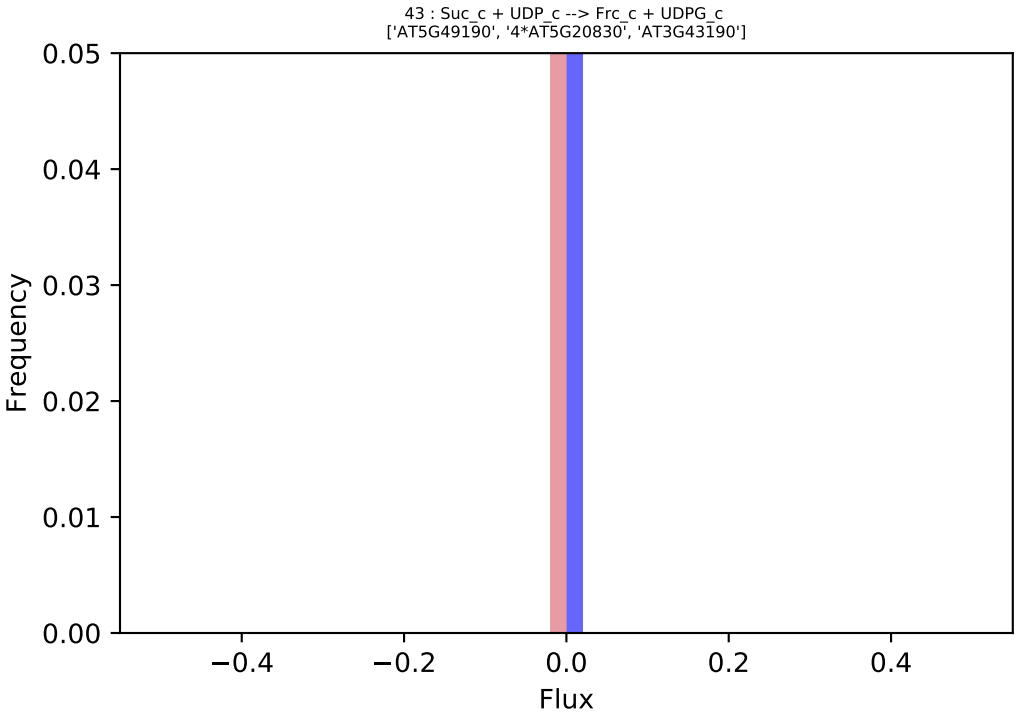

38 : F6P_c <=> G6P_c
['2*AT4G24620', 'AT5G42740']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−10
−9
−8
−7
−6
−5
−4
−3
Flux

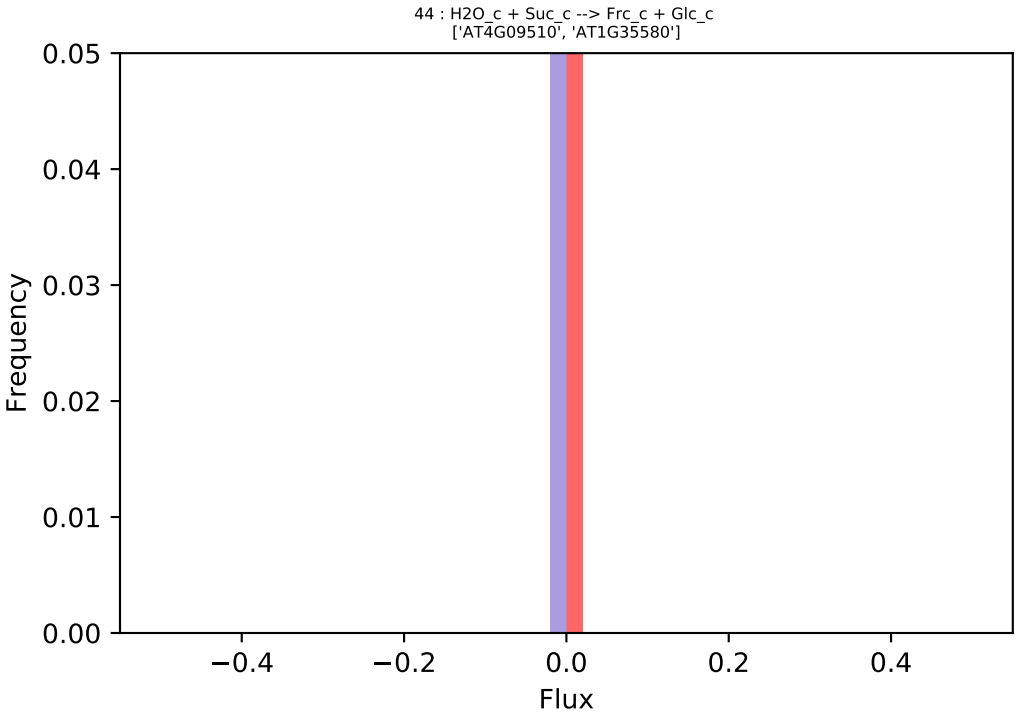

39 : G6P_c --> G1P_c
['AT1G70730', 'AT5G51820', 'AT1G23190']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

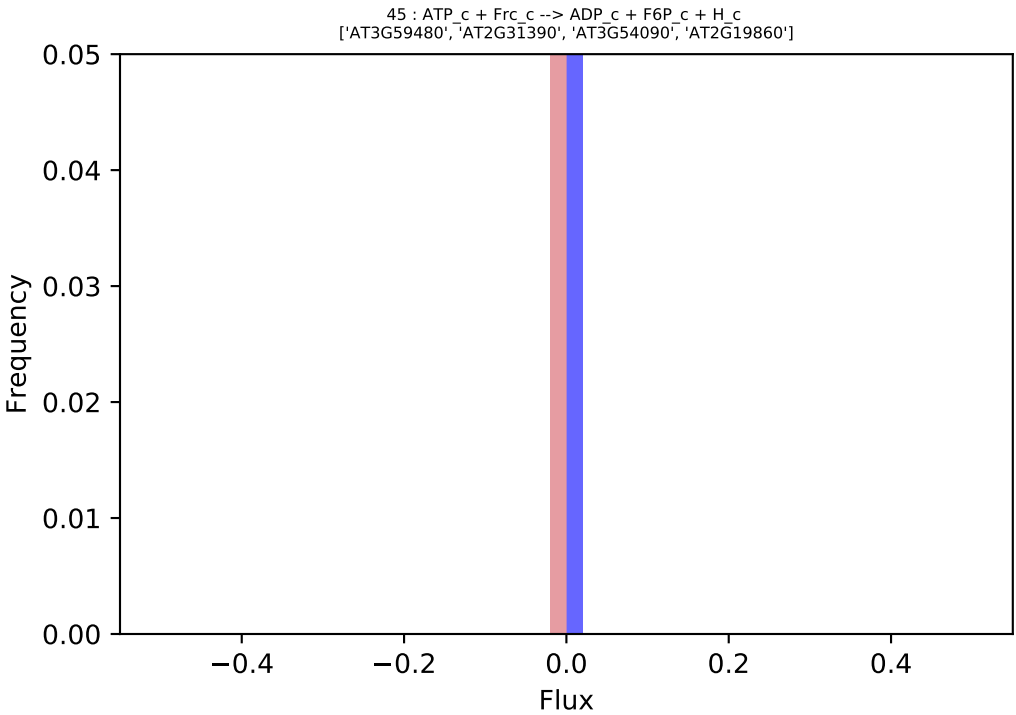

40 : G1P_c + H_c + UTP_c --> PPi_c + UDPG_c
['AT3G03250', 'AT5G17310']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

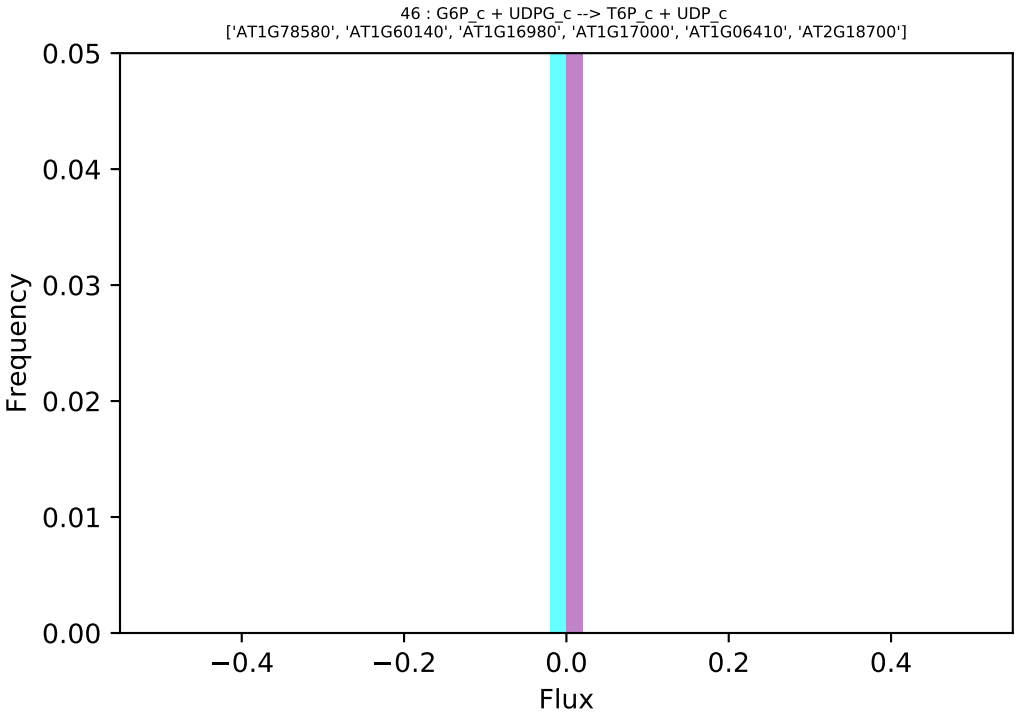

41 : F6P_c + UDPG_c --> S6P_c + UDP_c
['4*AT5G20280', '2*AT5G20280']
Frequency
0.05
0.04
0.03
0.02
0.01
0.00
−0.4
−0.2
0.0
0.2
0.4
Flux

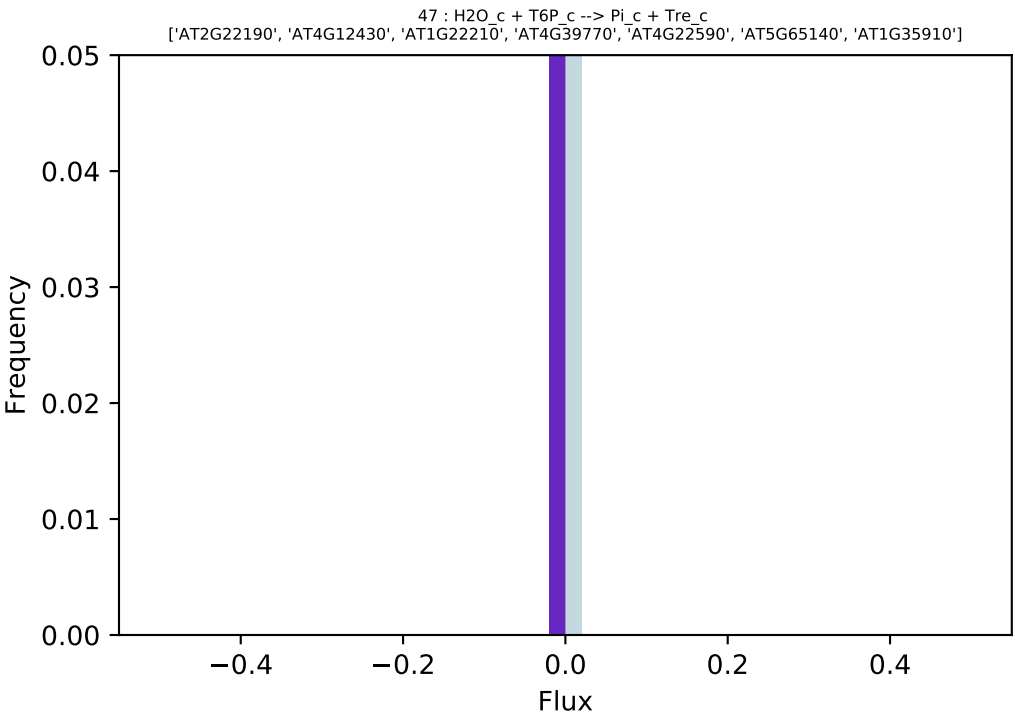

42 : H2O_c + S6P_c --> Pi_c + Suc_c
['AT3G52340', '2*AT2G35840']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

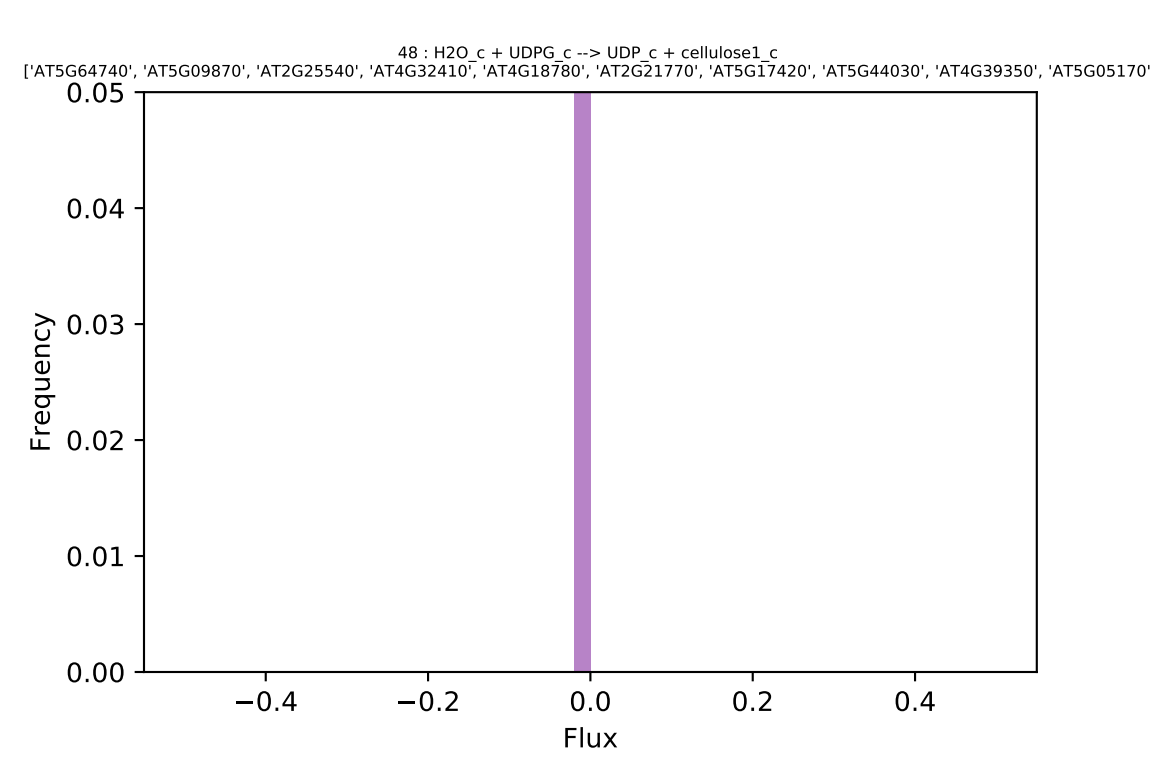

43 : Suc_c + UDP_c --> Frc_c + UDPG_c
['AT5G49190', '4*AT5G20830', 'AT3G43190']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

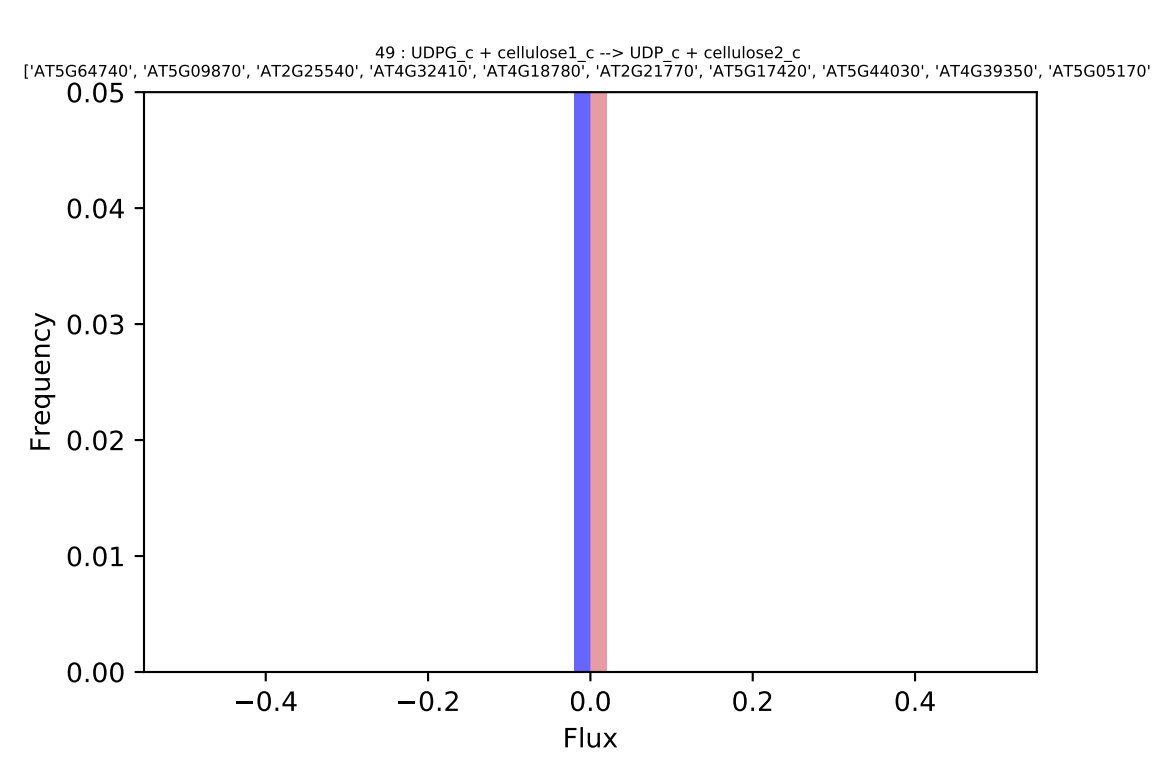

44 : H2O_c + Suc_c --> Frc_c + Glc_c
['AT4G09510', 'AT1G35580']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

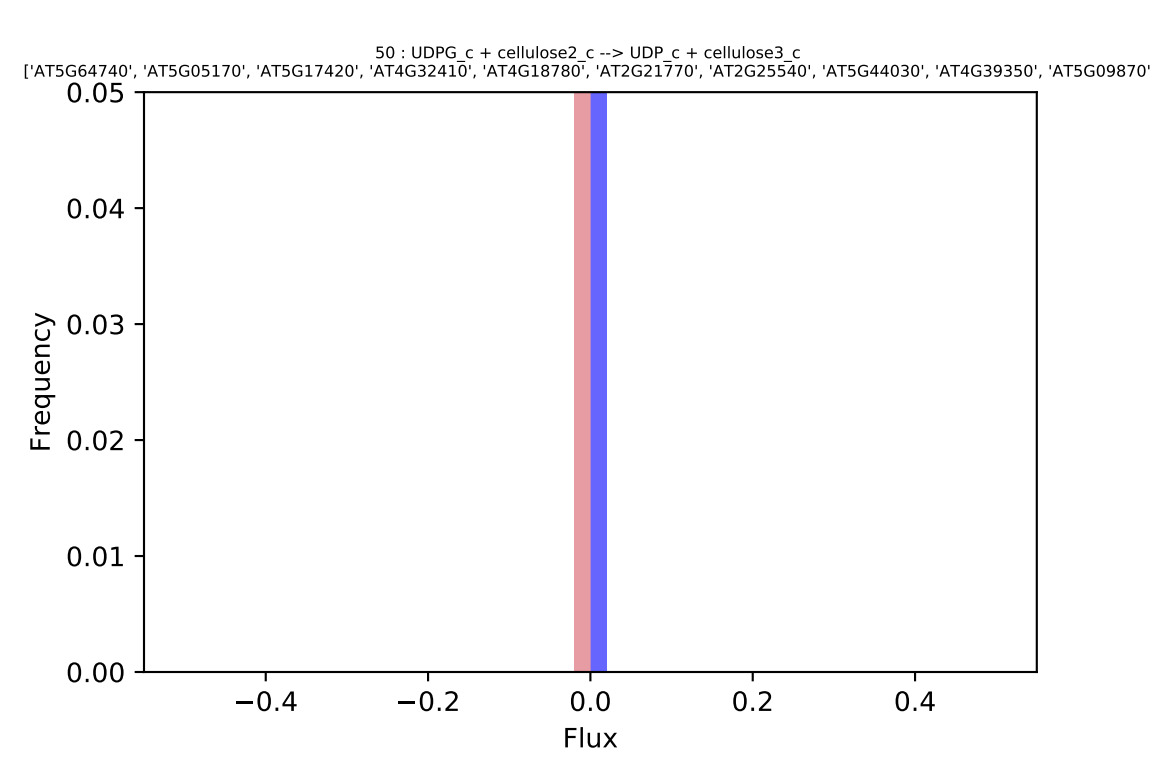

45 : ATP_c + Frc_c --> ADP_c + F6P_c + H_c
['AT3G59480', 'AT2G31390', 'AT3G54090', 'AT2G19860']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

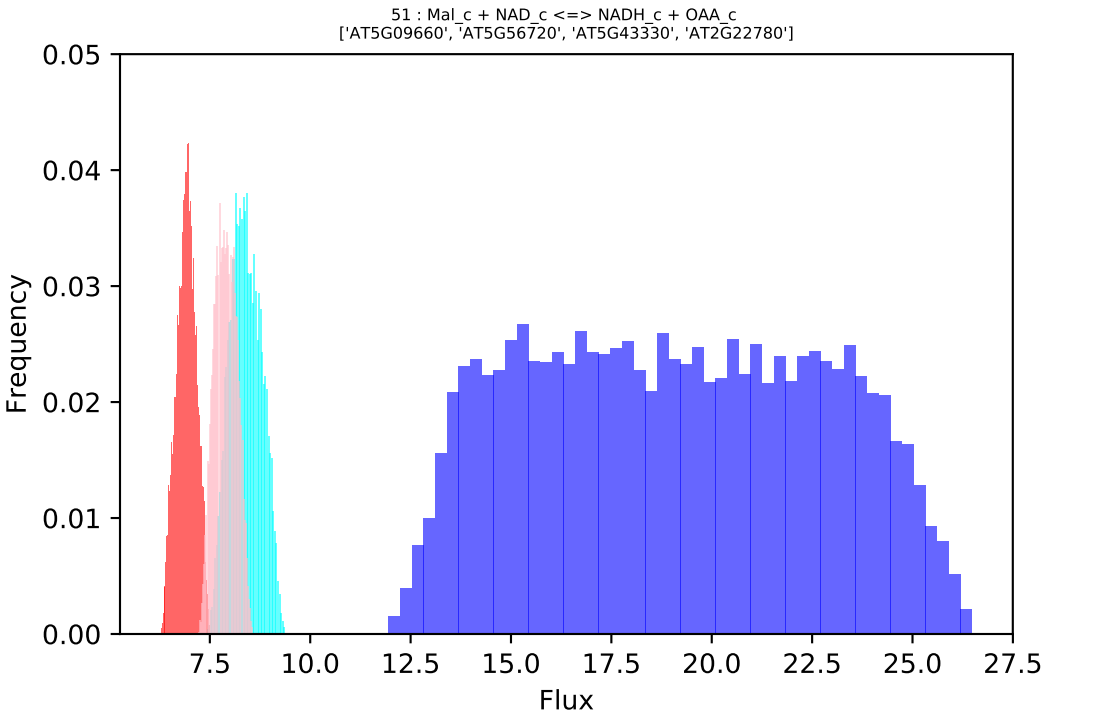

46 : G6P_c + UDPG_c --> T6P_c + UDP_c
['AT1G78580', 'AT1G60140', 'AT1G16980', 'AT1G17000', 'AT1G06410', 'AT2G18700']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

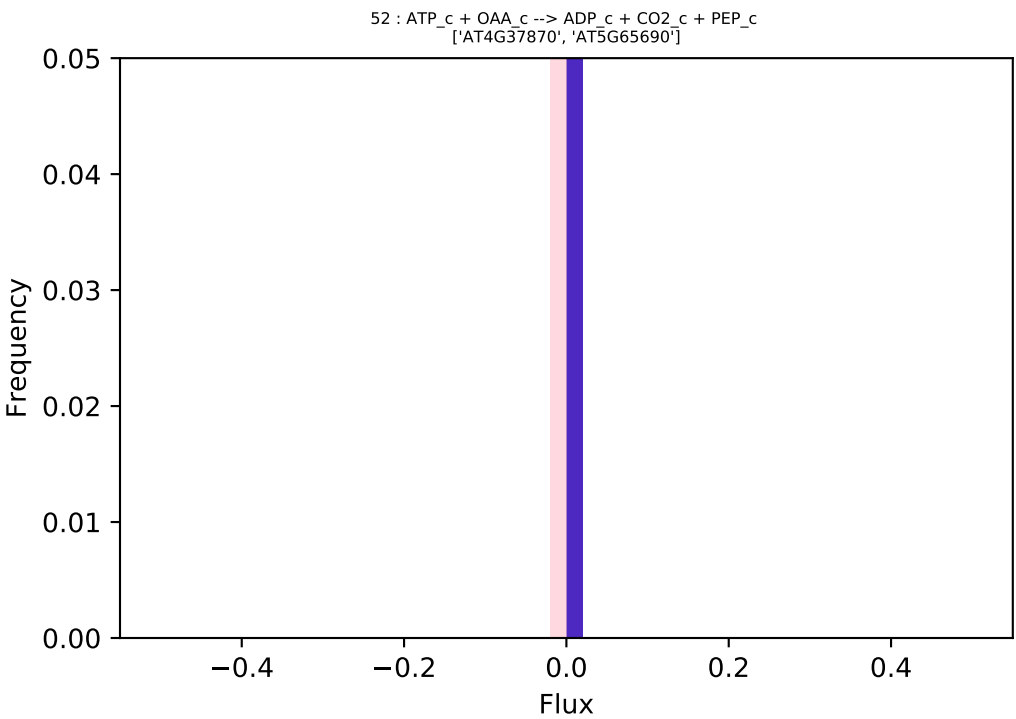

47 : H2O_c + T6P_c --> Pi_c + Tre_c
['AT2G22190', 'AT4G12430', 'AT1G22210', 'AT4G39770', 'AT4G22590', 'AT5G65140', 'AT1G35910']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

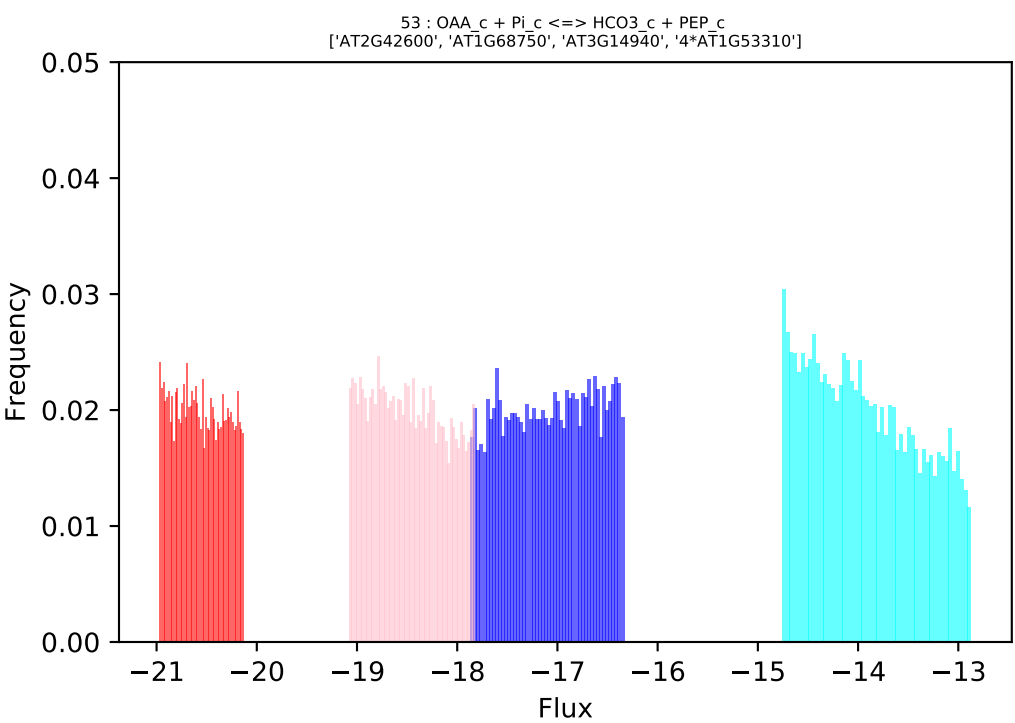

48 : H2O_c + UDPG_c --> UDP_c + cellulose1_c
['AT5G64740', 'AT5G09870', 'AT2G25540', 'AT4G32410', 'AT4G18780', 'AT2G21770', 'AT5G17420', 'AT5G44030', 'AT4G39350', 'AT5G05170'
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

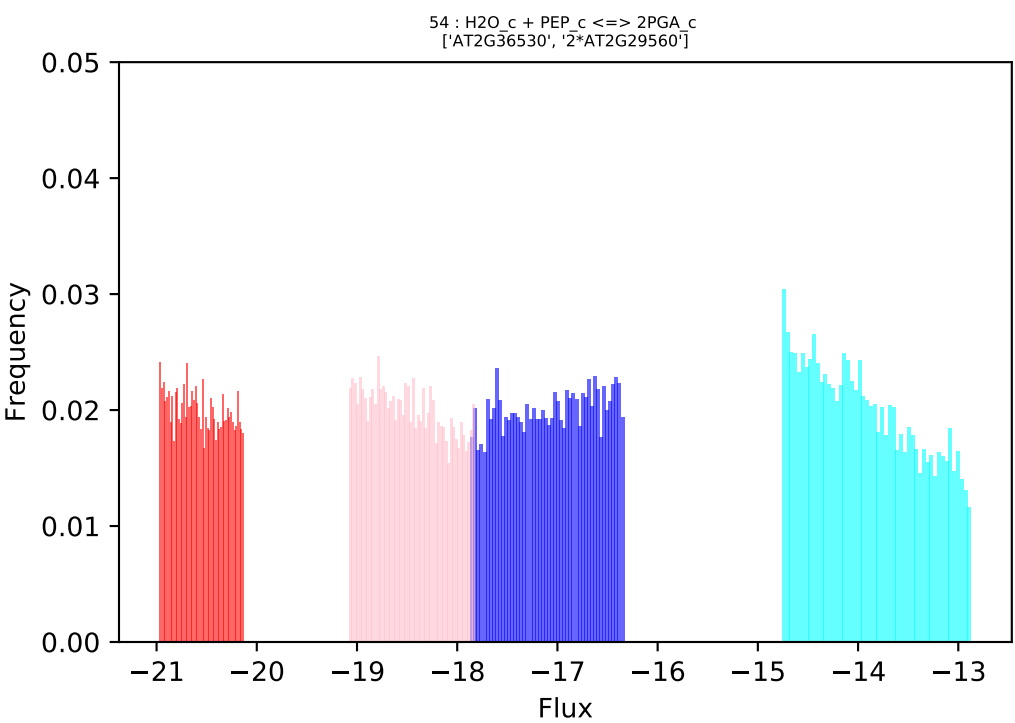

49 : UDPG_c + cellulose1_c --> UDP_c + cellulose2_c
['AT5G64740', 'AT5G09870', 'AT2G25540', 'AT4G32410', 'AT4G18780', 'AT2G21770', 'AT5G17420', 'AT5G44030', 'AT4G39350', 'AT5G05170'
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

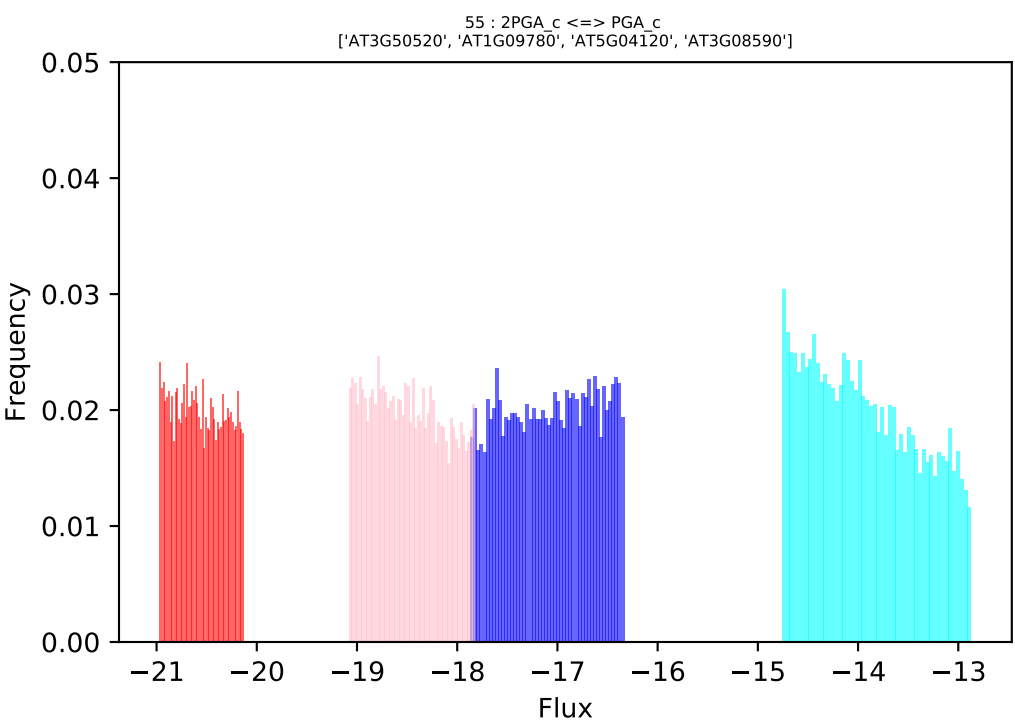

50 : UDPG_c + cellulose2_c --> UDP_c + cellulose3_c
['AT5G64740', 'AT5G05170', 'AT5G17420', 'AT4G32410', 'AT4G18780', 'AT2G21770', 'AT2G25540', 'AT5G44030', 'AT4G39350', 'AT5G09870'
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

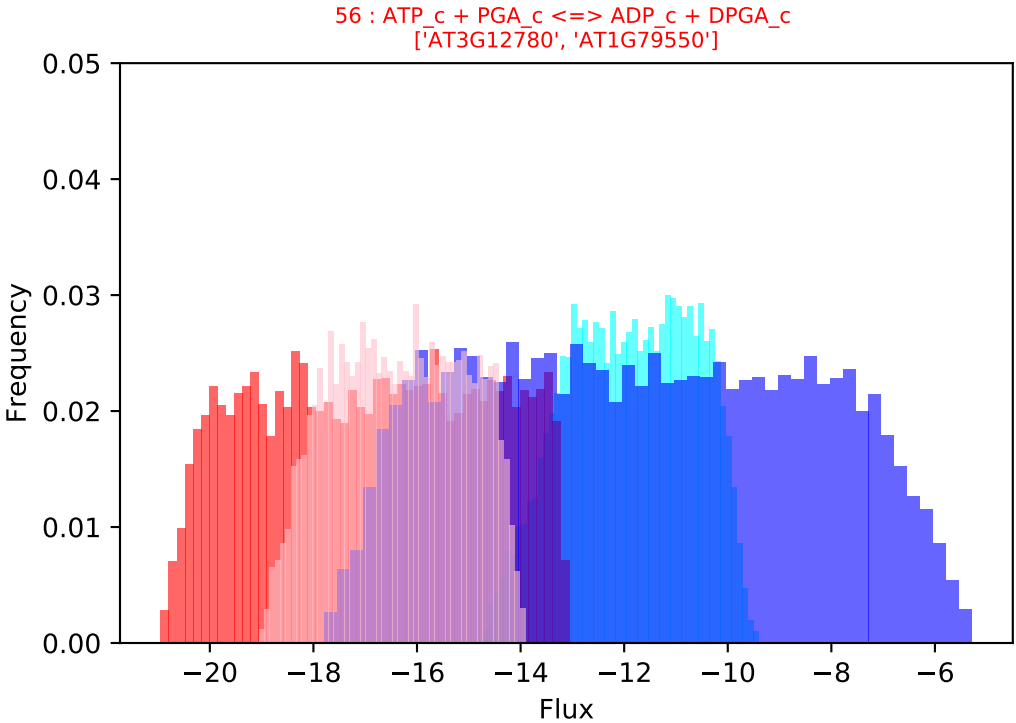

51 : Mal_c + NAD_c <=> NADH_c + OAA_c
['AT5G09660', 'AT5G56720', 'AT5G43330', 'AT2G22780']
Frequency
0.05
0.04
0.03
0.02
0.01
0.00
7.5
10.0
12.5
15.0
17.5
20.0
22.5
25.0
27.5
Flux

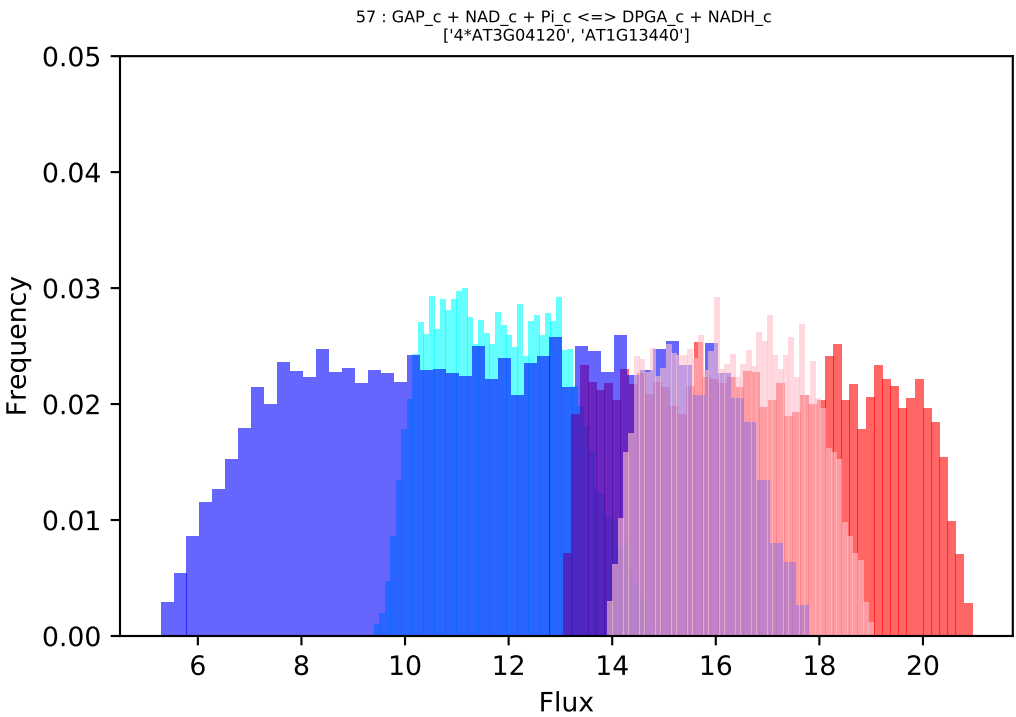

52 : ATP_c + OAA_c --> ADP_c + CO2_c + PEP_c
['AT4G37870', 'AT5G65690']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

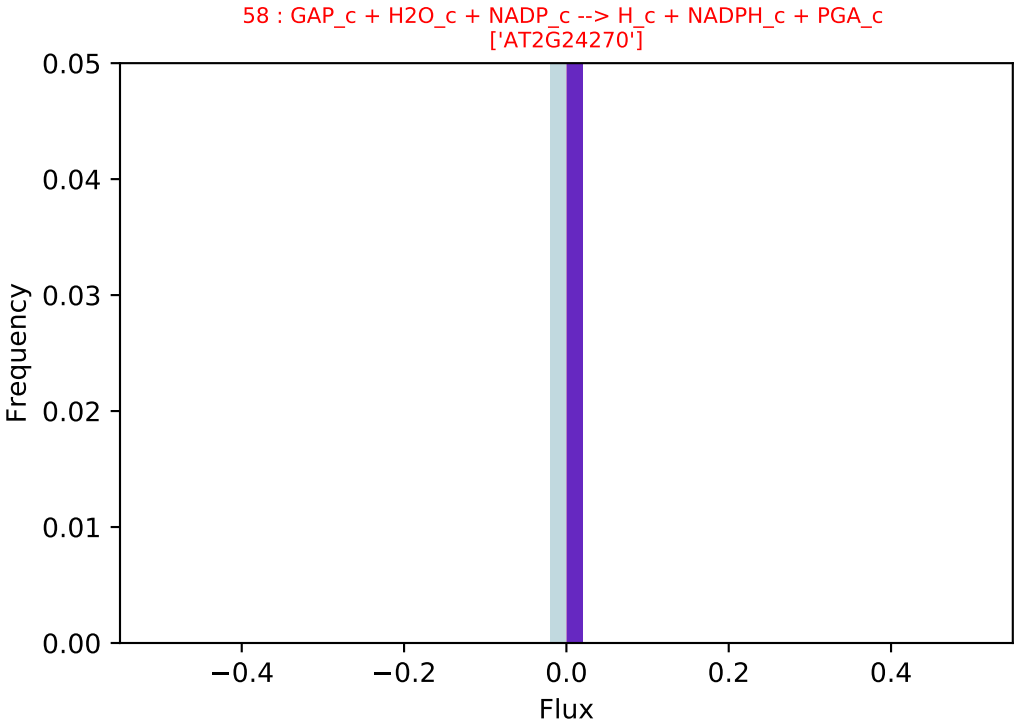

53 : OAA_c + Pi_c <=> HCO3_c + PEP_c
['AT2G42600', 'AT1G68750', 'AT3G14940', '4*AT1G53310']
Frequency
0.05
0.04
0.03
0.02
0.01
0.00
−21
−20
−19
−18
−17
−16
−15
−14
−13
Flux

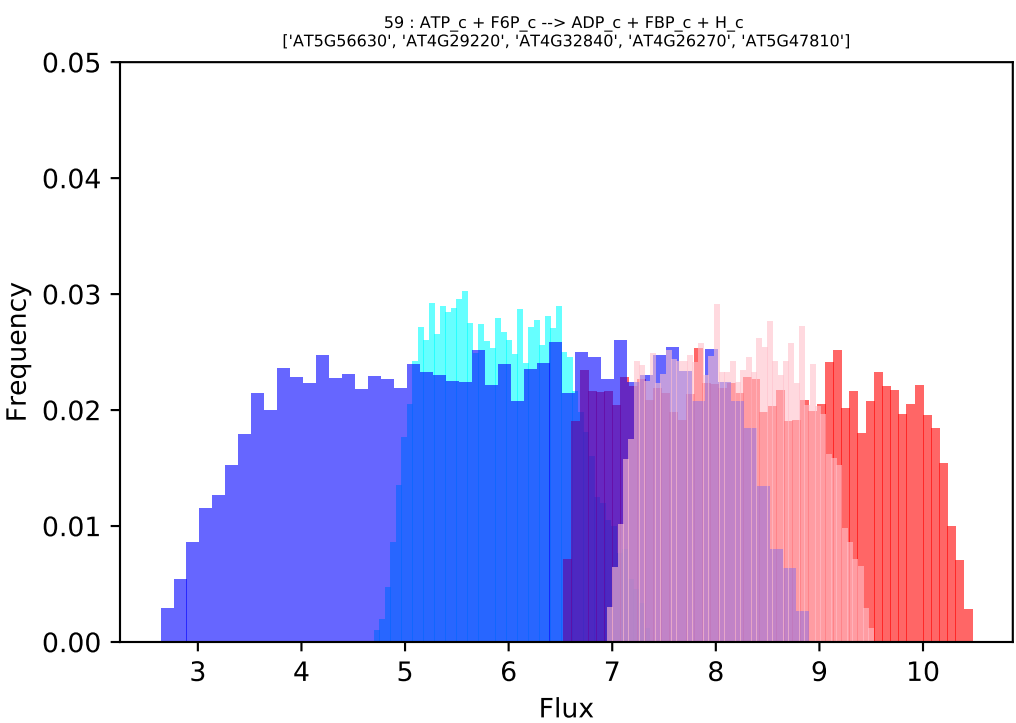

54 : H2O_c + PEP_c <=> 2PGA_c
['AT2G36530', '2*AT2G29560']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−21
−20
−19
−18
−17
−16
−15
−14
−13
Flux

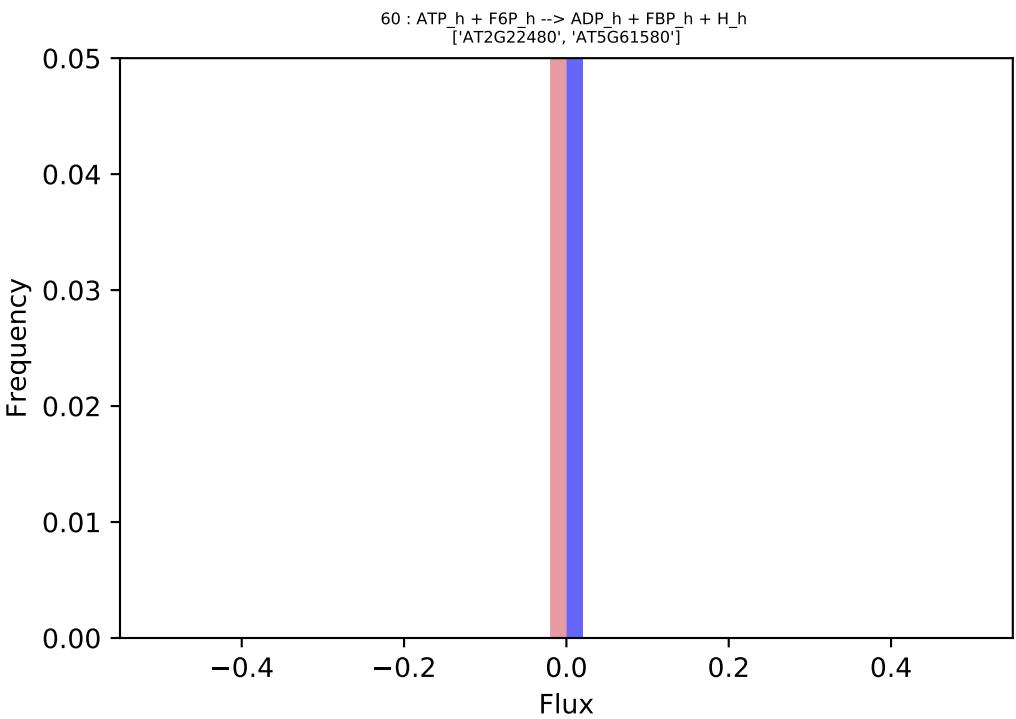

55 : 2PGA_c <=> PGA_c
['AT3G50520', 'AT1G09780', 'AT5G04120', 'AT3G08590']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−21
−20
−19
−18
−17
−16
−15
−14
−13
Flux

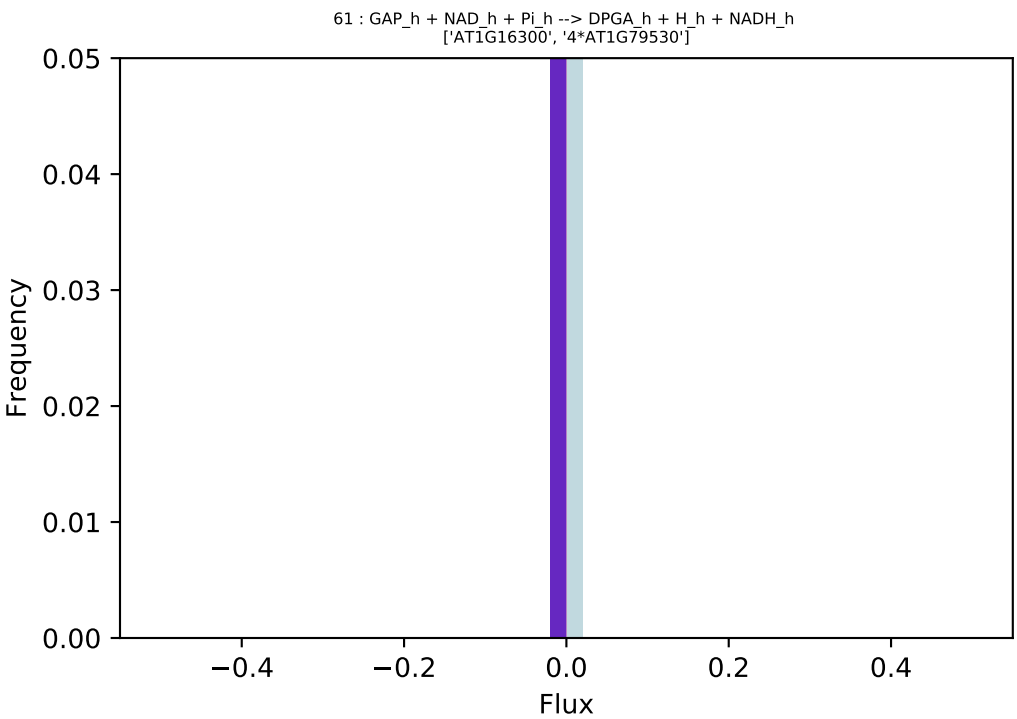

56 : ATP_c + PGA_c <=> ADP_c + DPGA_c
['AT3G12780', 'AT1G79550']
Frequency
0.05
0.04
0.03
0.02
0.01
0.00
−20
−18
−16
−14
−12
−10
−8
−6
Flux

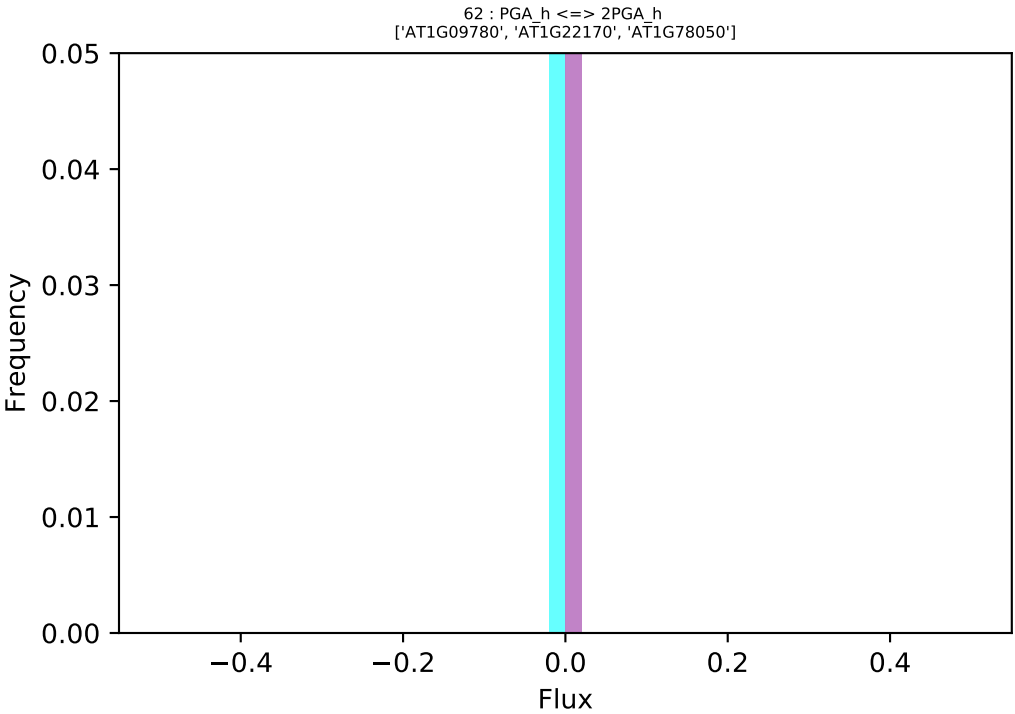

57 : GAP_c + NAD_c + Pi_c <=> DPGA_c + NADH_c
['4*AT3G04120', 'AT1G13440']
Frequency
0.05
0.04
0.03
0.02
0.01
0.00
6
8
10
12
14
16
18
20
Flux

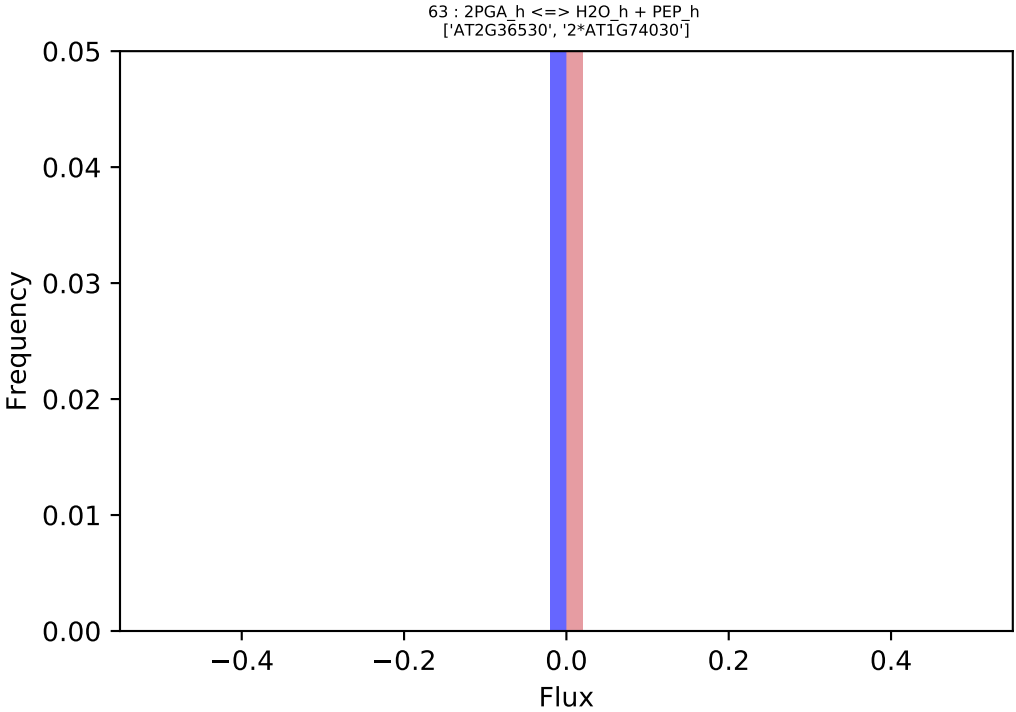

58 : GAP_c + H2O_c + NADP_c --> H_c + NADPH_c + PGA_c
['AT2G24270']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

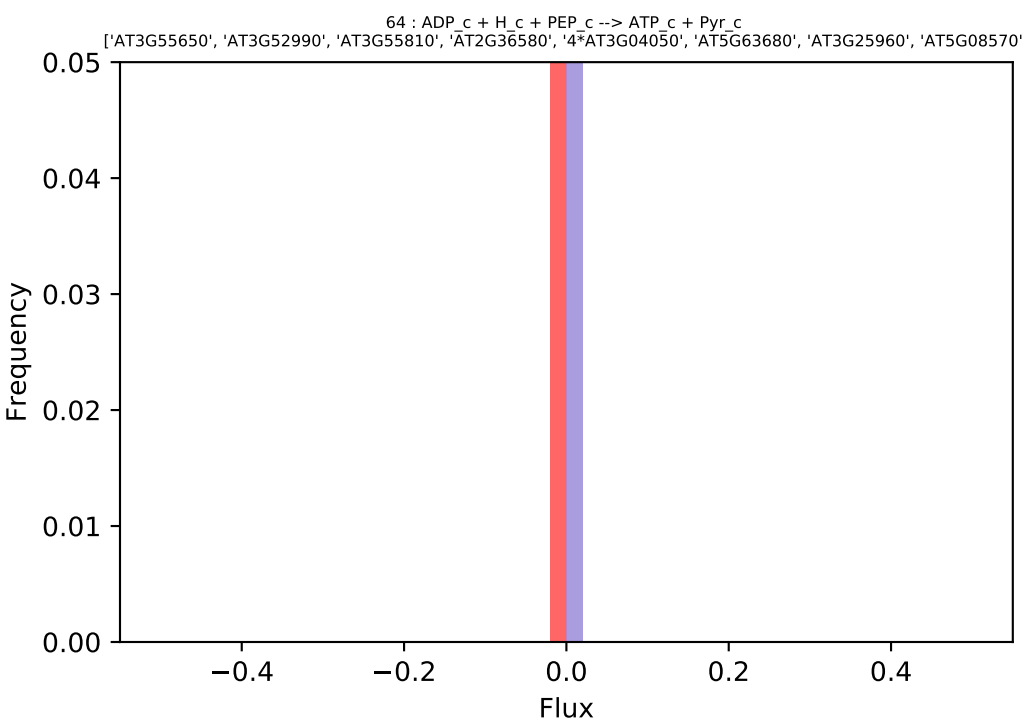

59 : ATP_c + F6P_c --> ADP_c + FBP_c + H_c
['AT5G56630', 'AT4G29220', 'AT4G32840', 'AT4G26270', 'AT5G47810']
Frequency
0.00
0.01
0.02
0.03
0.04
0.05
3
4
5
6
7
8
9
10
Flux

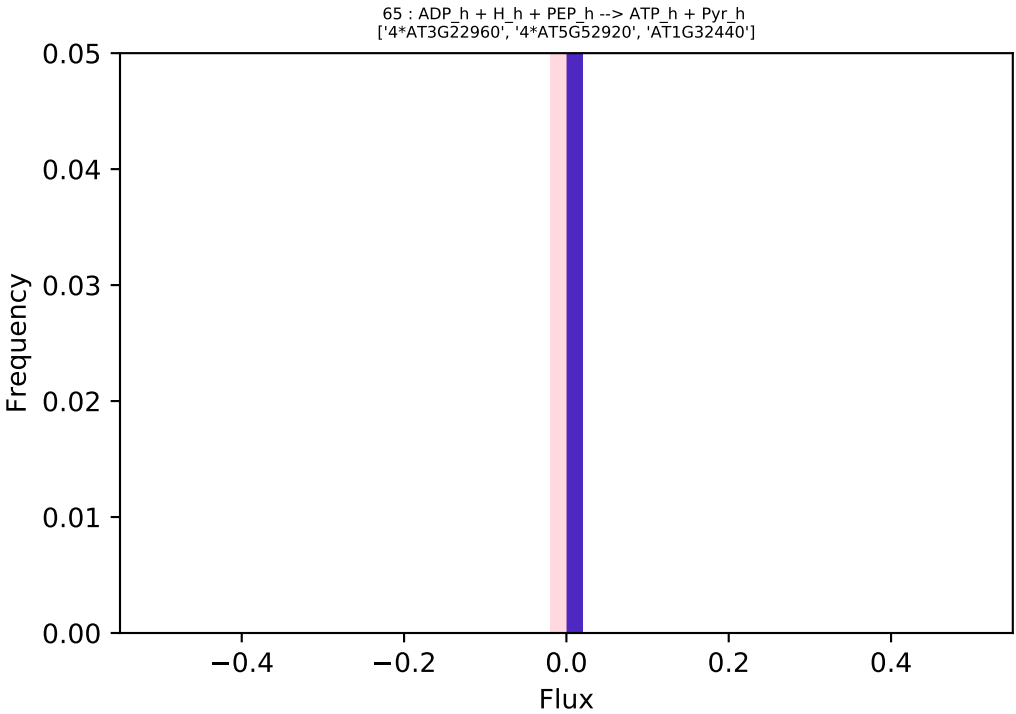

60 : ATP_h + F6P_h --> ADP_h + FBP_h + H_h
['AT2G22480', 'AT5G61580']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

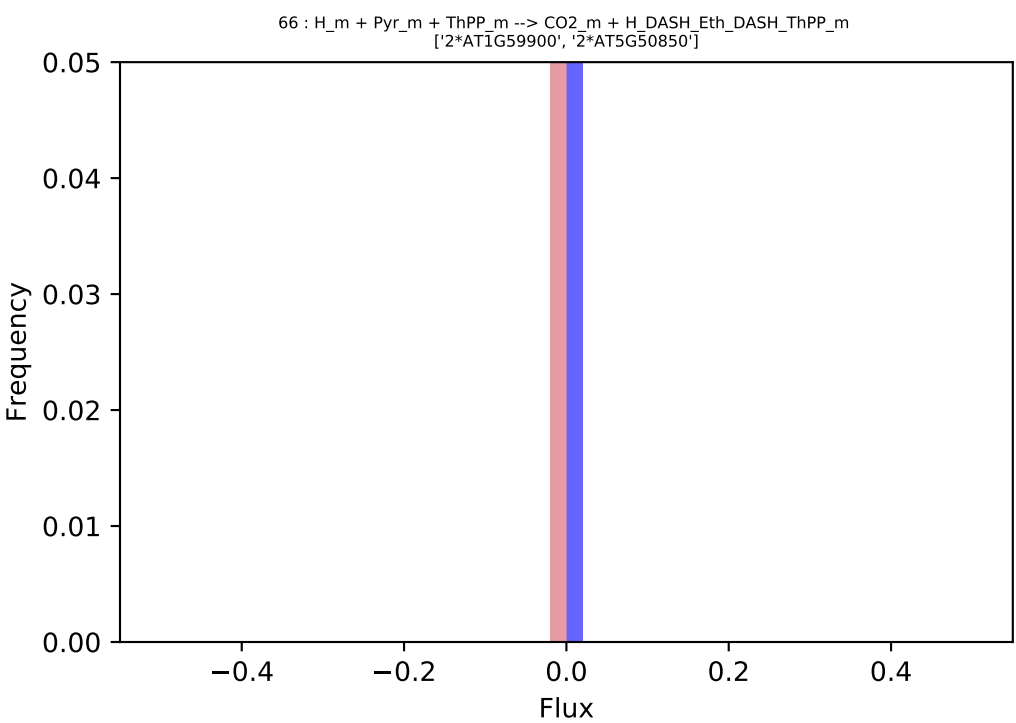

61 : GAP_h + NAD_h + Pi_h --> DPGA_h + H_h + NADH_h
['AT1G16300', '4*AT1G79530']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

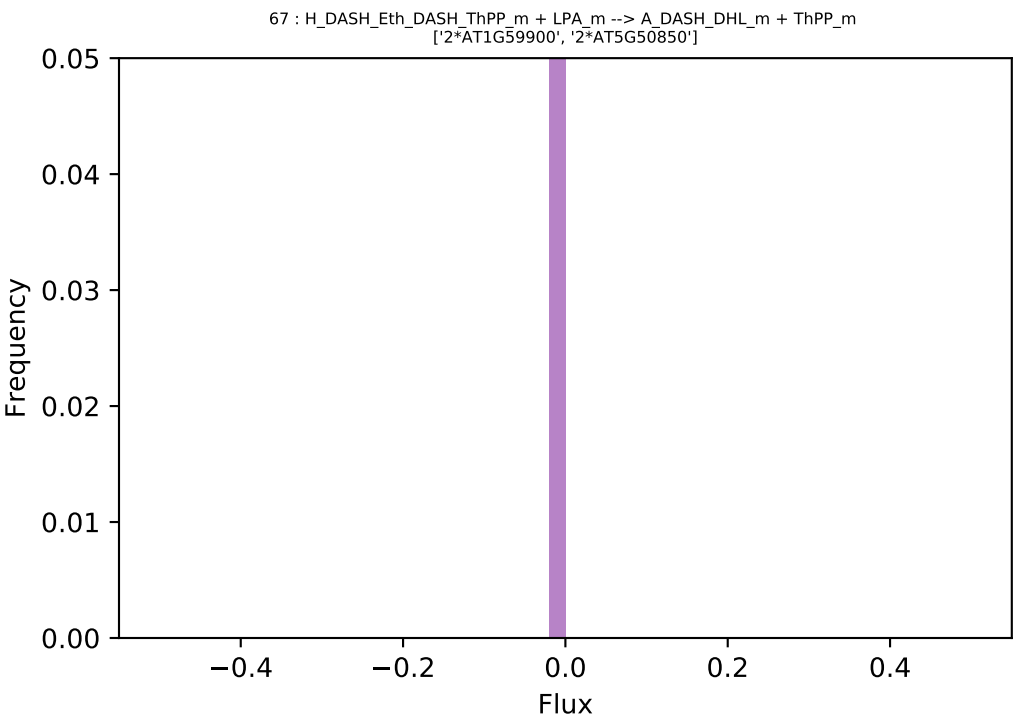

62 : PGA_h <=> 2PGA_h
['AT1G09780', 'AT1G22170', 'AT1G78050']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

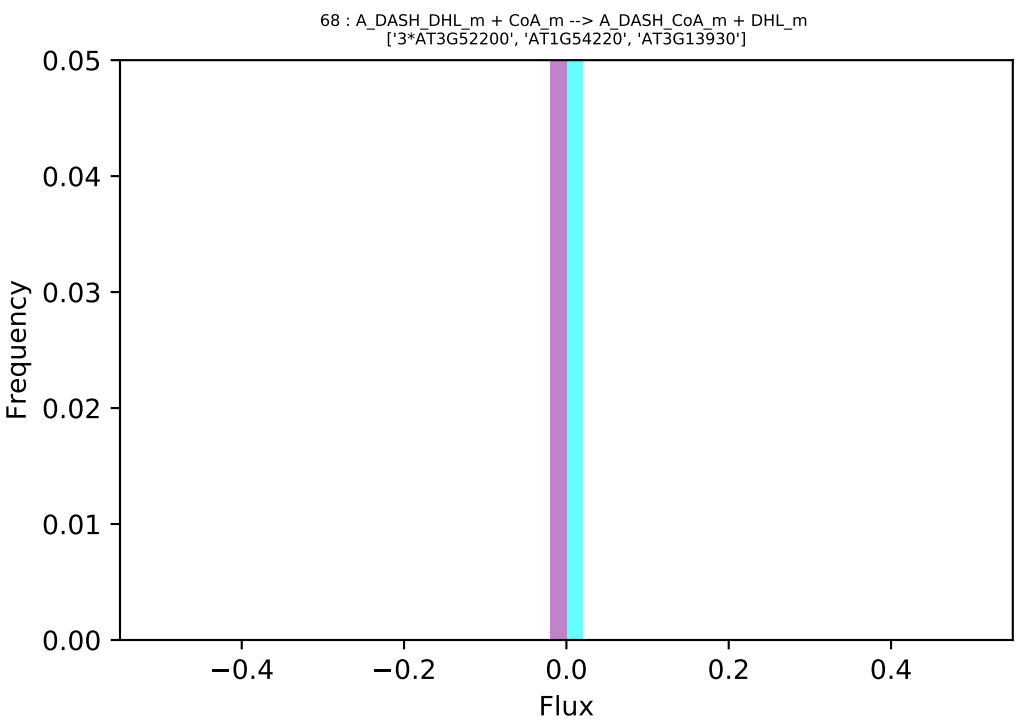

63 : 2PGA_h <=> H2O_h + PEP_h
['AT2G36530', '2*AT1G74030']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

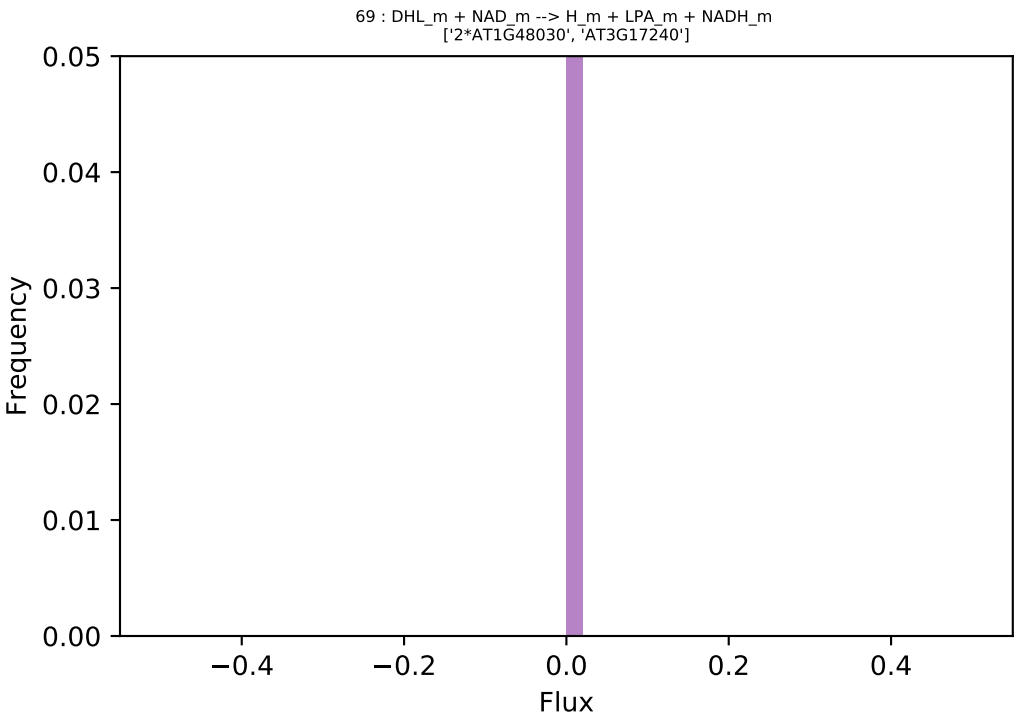

64 : ADP_c + H_c + PEP_c --> ATP_c + Pyr_c
['AT3G55650', 'AT3G52990', 'AT3G55810', 'AT2G36580', '4*AT3G04050', 'AT5G63680', 'AT3G25960', 'AT5G08570']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

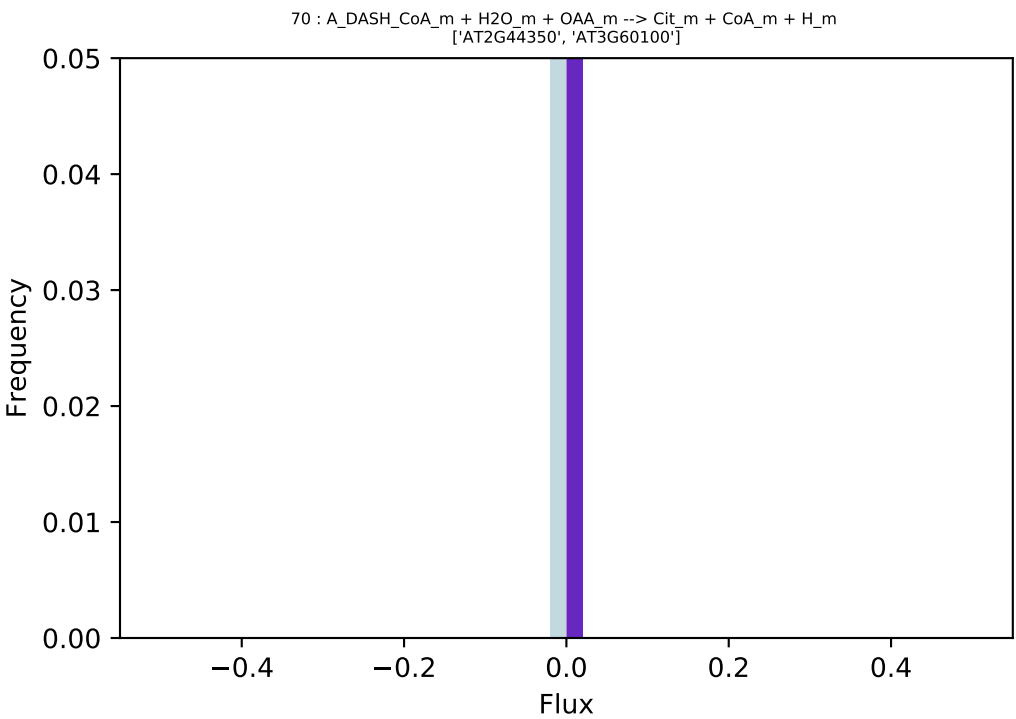

65 : ADP_h + H_h + PEP_h --> ATP_h + Pyr_h
['4*AT3G22960', '4*AT5G52920', 'AT1G32440']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

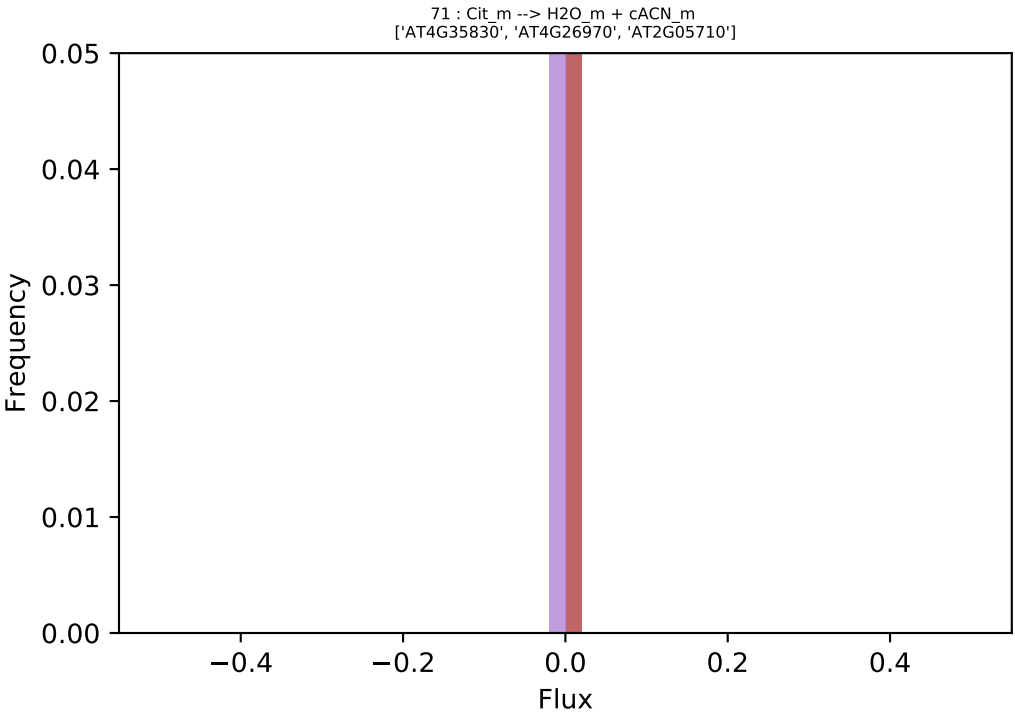

66 : H_m + Pyr_m + ThPP_m --> CO2_m + H_DASH_Eth_DASH_ThPP_m
['2*AT1G59900', '2*AT5G50850']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

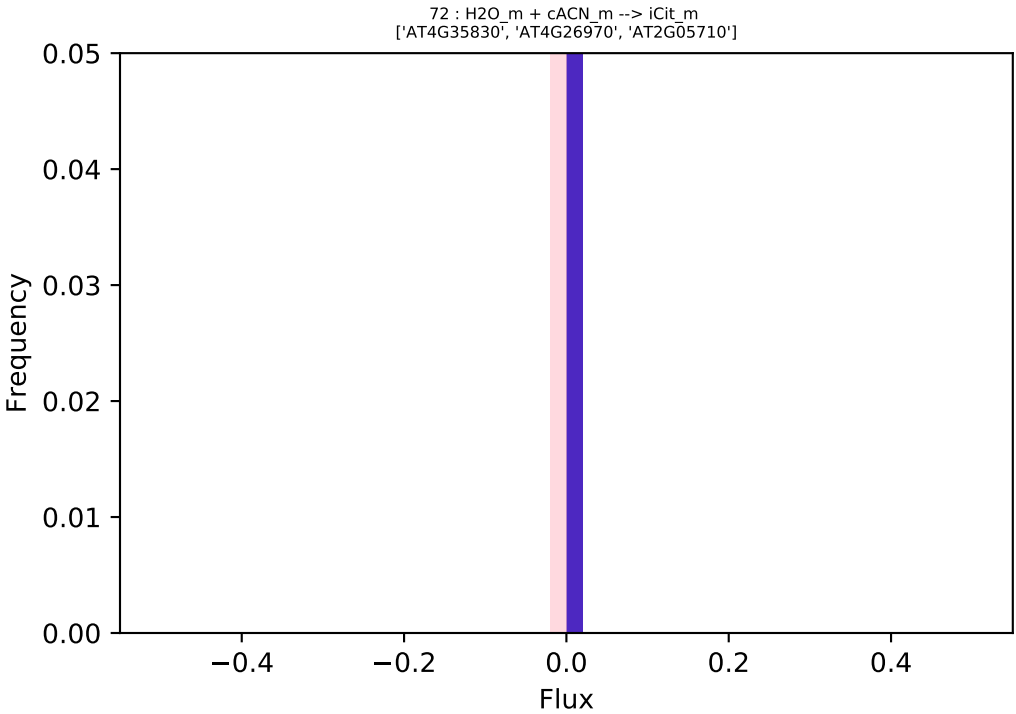

67 : H_DASH_Eth_DASH_ThPP_m + LPA_m --> A_DASH_DHL_m + ThPP_m
['2*AT1G59900', '2*AT5G50850']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

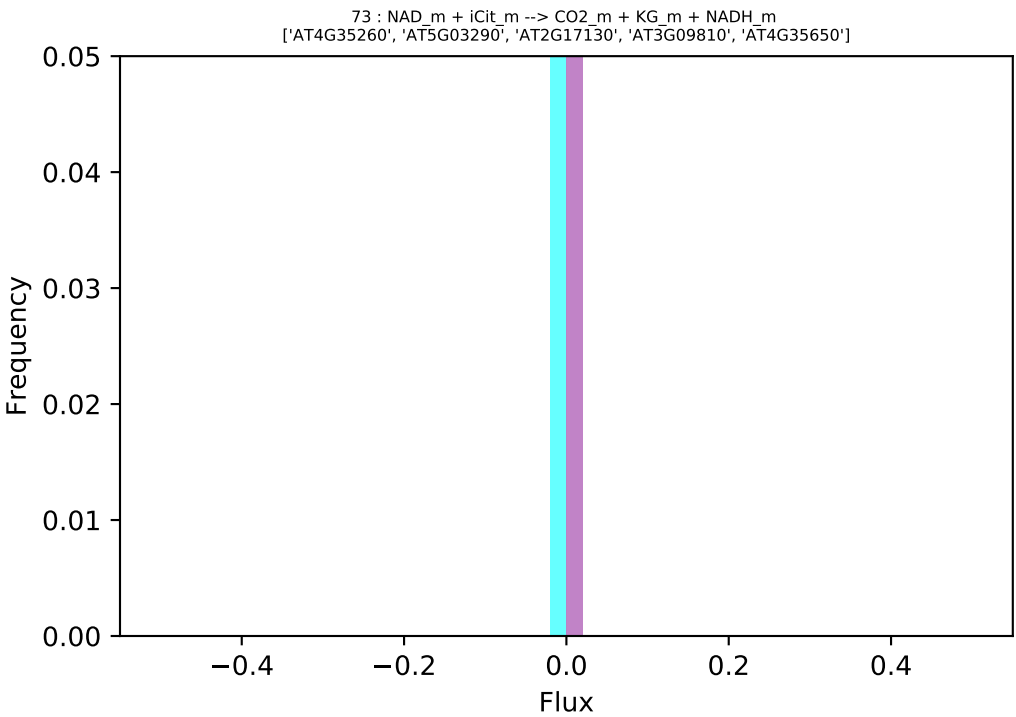

68 : A_DASH_DHL_m + CoA_m --> A_DASH_CoA_m + DHL_m
['3*AT3G52200', 'AT1G54220', 'AT3G13930']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

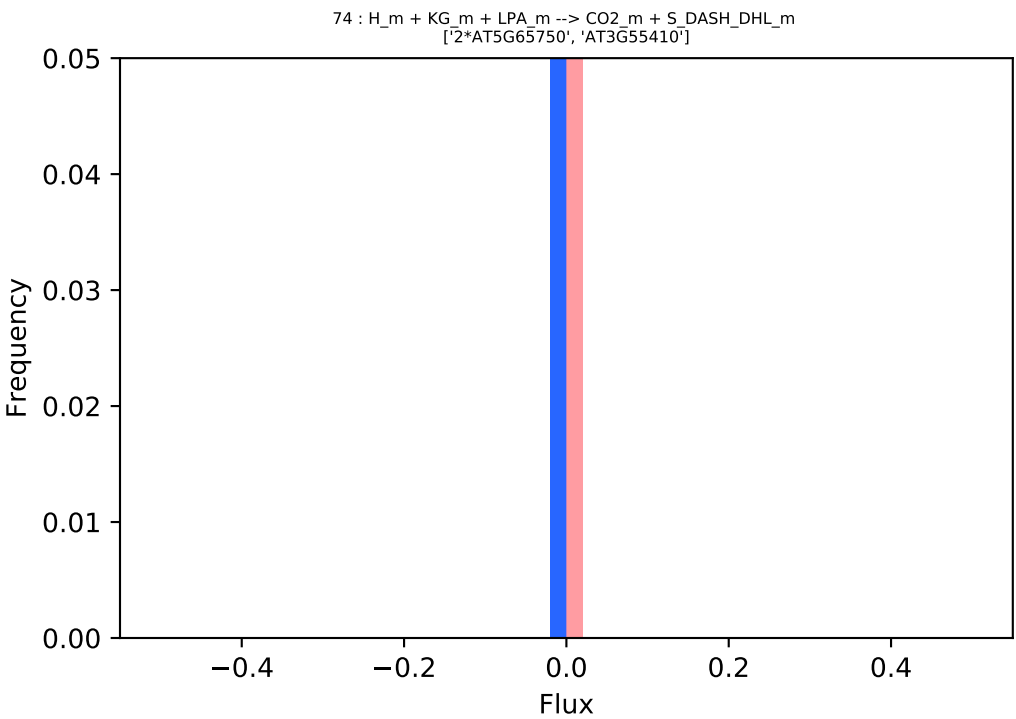

69 : DHL_m + NAD_m --> H_m + LPA_m + NADH_m
['2*AT1G48030', 'AT3G17240']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

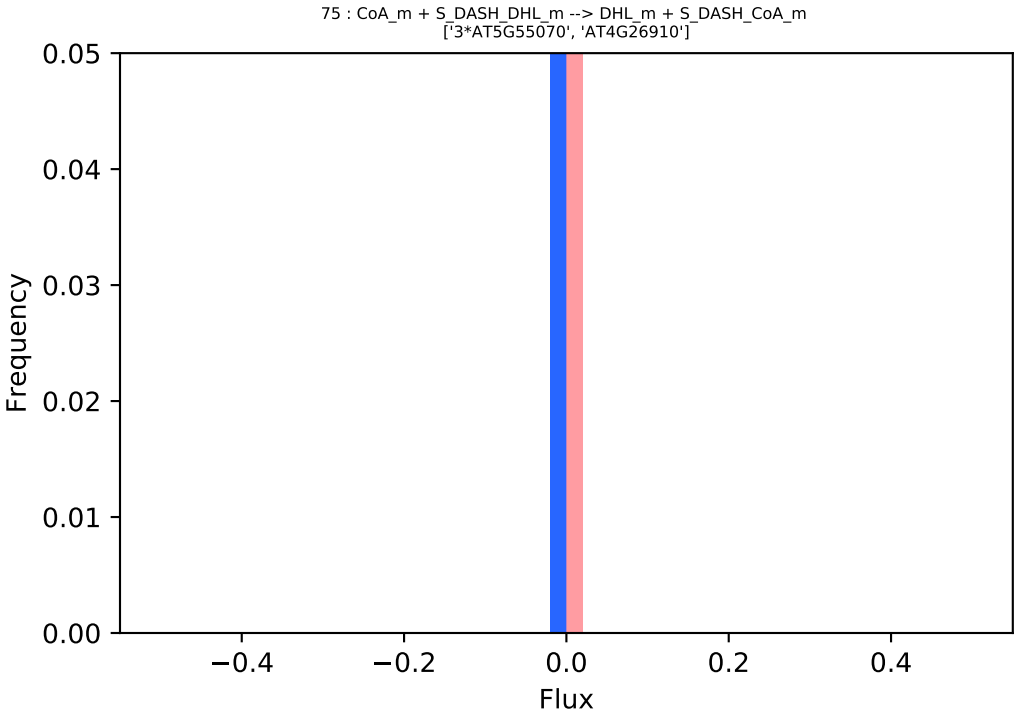

70 : A_DASH_CoA_m + H2O_m + OAA_m --> Cit_m + CoA_m + H_m
['AT2G44350', 'AT3G60100']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

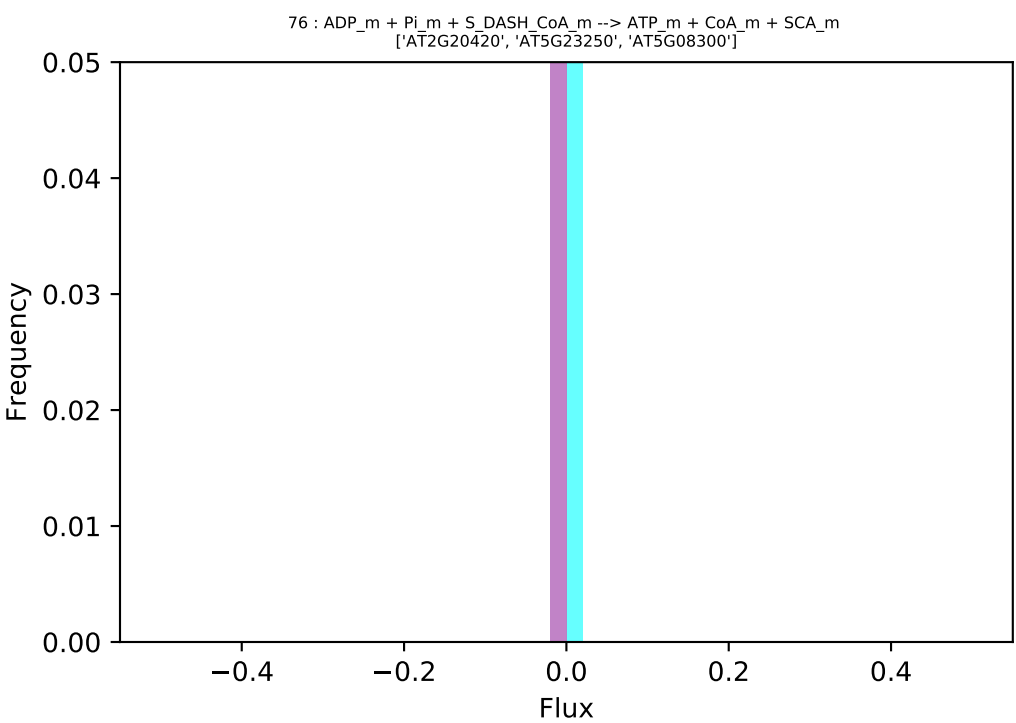

71 : Cit_m --> H2O_m + cACN_m
['AT4G35830', 'AT4G26970', 'AT2G05710']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

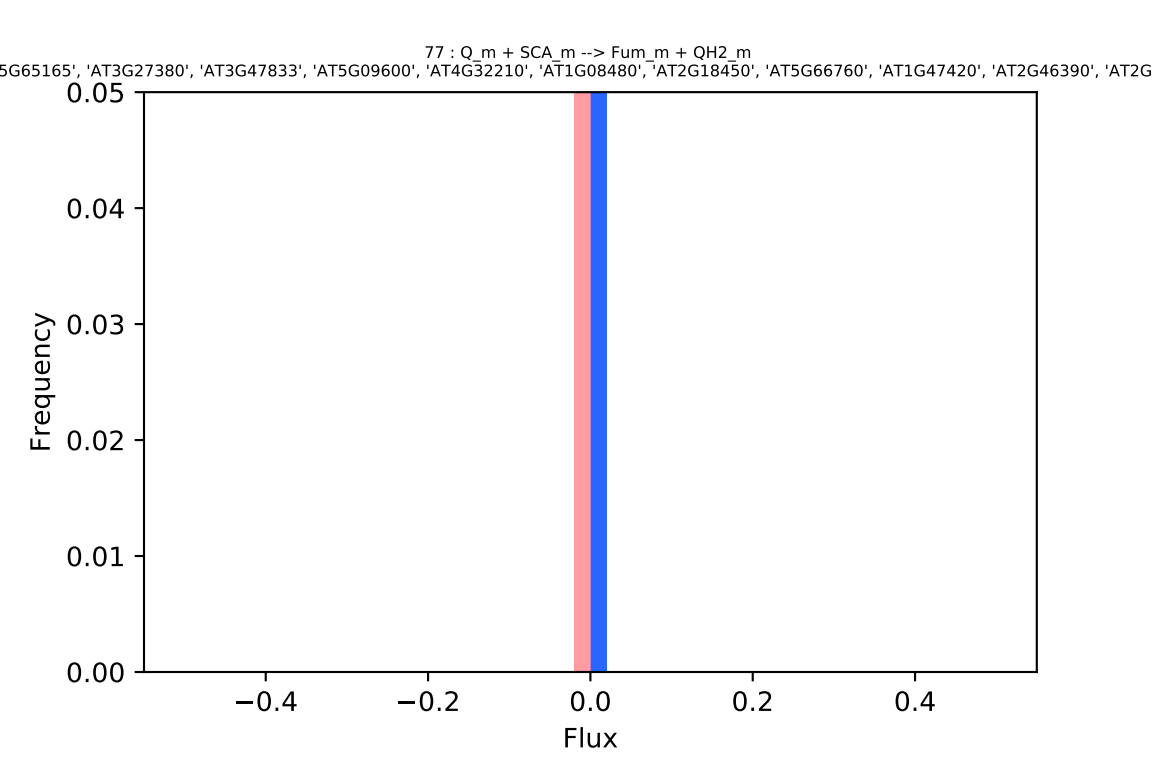

72 : H2O_m + cACN_m --> iCit_m
['AT4G35830', 'AT4G26970', 'AT2G05710']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

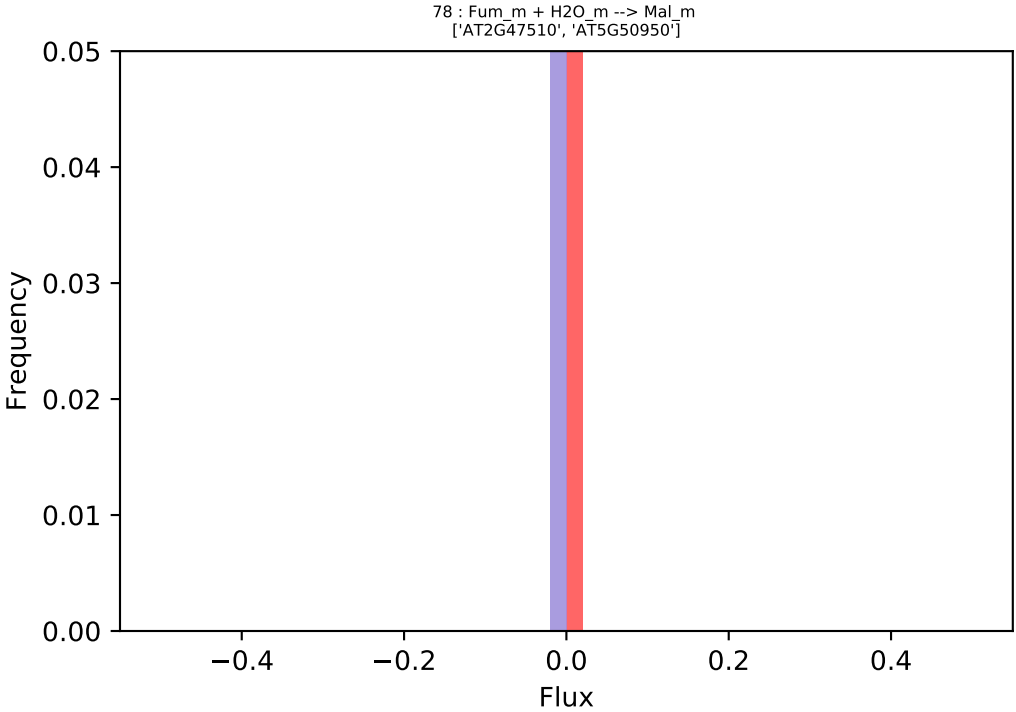

73 : NAD_m + iCit_m --> CO2_m + KG_m + NADH_m
['AT4G35260', 'AT5G03290', 'AT2G17130', 'AT3G09810', 'AT4G35650']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

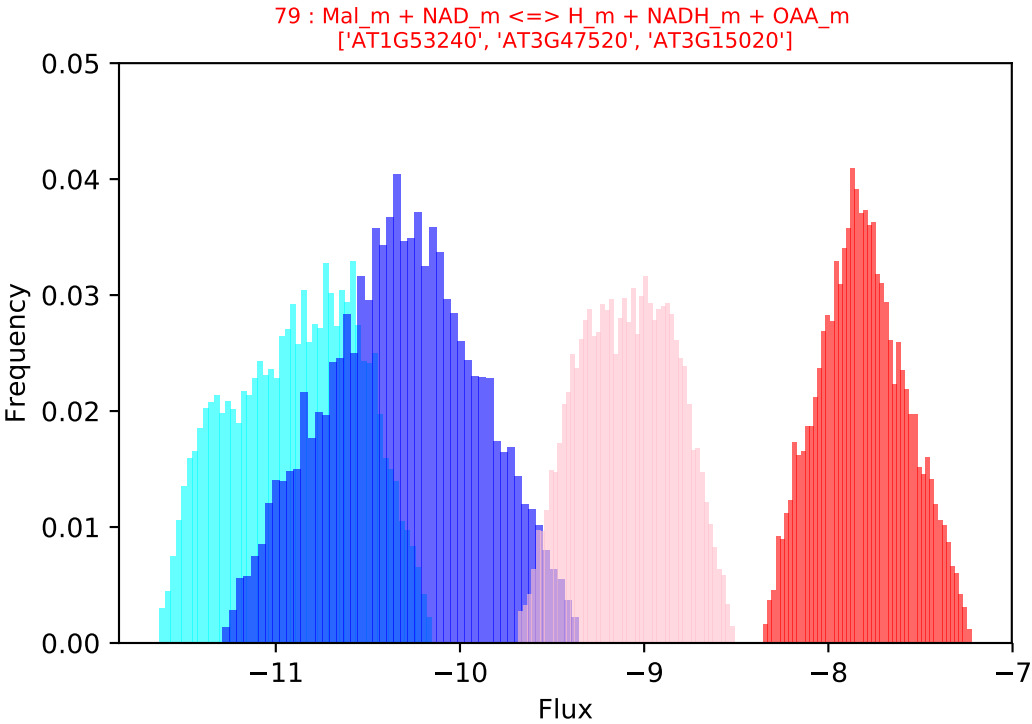

74 : H_m + KG_m + LPA_m --> CO2_m + S_DASH_DHL_m
['2*AT5G65750', 'AT3G55410']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

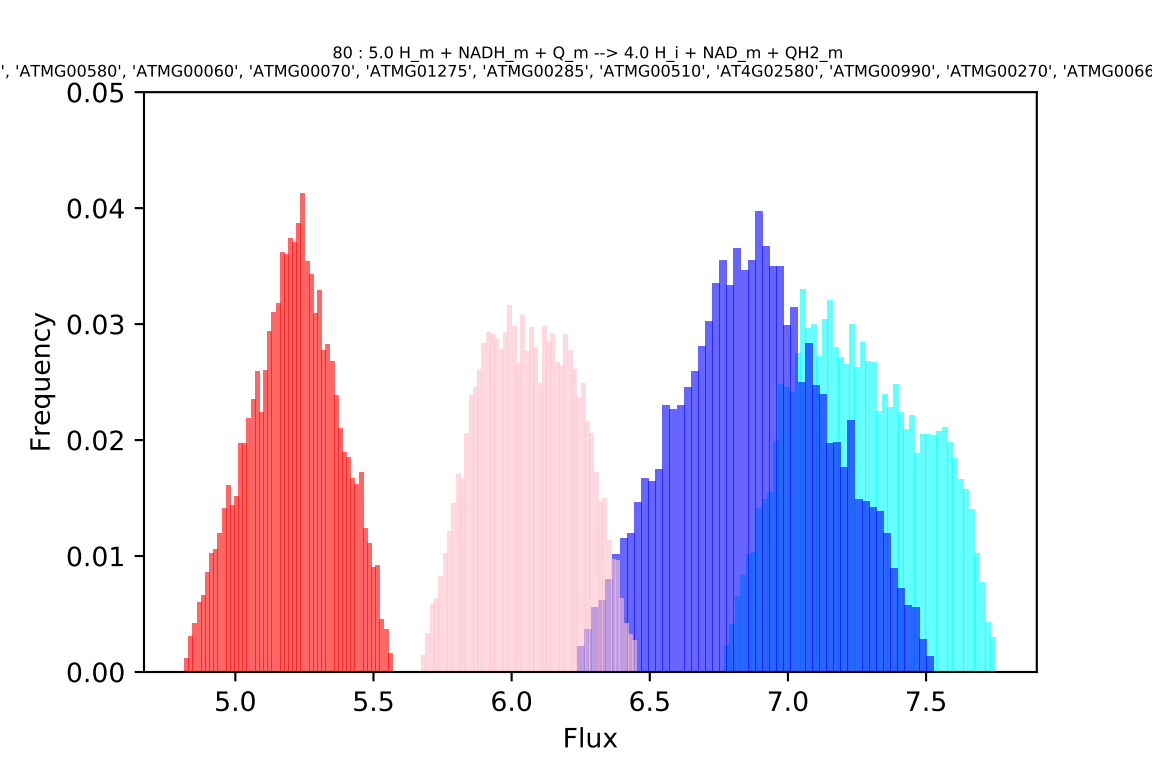

75 : CoA_m + S_DASH_DHL_m --> DHL_m + S_DASH_CoA_m
['3*AT5G55070', 'AT4G26910']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

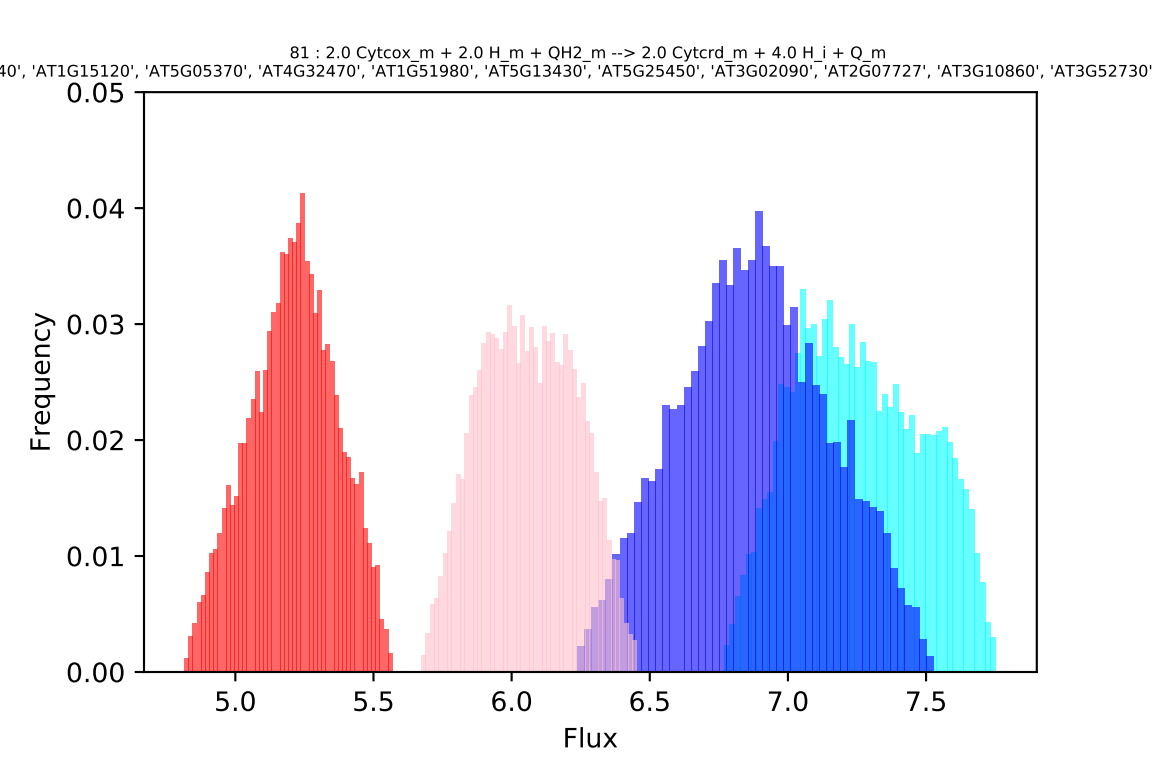

76 : ADP_m + Pi_m + S_DASH_CoA_m --> ATP_m + CoA_m + SCA_m
['AT2G20420', 'AT5G23250', 'AT5G08300']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

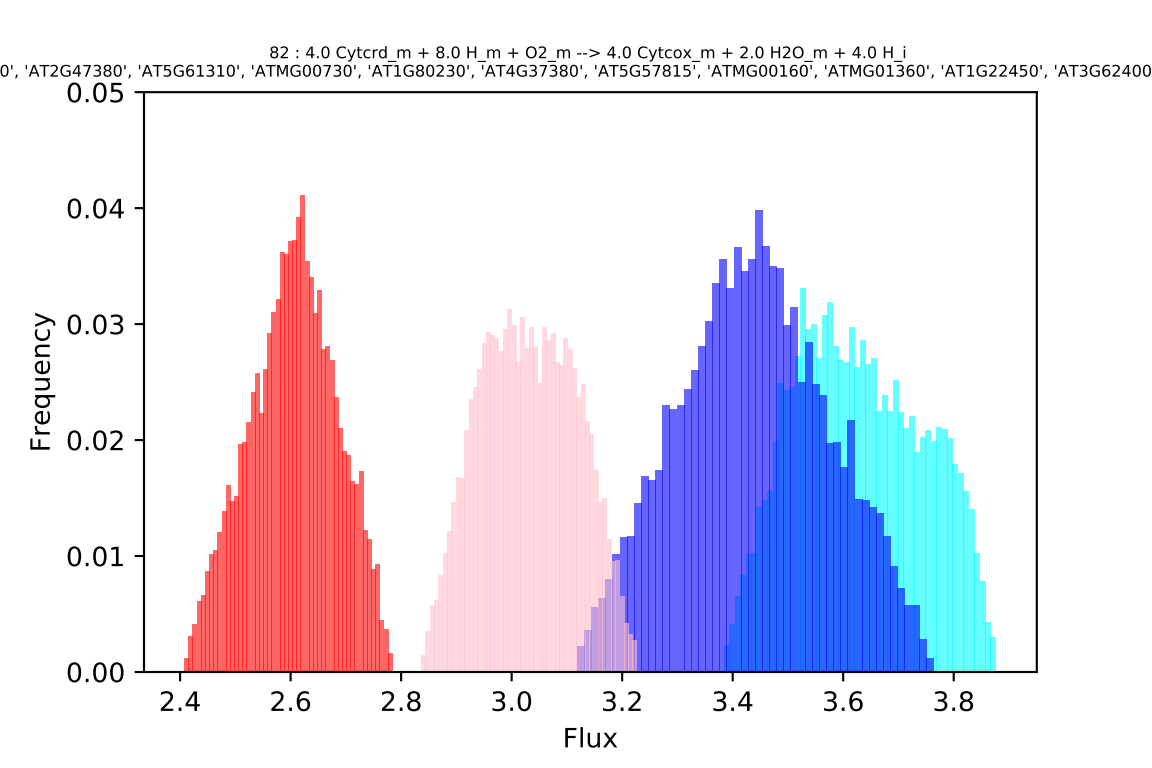

77 : Q_m + SCA_m --> Fum_m + QH2_m
5G65165', 'AT3G27380', 'AT3G47833', 'AT5G09600', 'AT4G32210', 'AT1G08480', 'AT2G18450', 'AT5G66760', 'AT1G47420', 'AT2G46390', 'AT2G
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

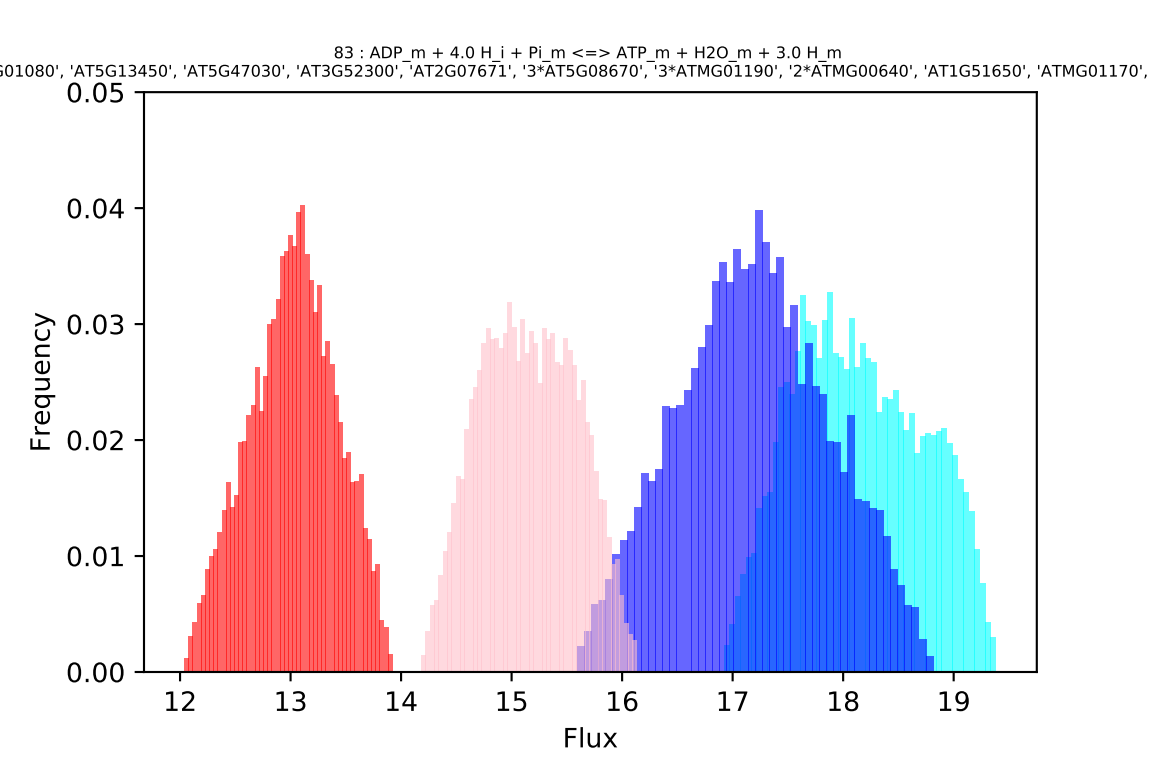

78 : Fum_m + H2O_m --> Mal_m
['AT2G47510', 'AT5G50950']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

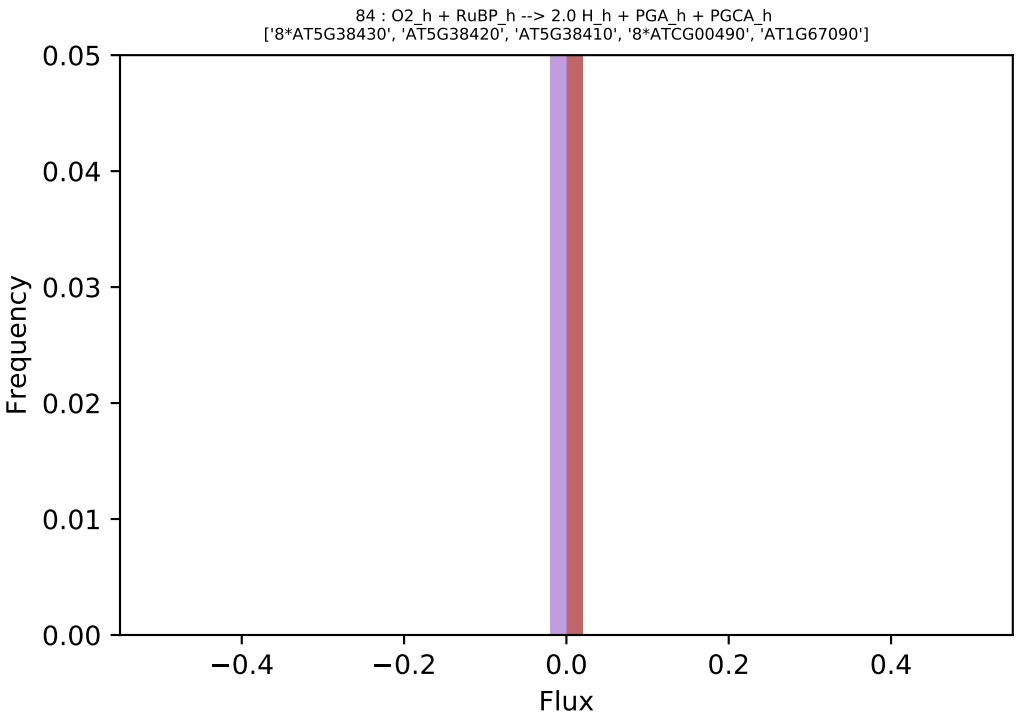

79 : Mal_m + NAD_m <=> H_m + NADH_m + OAA_m
['AT1G53240', 'AT3G47520', 'AT3G15020']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−11
−10
−9
−8
−7
Flux

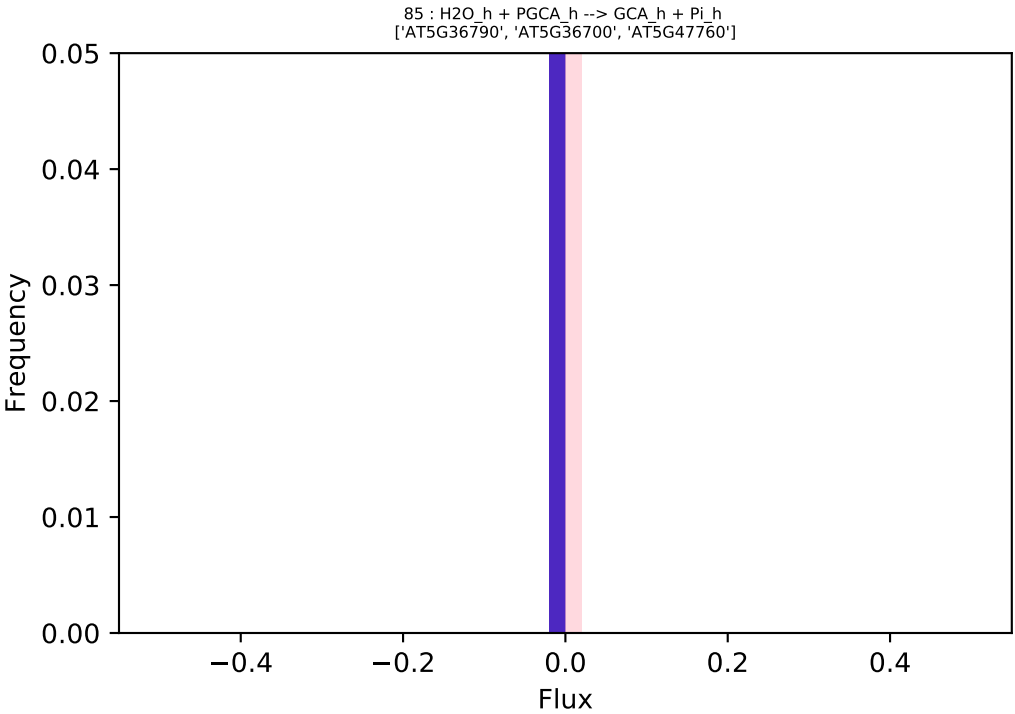

80 : 5.0 H_m + NADH_m + Q_m --> 4.0 H_i + NAD_m + QH2_m
', 'ATMG00580', 'ATMG00060', 'ATMG00070', 'ATMG01275', 'ATMG00285', 'ATMG00510', 'AT4G02580', 'ATMG00990', 'ATMG00270', 'ATMG0066
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
5.0
5.5
6.0
6.5
7.0
7.5
Flux

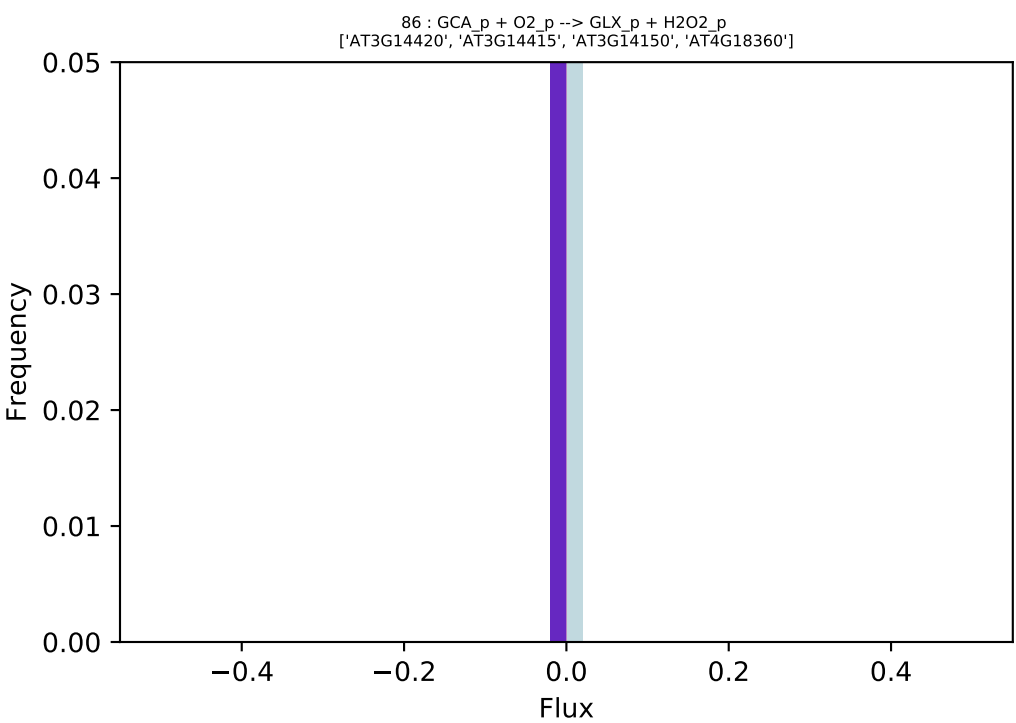

81 : 2.0 Cytcox_m + 2.0 H_m + QH2_m --> 2.0 Cytcrd_m + 4.0 H_i + Q_m
40', 'AT1G15120', 'AT5G05370', 'AT4G32470', 'AT1G51980', 'AT5G13430', 'AT5G25450', 'AT3G02090', 'AT2G07727', 'AT3G10860', 'AT3G52730'
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
5.0
5.5
6.0
6.5
7.0
7.5
Flux

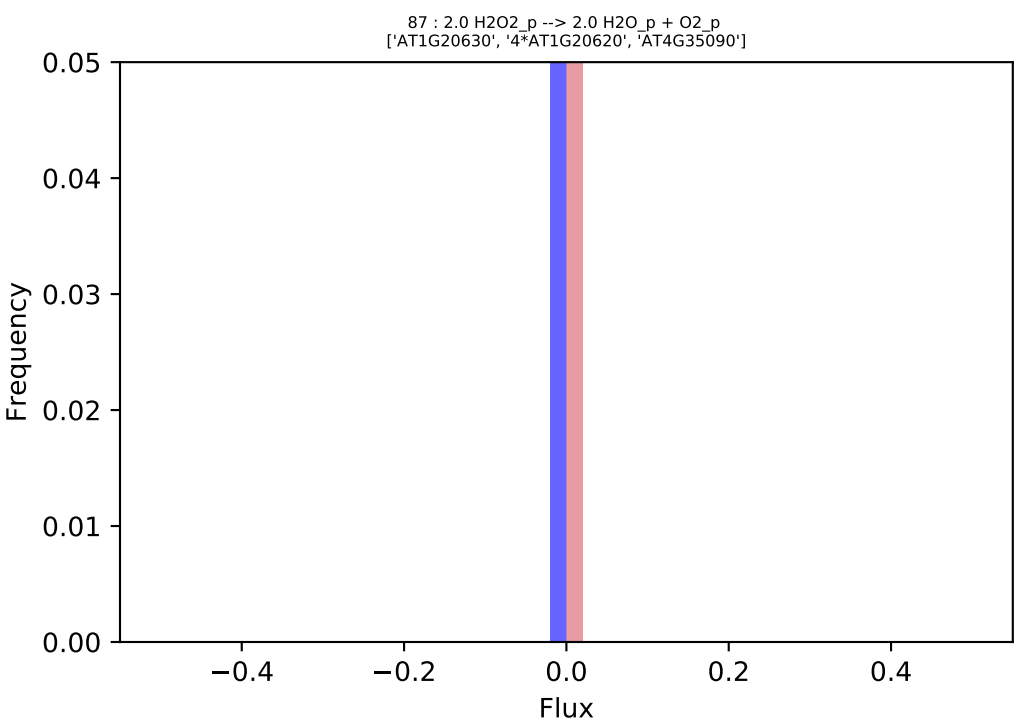

82 : 4.0 Cytcrd_m + 8.0 H_m + O2_m --> 4.0 Cytcox_m + 2.0 H2O_m + 4.0 H_i
0', 'AT2G47380', 'AT5G61310', 'ATMG00730', 'AT1G80230', 'AT4G37380', 'AT5G57815', 'ATMG00160', 'ATMG01360', 'AT1G22450', 'AT3G62400
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8
Flux

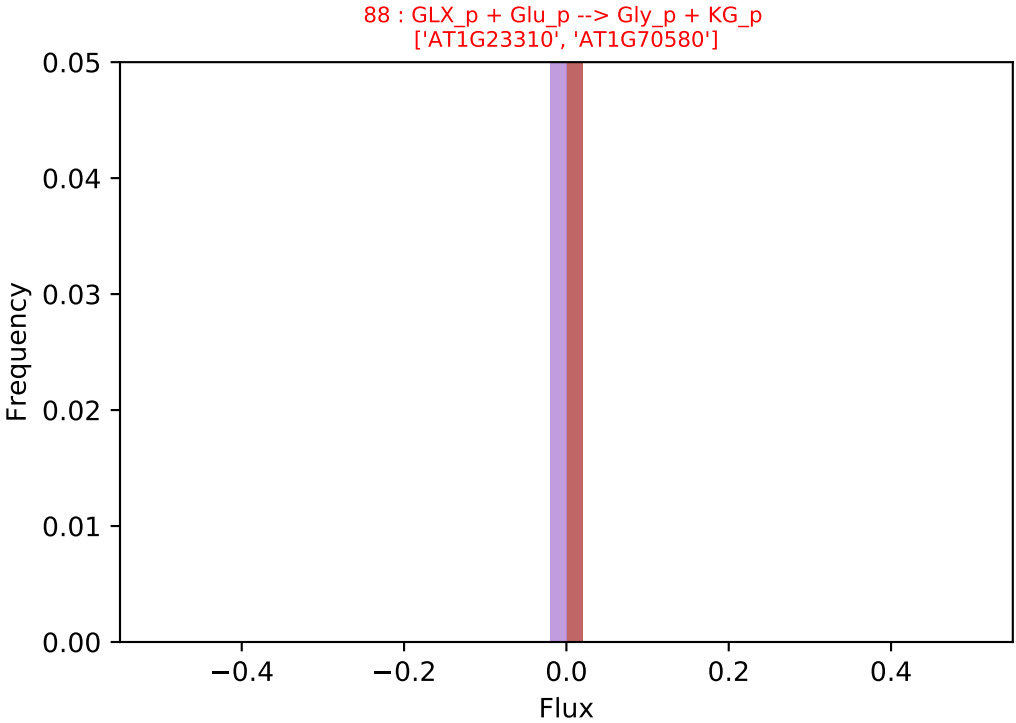

83 : ADP_m + 4.0 H_i + Pi_m <=> ATP_m + H2O_m + 3.0 H_m
G01080', 'AT5G13450', 'AT5G47030', 'AT3G52300', 'AT2G07671', '3*AT5G08670', '3*ATMG01190', '2*ATMG00640', 'AT1G51650', 'ATMG01170',
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
12
13
14
15
16
17
18
19
Flux

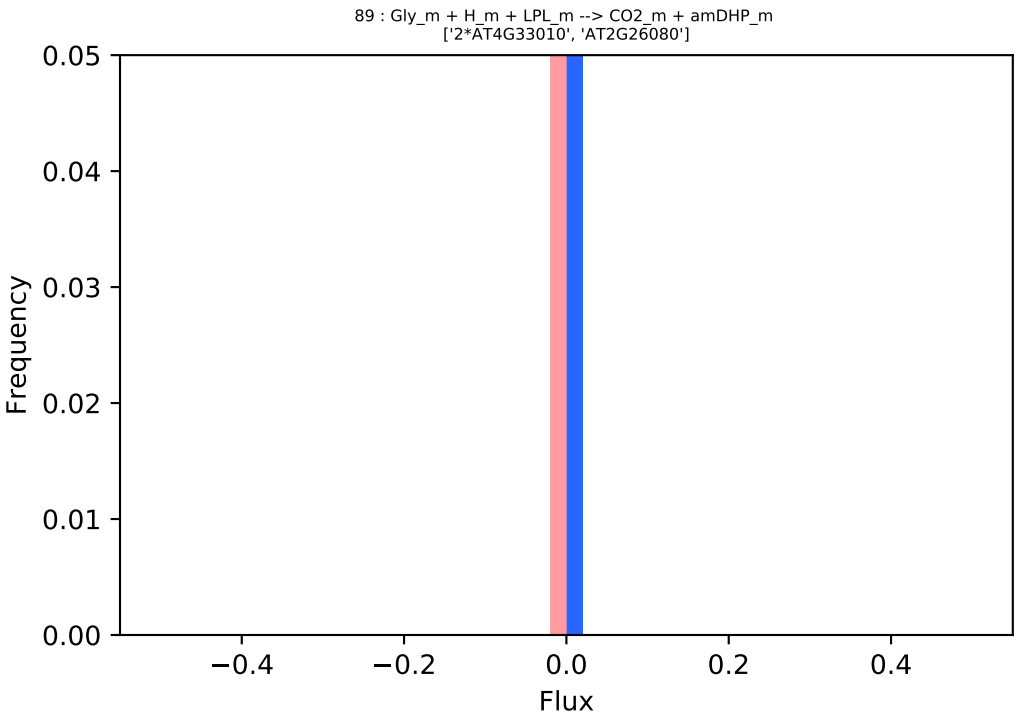

84 : O2_h + RuBP_h --> 2.0 H_h + PGA_h + PGCA_h
['8*AT5G38430', 'AT5G38420', 'AT5G38410', '8*ATCG00490', 'AT1G67090']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

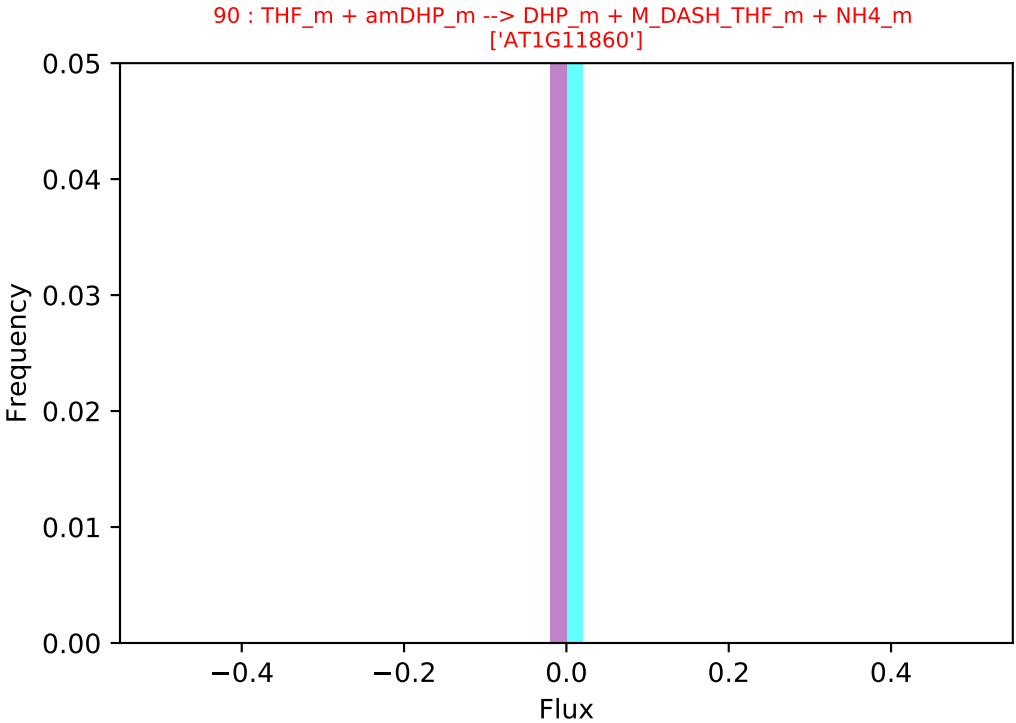

85 : H2O_h + PGCA_h --> GCA_h + Pi_h
['AT5G36790', 'AT5G36700', 'AT5G47760']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

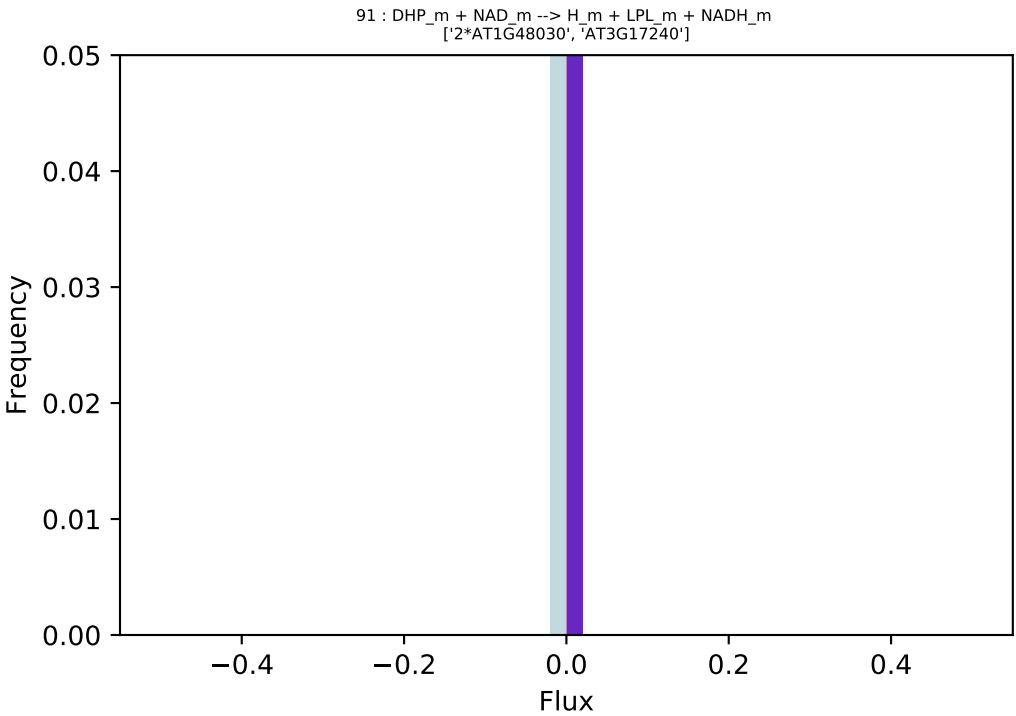

86 : GCA_p + O2_p --> GLX_p + H2O2_p
['AT3G14420', 'AT3G14415', 'AT3G14150', 'AT4G18360']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

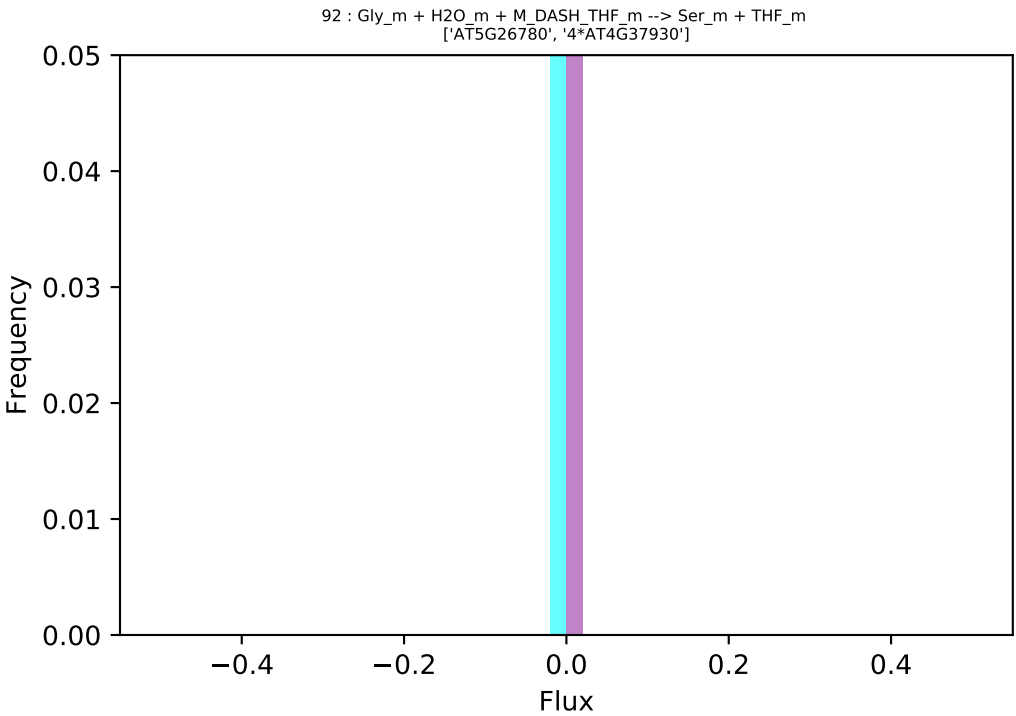

87 : 2.0 H2O2_p --> 2.0 H2O_p + O2_p
['AT1G20630', '4*AT1G20620', 'AT4G35090']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

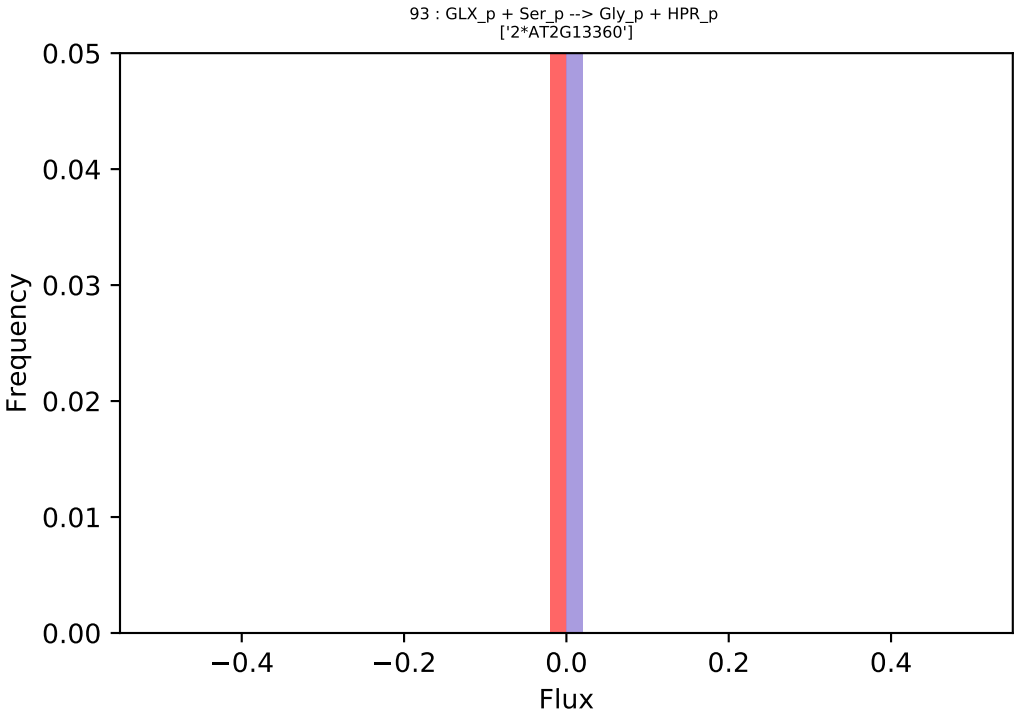

88 : GLX_p + Glu_p --> Gly_p + KG_p
['AT1G23310', 'AT1G70580']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


89 : Gly_m + H_m + LPL_m --> CO2_m + amDHP_m
['2*AT4G33010', 'AT2G26080']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


90 : THF_m + amDHP_m --> DHP_m + M_DASH_THF_m + NH4_m
['AT1G11860']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


91 : DHP_m + NAD_m --> H_m + LPL_m + NADH_m
['2*AT1G48030', 'AT3G17240']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


92 : Gly_m + H2O_m + M_DASH_THF_m --> Ser_m + THF_m
['AT5G26780', '4*AT4G37930']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


93 : GLX_p + Ser_p --> Gly_p + HPR_p
['2*AT2G13360']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
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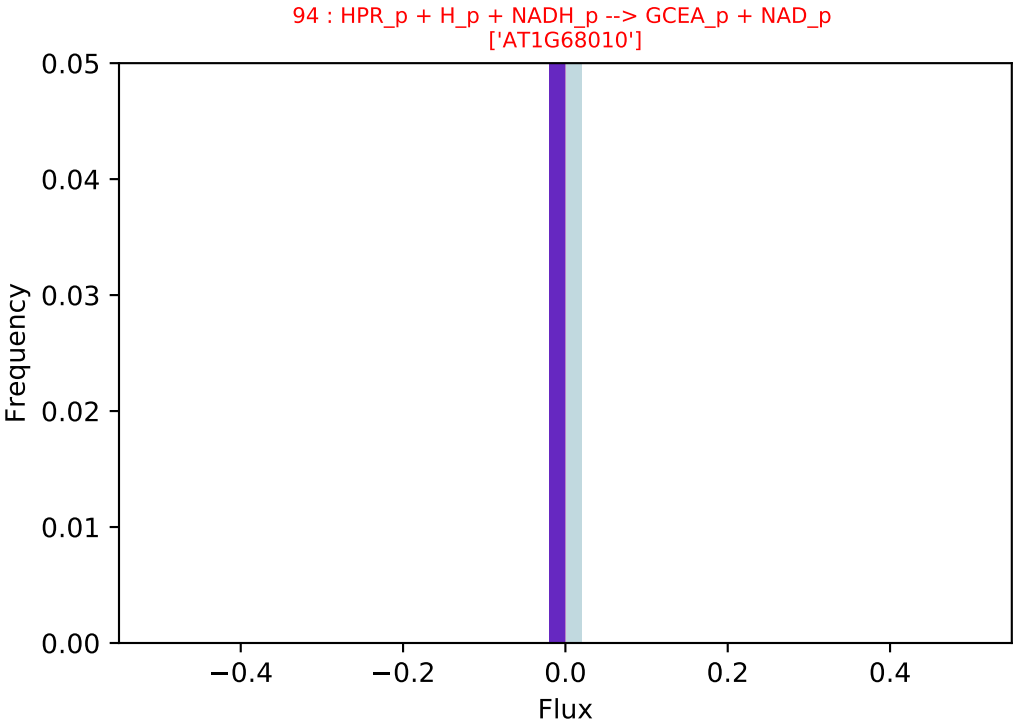
0.4
Flux


94 : HPR_p + H_p + NADH_p --> GCEA_p + NAD_p
['AT1G68010']
0.05
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0.02
0.01
0.00
Frequency
−0.4
−0.2
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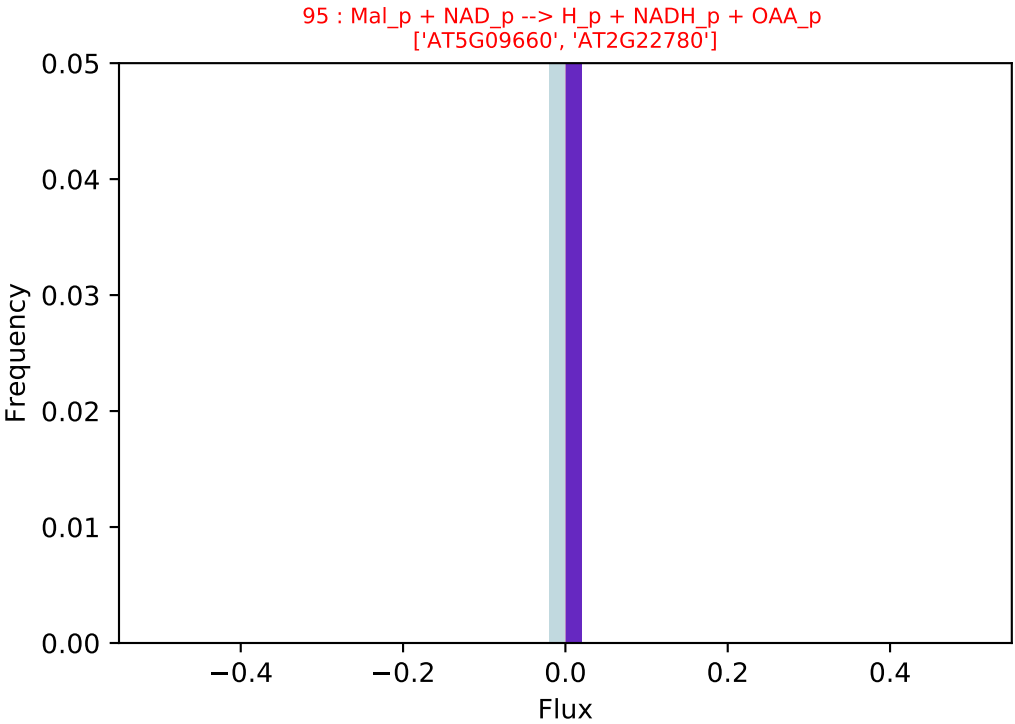
Flux


95 : Mal_p + NAD_p --> H_p + NADH_p + OAA_p
['AT5G09660', 'AT2G22780']
0.05
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0.03
0.02
0.01
0.00
Frequency
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−0.2
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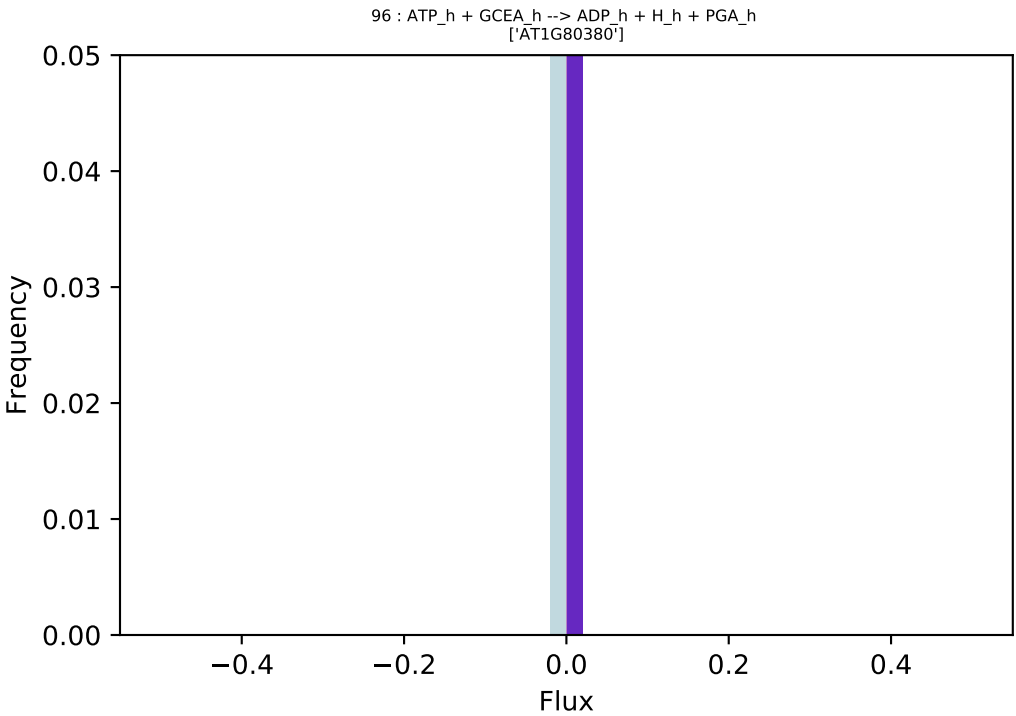
0.2
0.4
Flux


96 : ATP_h + GCEA_h --> ADP_h + H_h + PGA_h
['AT1G80380']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
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−0.2
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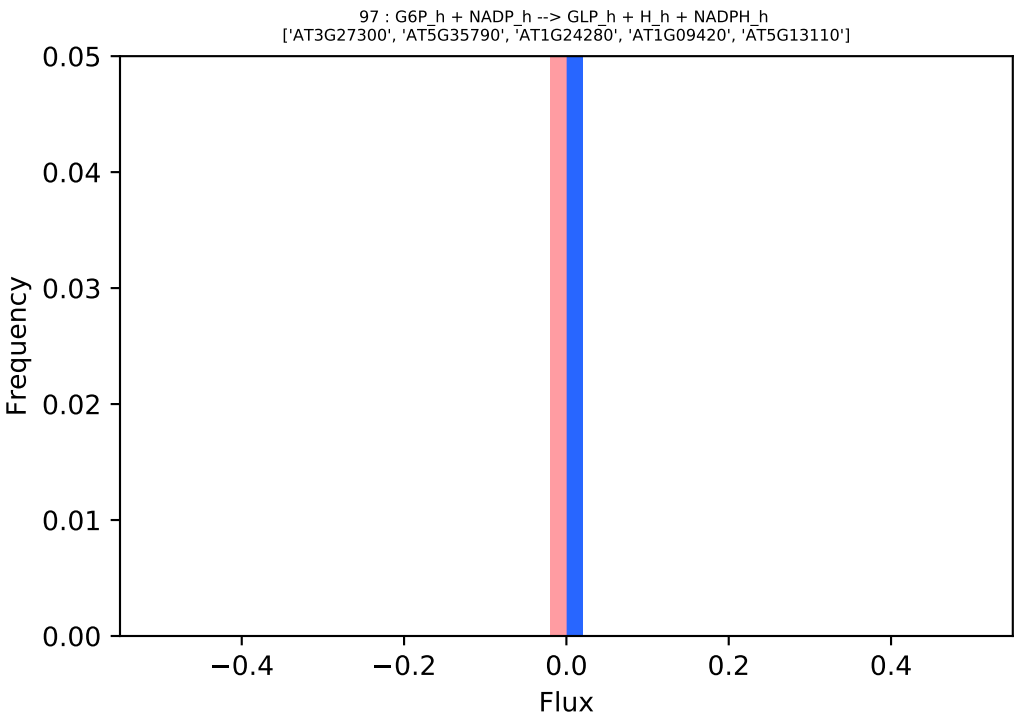
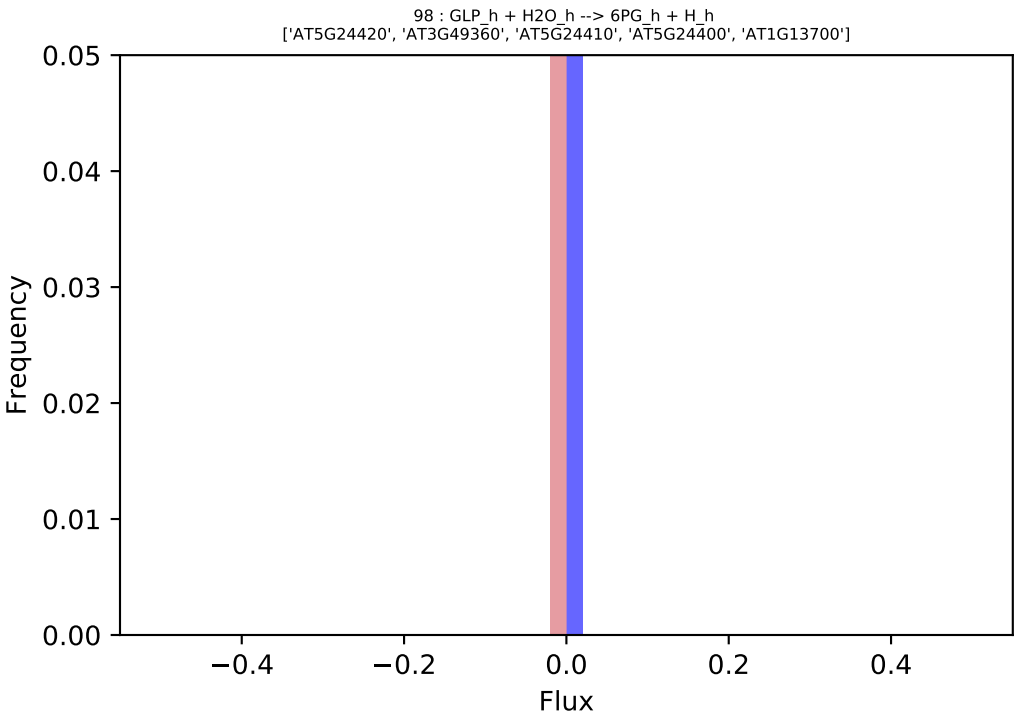
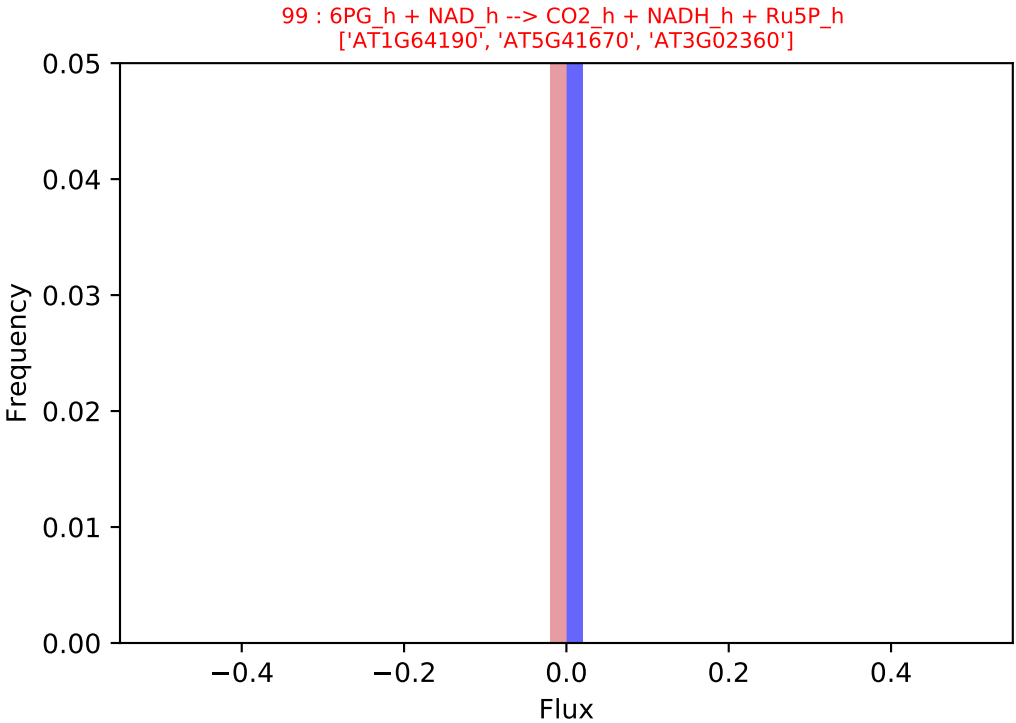
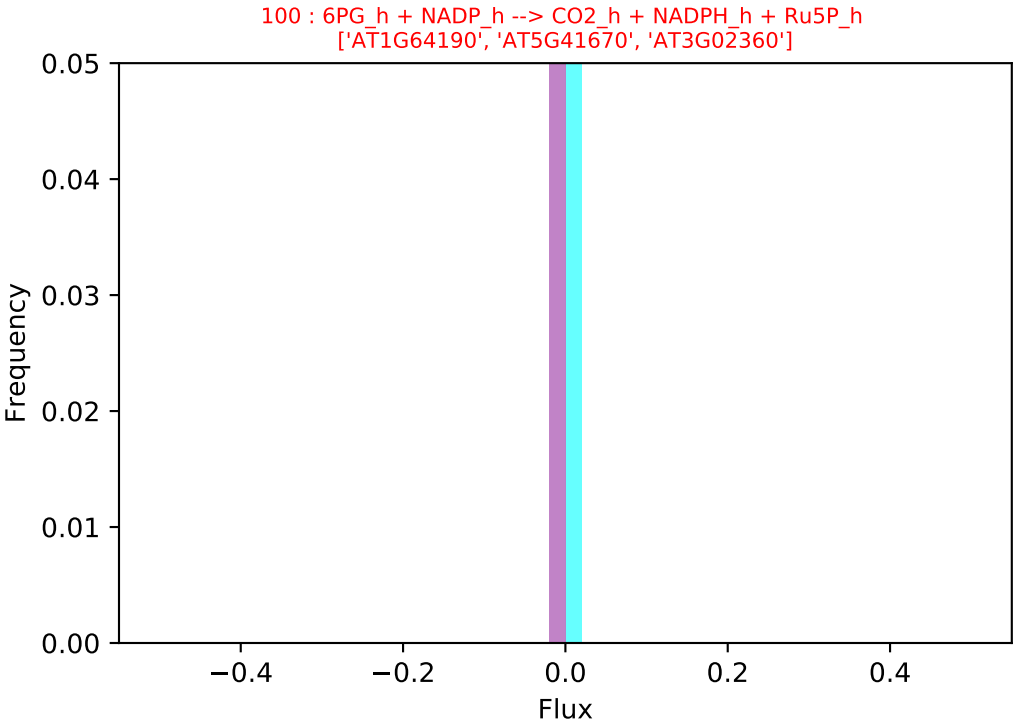
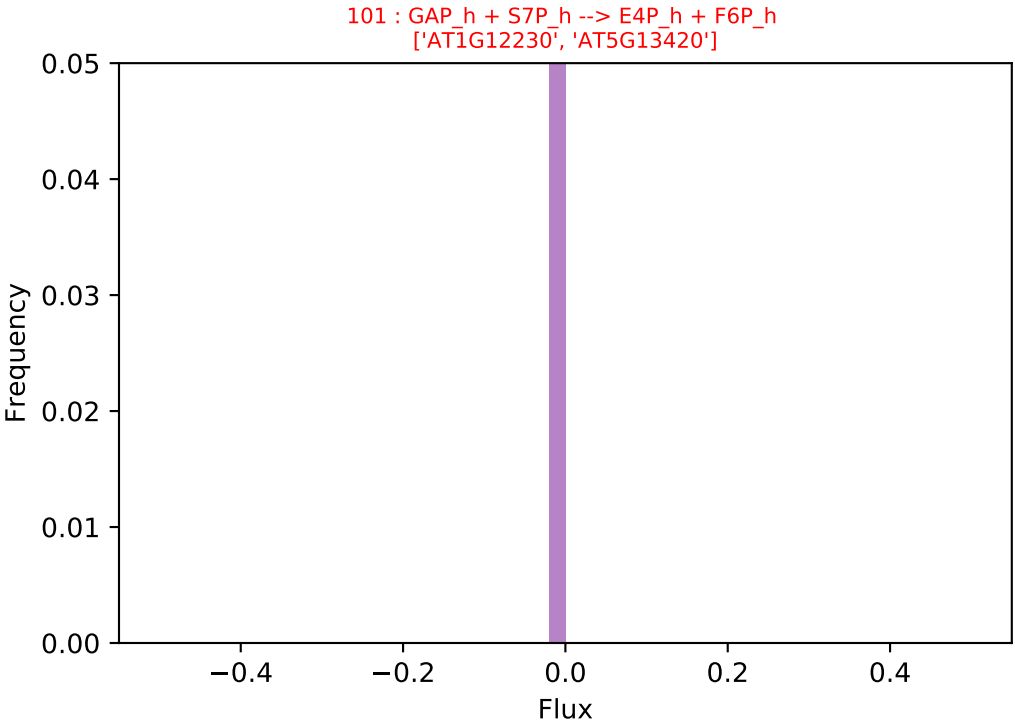
0.2
0.4
Flux

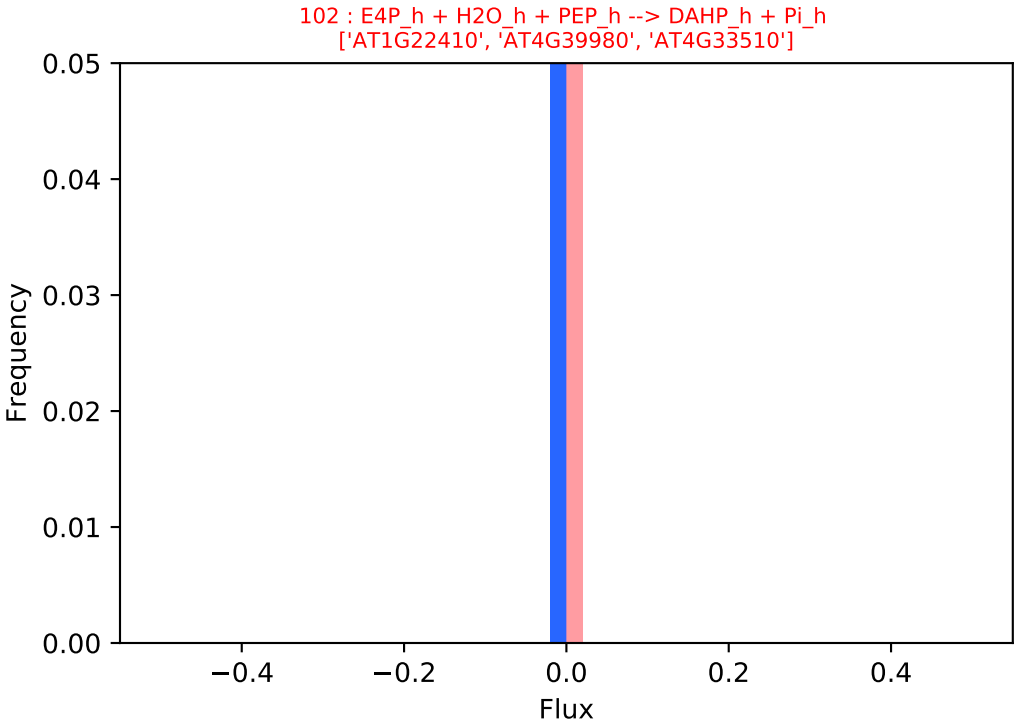

97 : G6P_h + NADP_h --> GLP_h + H_h + NADPH_h
['AT3G27300', 'AT5G35790', 'AT1G24280', 'AT1G09420', 'AT5G13110']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

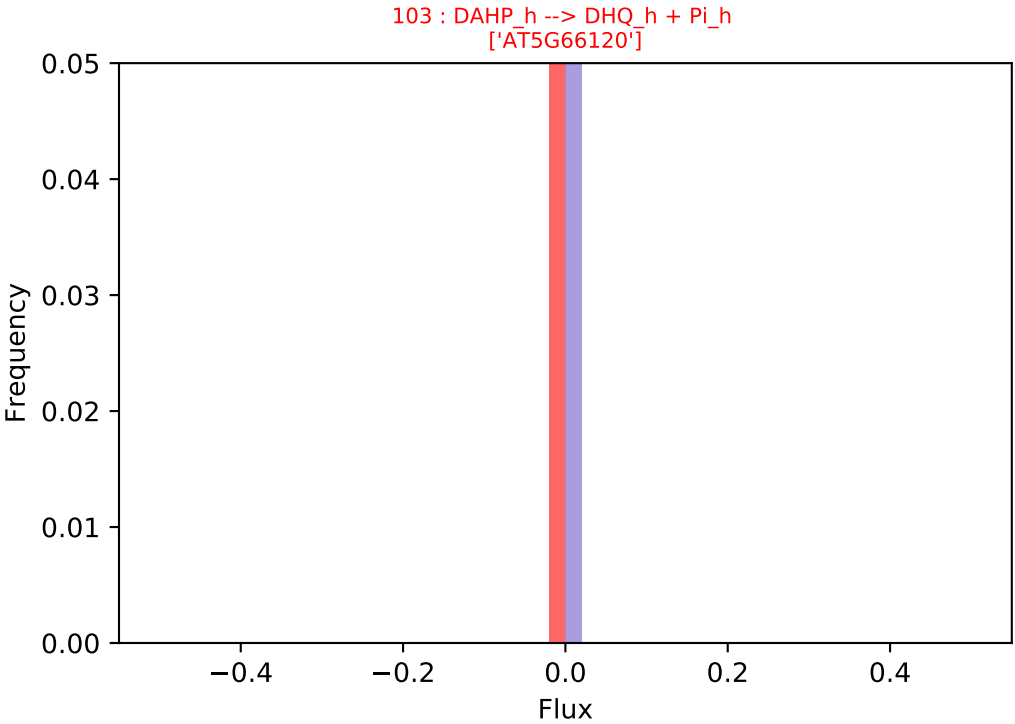

98 : GLP_h + H2O_h --> 6PG_h + H_h
['AT5G24420', 'AT3G49360', 'AT5G24410', 'AT5G24400', 'AT1G13700']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

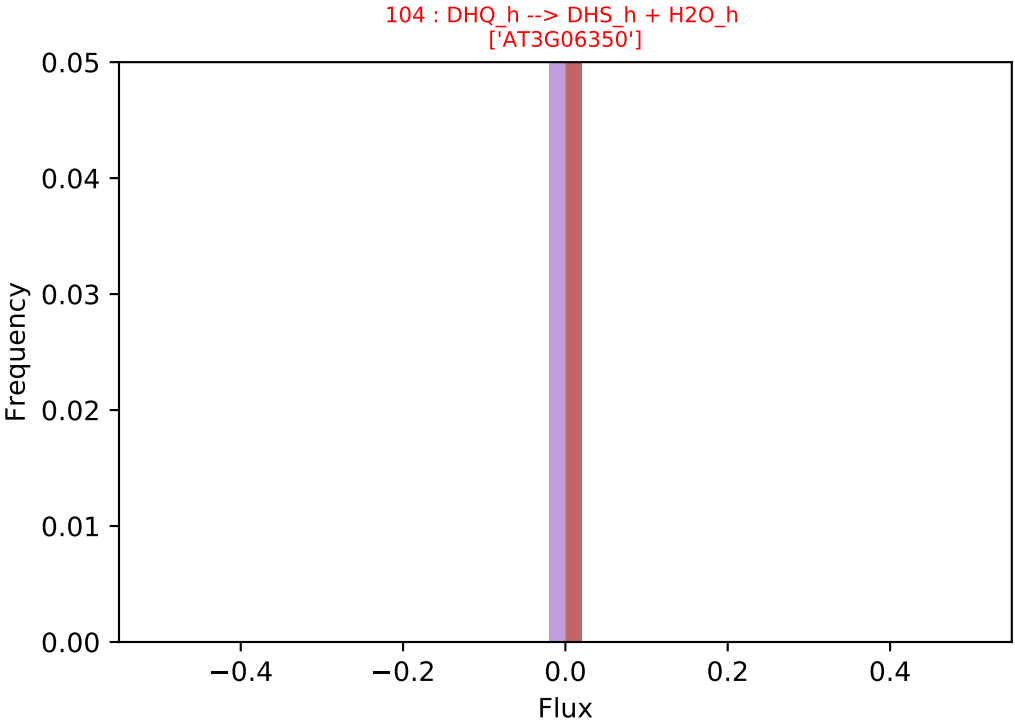

99 : 6PG_h + NAD_h --> CO2_h + NADH_h + Ru5P_h
['AT1G64190', 'AT5G41670', 'AT3G02360']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

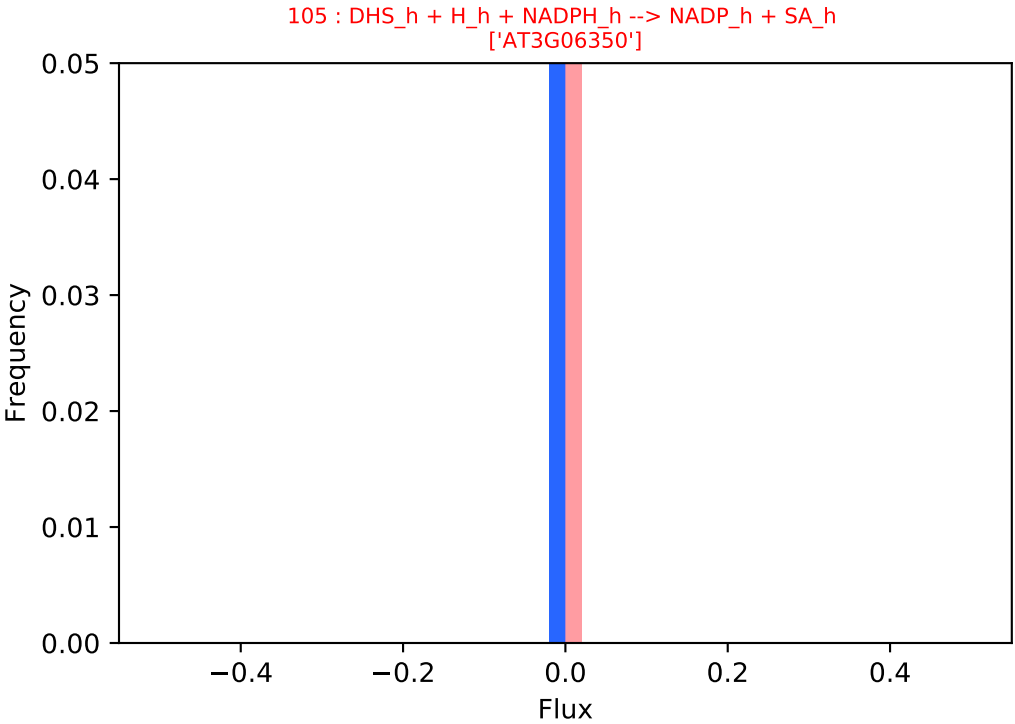

100 : 6PG_h + NADP_h --> CO2_h + NADPH_h + Ru5P_h
['AT1G64190', 'AT5G41670', 'AT3G02360']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

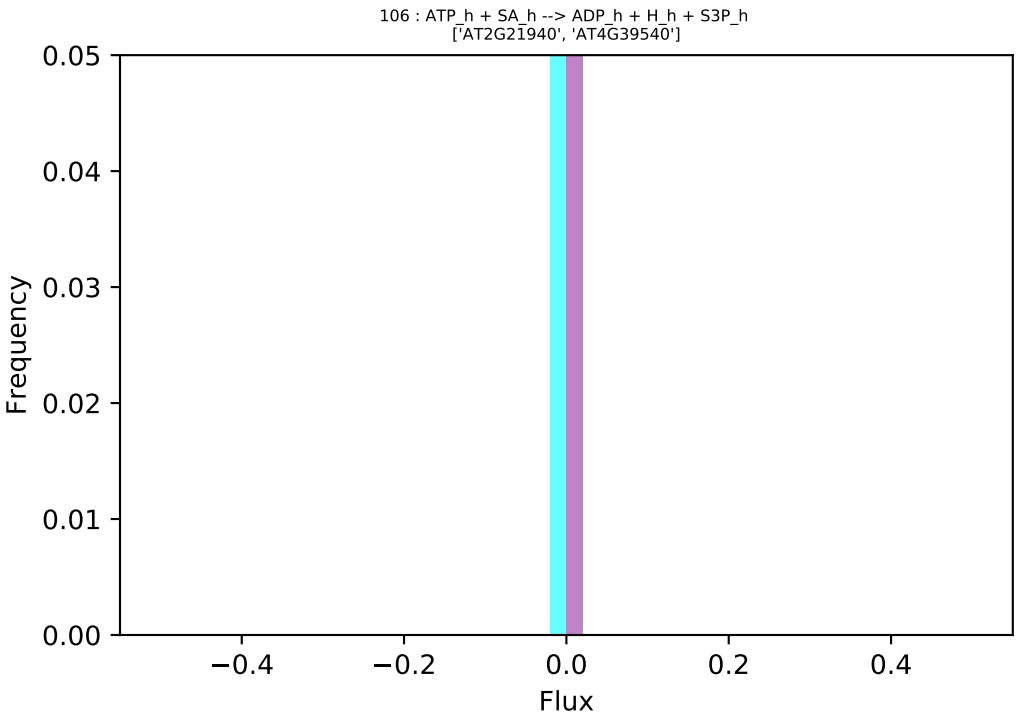

101 : GAP_h + S7P_h --> E4P_h + F6P_h
['AT1G12230', 'AT5G13420']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

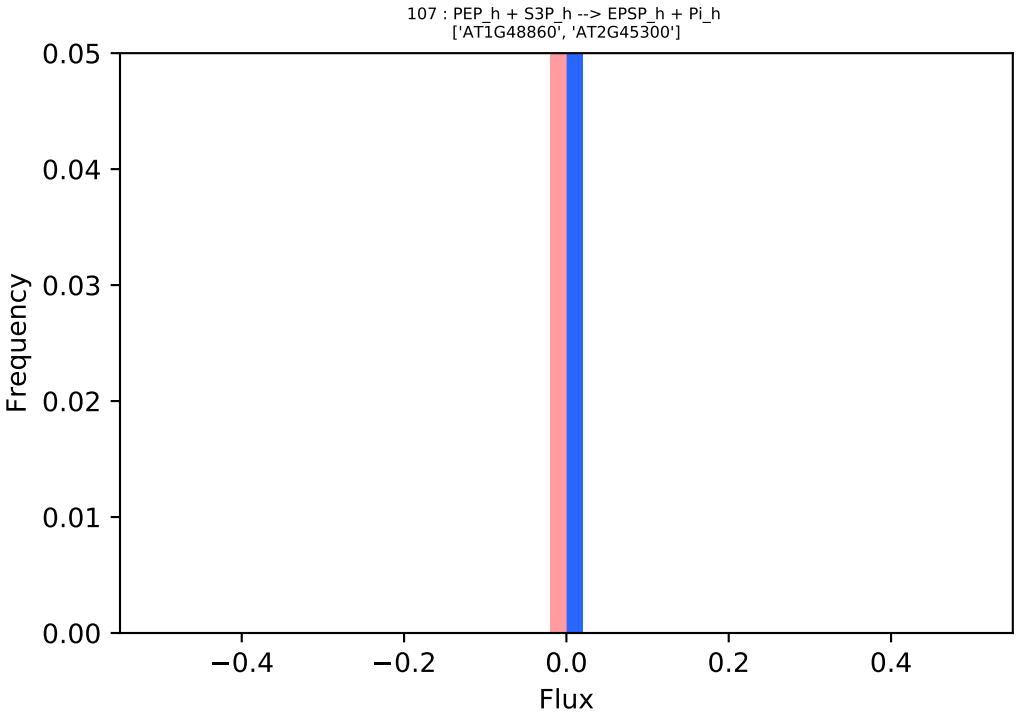

102 : E4P_h + H2O_h + PEP_h --> DAHP_h + Pi_h
['AT1G22410', 'AT4G39980', 'AT4G33510']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

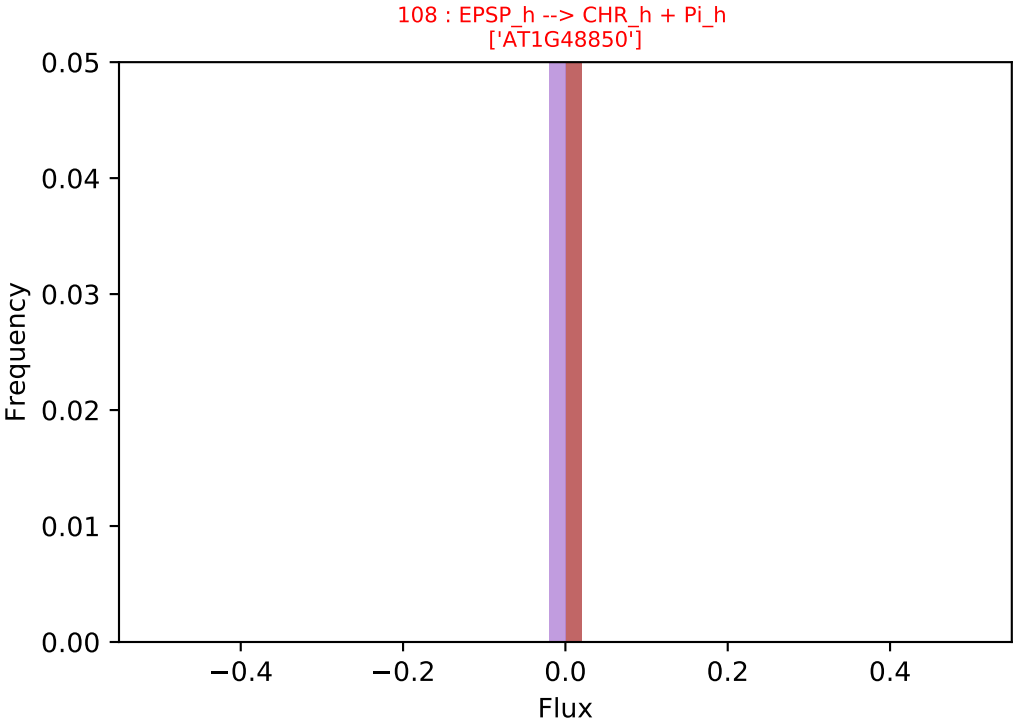

103 : DAHP_h --> DHQ_h + Pi_h
['AT5G66120']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

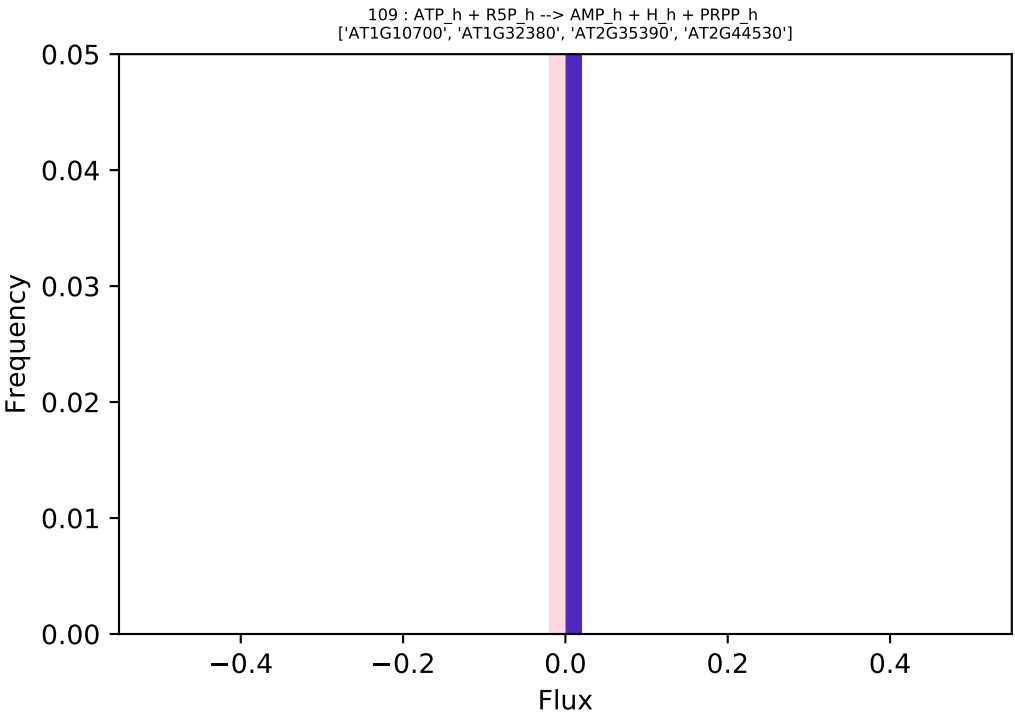

104 : DHQ_h --> DHS_h + H2O_h
['AT3G06350']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

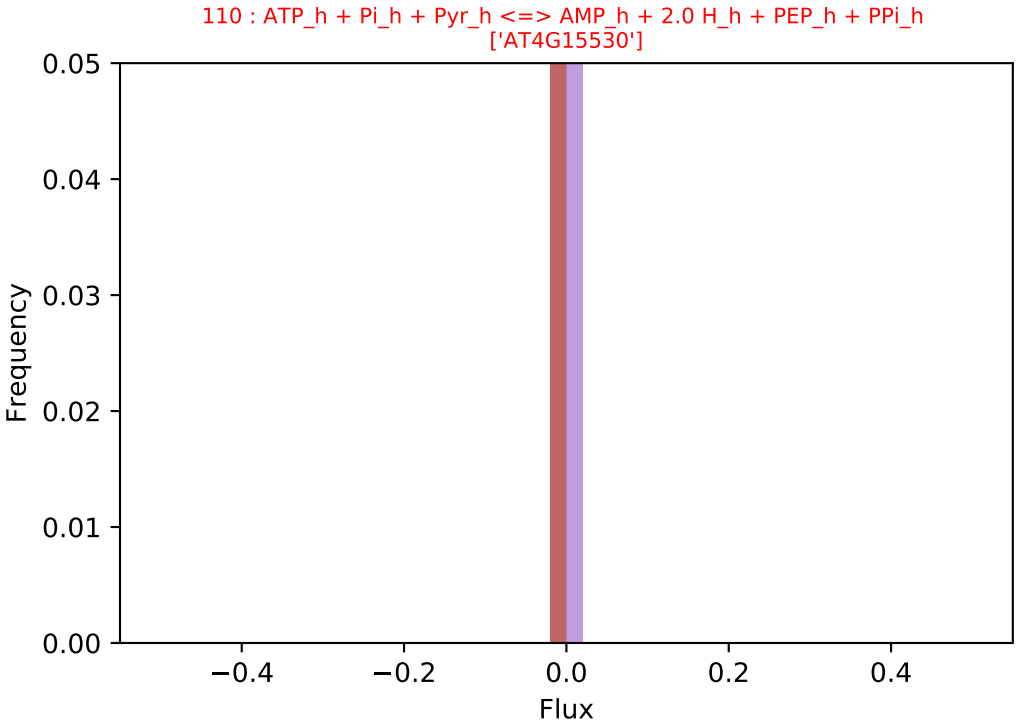

105 : DHS_h + H_h + NADPH_h --> NADP_h + SA_h
['AT3G06350']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

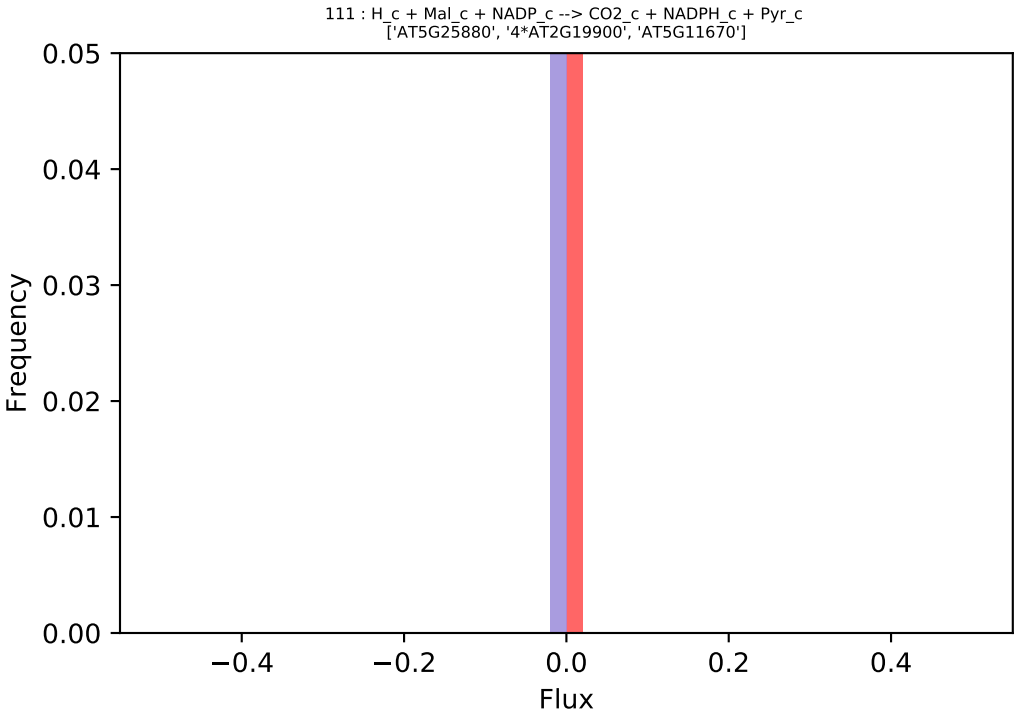

106 : ATP_h + SA_h --> ADP_h + H_h + S3P_h
['AT2G21940', 'AT4G39540']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

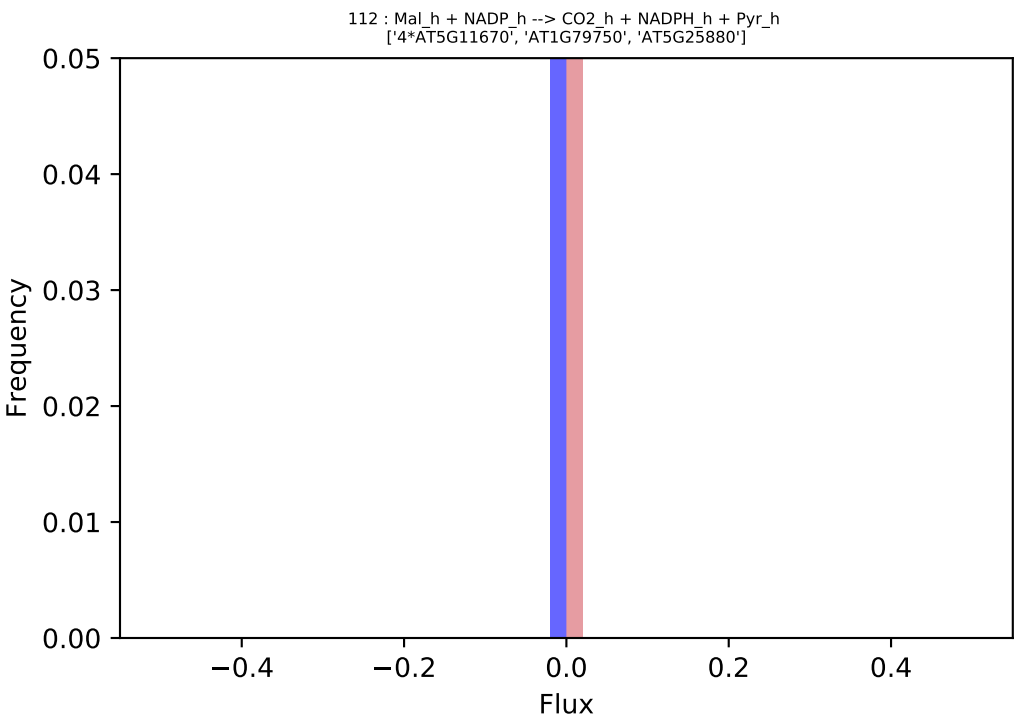

107 : PEP_h + S3P_h --> EPSP_h + Pi_h
['AT1G48860', 'AT2G45300']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


108 : EPSP_h --> CHR_h + Pi_h
['AT1G48850']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


109 : ATP_h + R5P_h --> AMP_h + H_h + PRPP_h
['AT1G10700', 'AT1G32380', 'AT2G35390', 'AT2G44530']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


110 : ATP_h + Pi_h + Pyr_h <=> AMP_h + 2.0 H_h + PEP_h + PPi_h
['AT4G15530']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


111 : H_c + Mal_c + NADP_c --> CO2_c + NADPH_c + Pyr_c
['AT5G25880', '4*AT2G19900', 'AT5G11670']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


112 : Mal_h + NADP_h --> CO2_h + NADPH_h + Pyr_h
['4*AT5G11670', 'AT1G79750', 'AT5G25880']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
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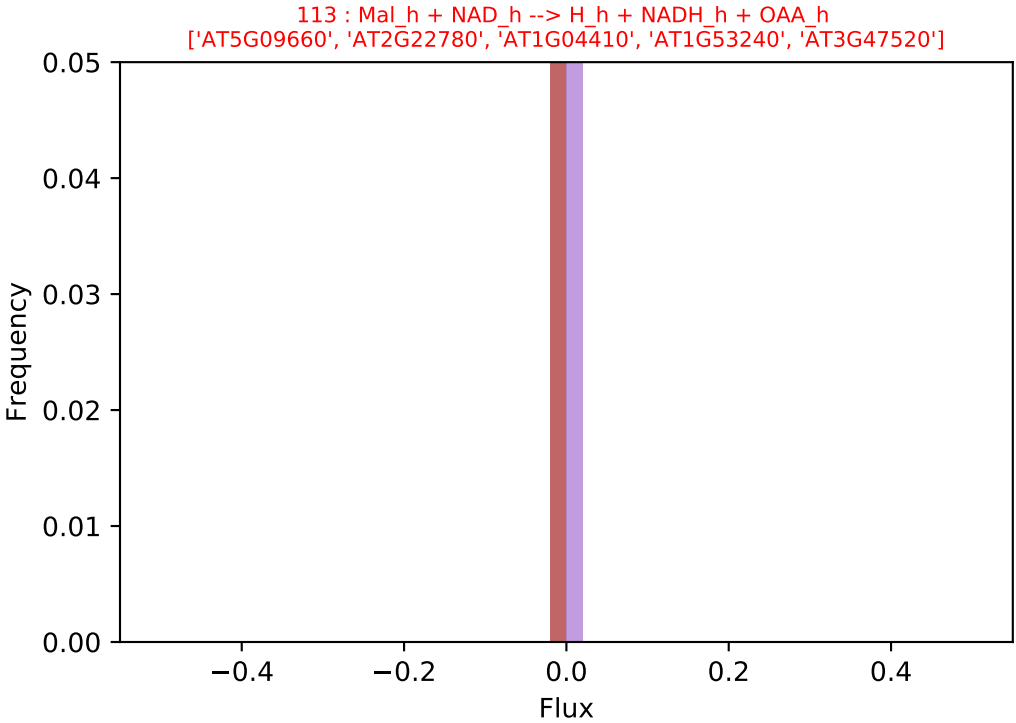
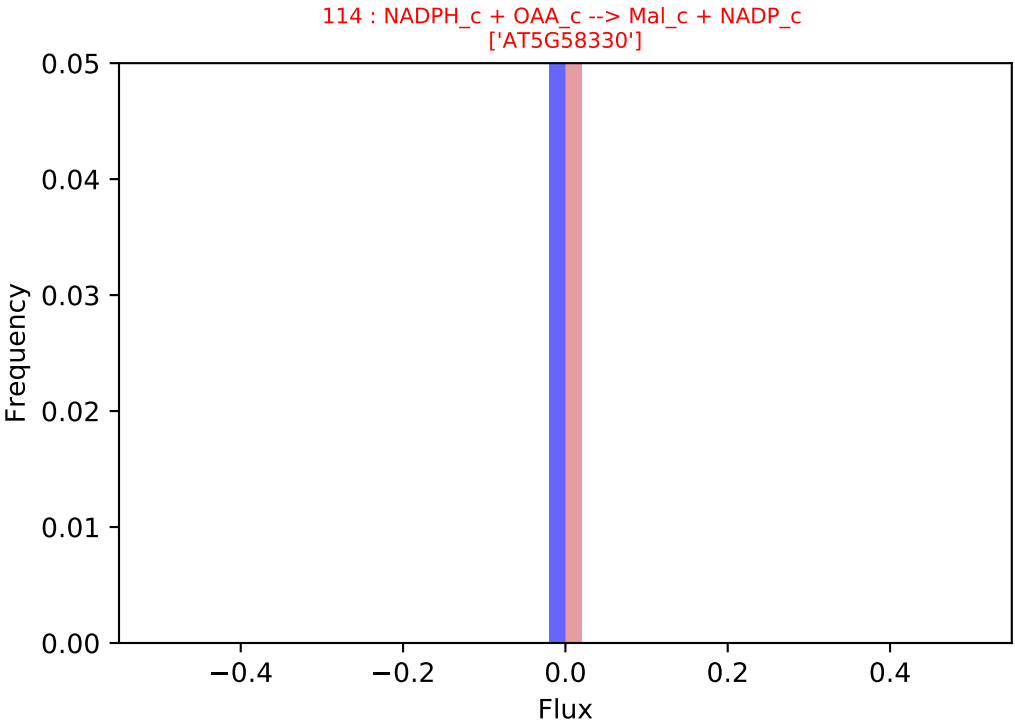
−0.2
0.0
0.2
0.4
Flux


113 : Mal_h + NAD_h --> H_h + NADH_h + OAA_h
['AT5G09660', 'AT2G22780', 'AT1G04410', 'AT1G53240', 'AT3G47520']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


114 : NADPH_c + OAA_c --> Mal_c + NADP_c
['AT5G58330']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
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−0.2
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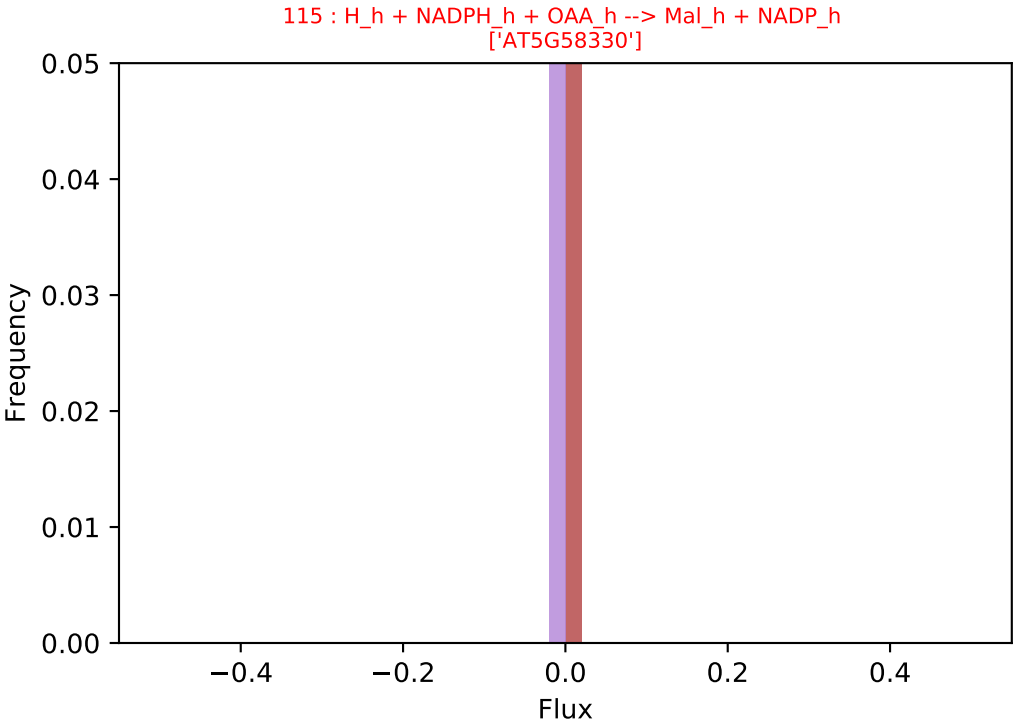
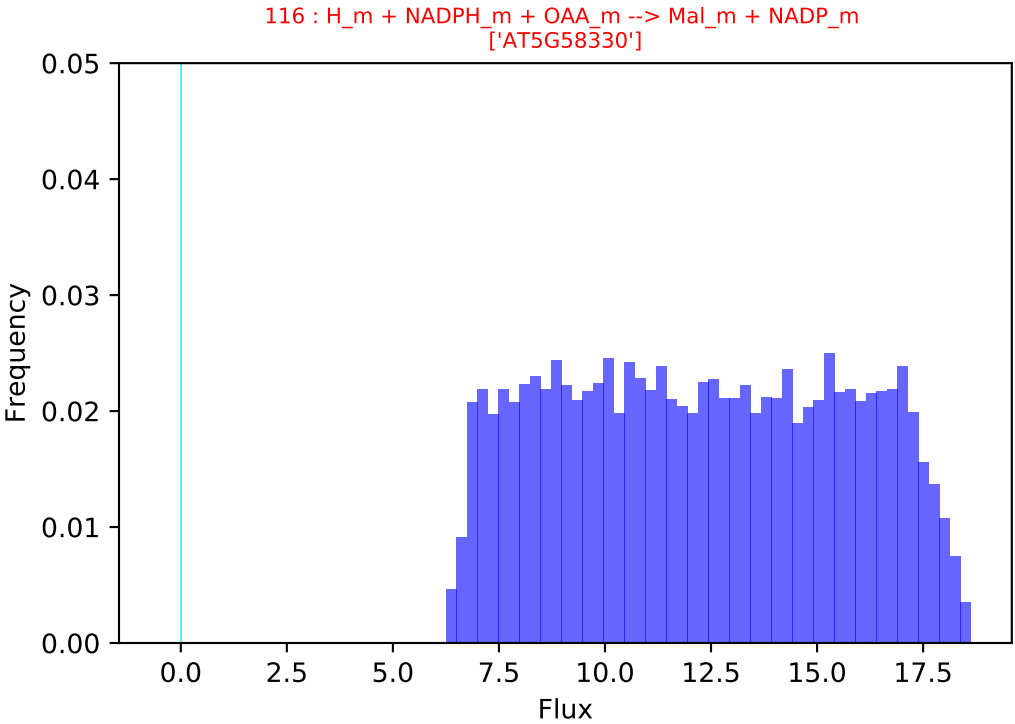
0.2
0.4
Flux


115 : H_h + NADPH_h + OAA_h --> Mal_h + NADP_h
['AT5G58330']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


116 : H_m + NADPH_m + OAA_m --> Mal_m + NADP_m
['AT5G58330']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
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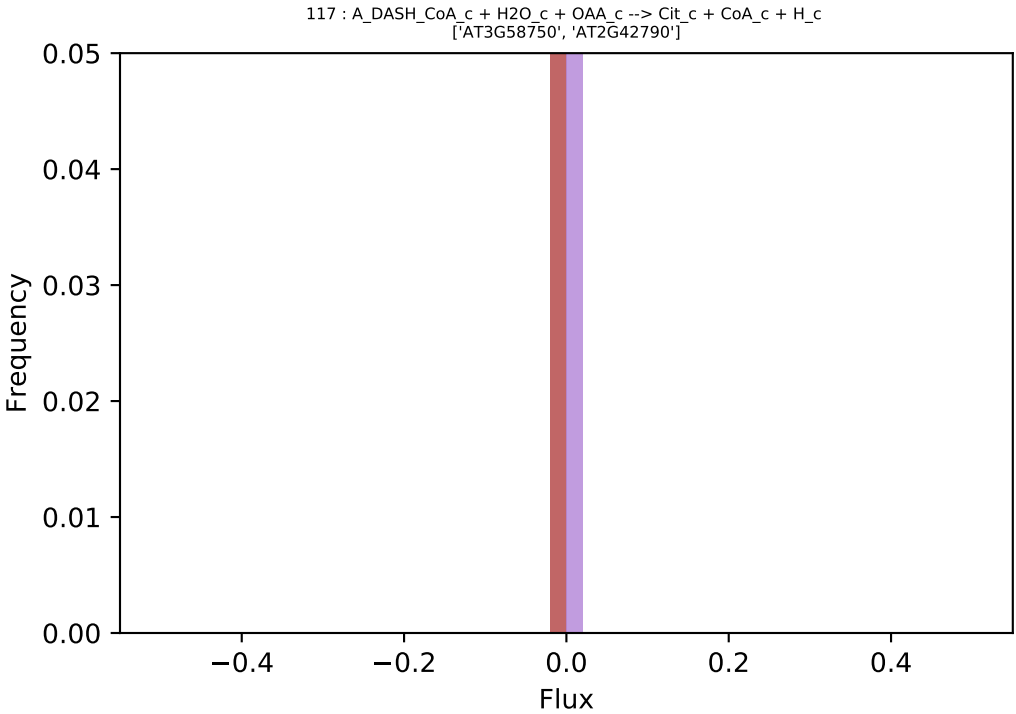
5.0
7.5
10.0
12.5
15.0
17.5
Flux


117 : A_DASH_CoA_c + H2O_c + OAA_c --> Cit_c + CoA_c + H_c
['AT3G58750', 'AT2G42790']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
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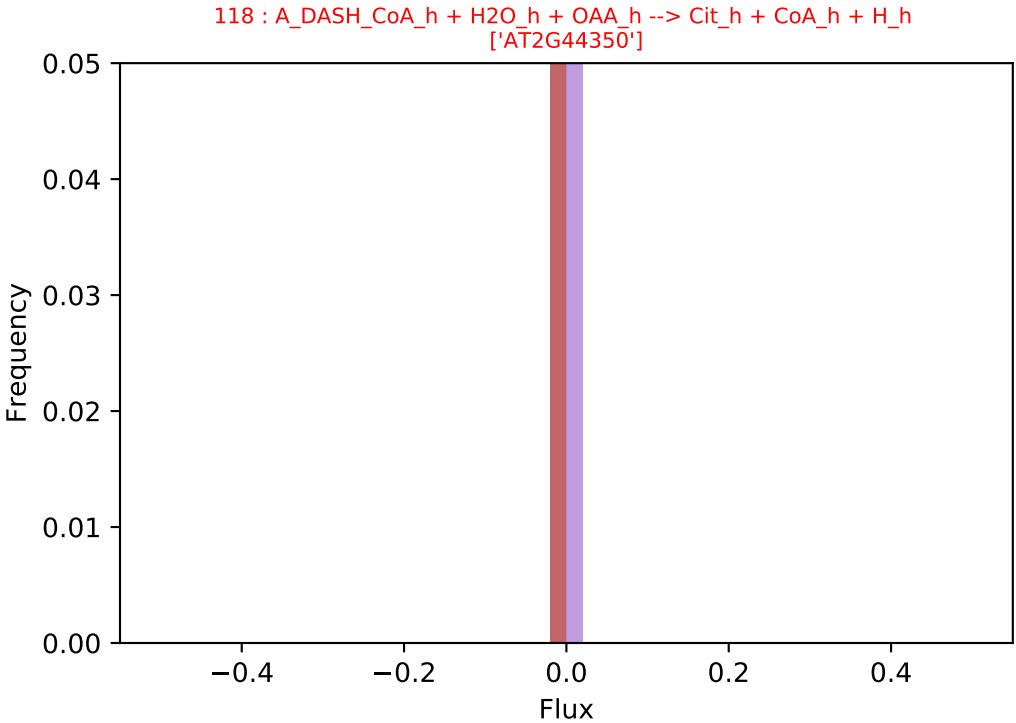
0.2
0.4
Flux


118 : A_DASH_CoA_h + H2O_h + OAA_h --> Cit_h + CoA_h + H_h
['AT2G44350']
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0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
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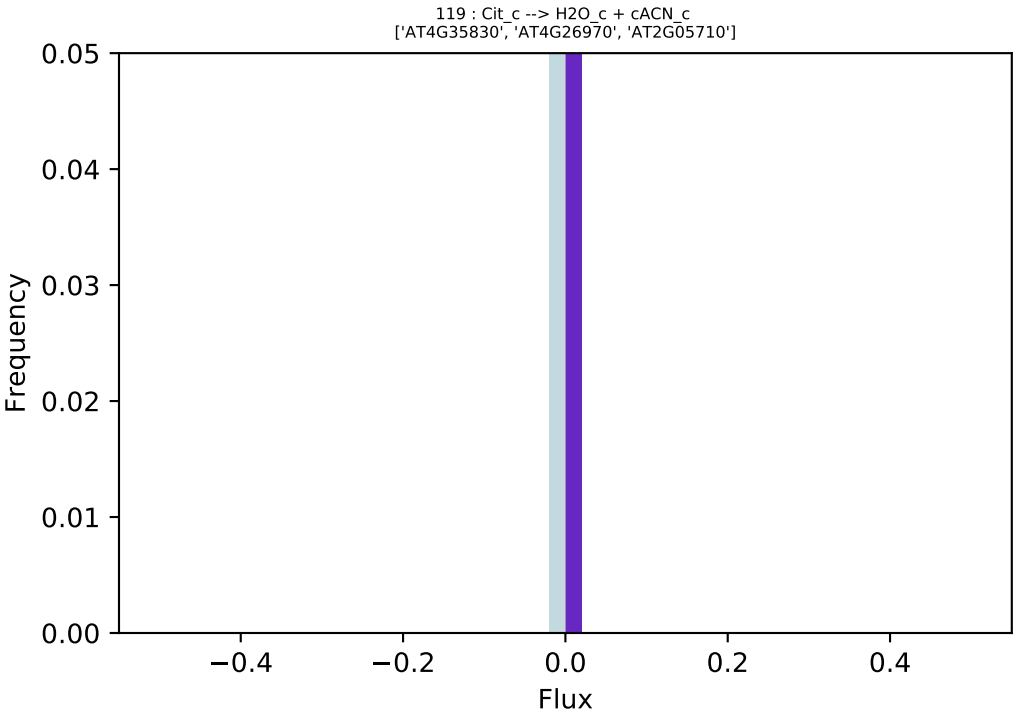
0.4
Flux


119 : Cit_c --> H2O_c + cACN_c
['AT4G35830', 'AT4G26970', 'AT2G05710']
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0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
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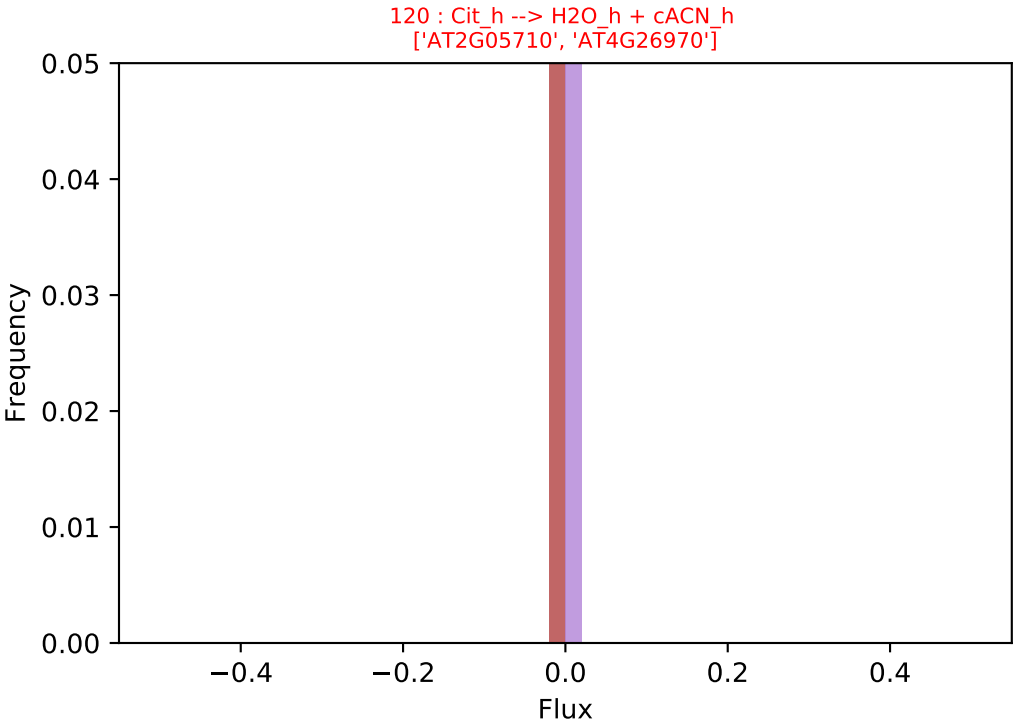
0.2
0.4
Flux


120 : Cit_h --> H2O_h + cACN_h
['AT2G05710', 'AT4G26970']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
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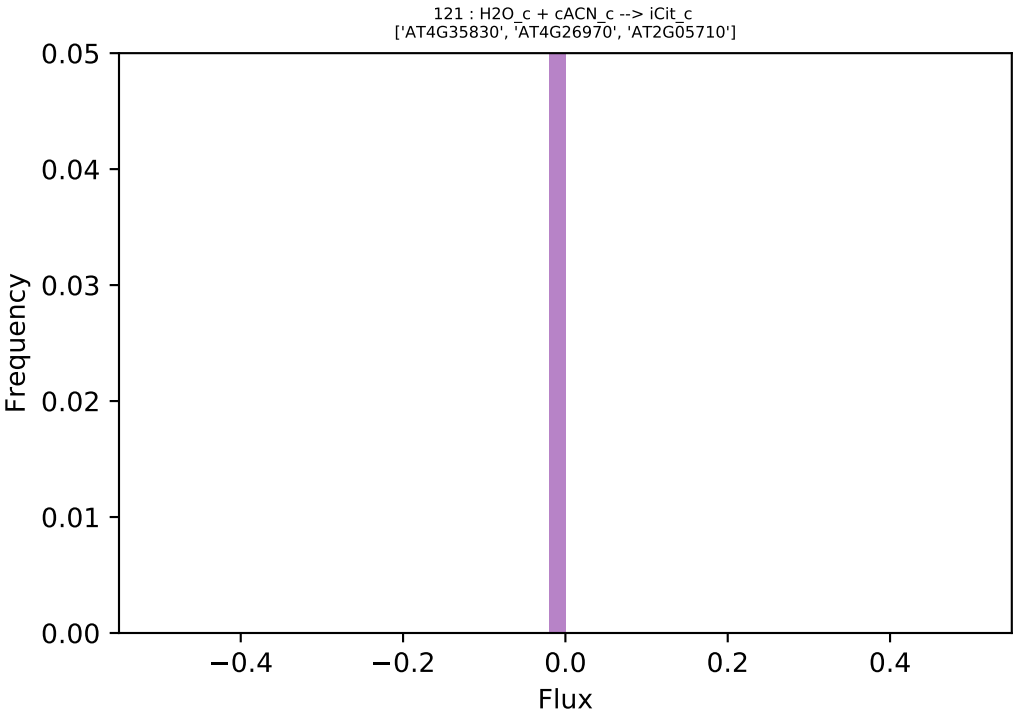
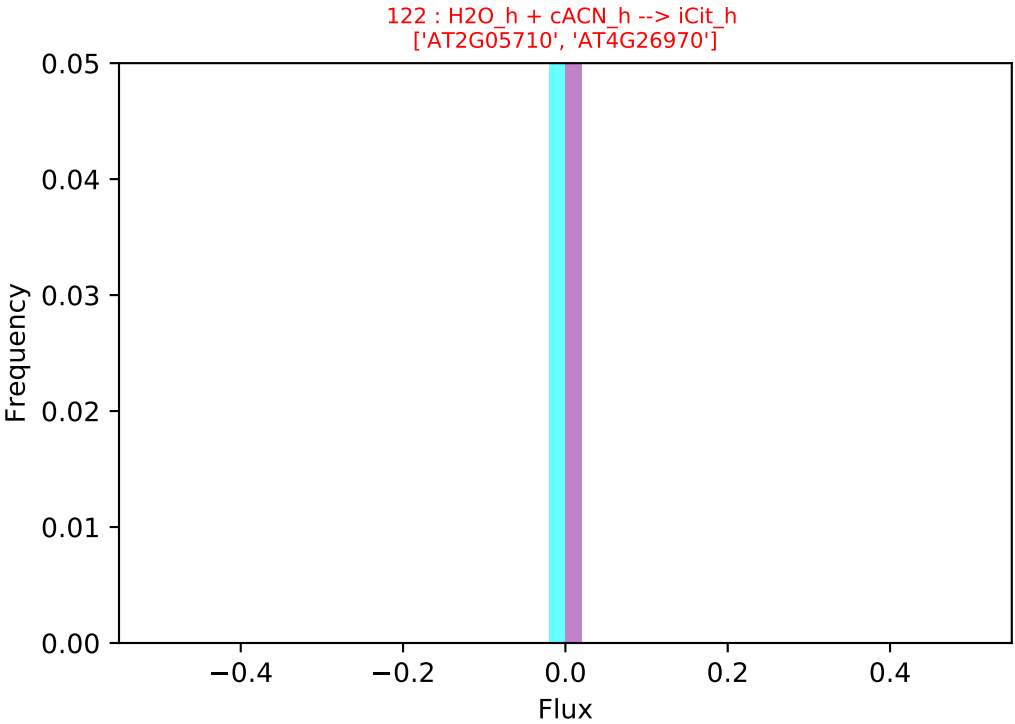
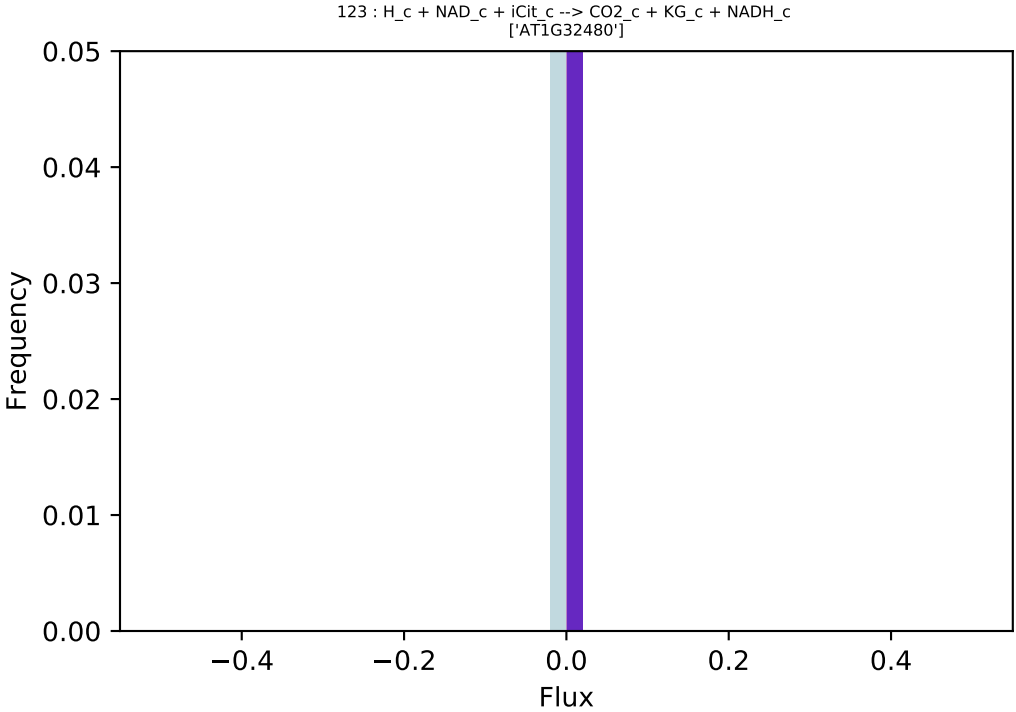
0.2
0.4
Flux


121 : H2O_c + cACN_c --> iCit_c
['AT4G35830', 'AT4G26970', 'AT2G05710']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


122 : H2O_h + cACN_h --> iCit_h
['AT2G05710', 'AT4G26970']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


123 : H_c + NAD_c + iCit_c --> CO2_c + KG_c + NADH_c
['AT1G32480']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
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−0.2
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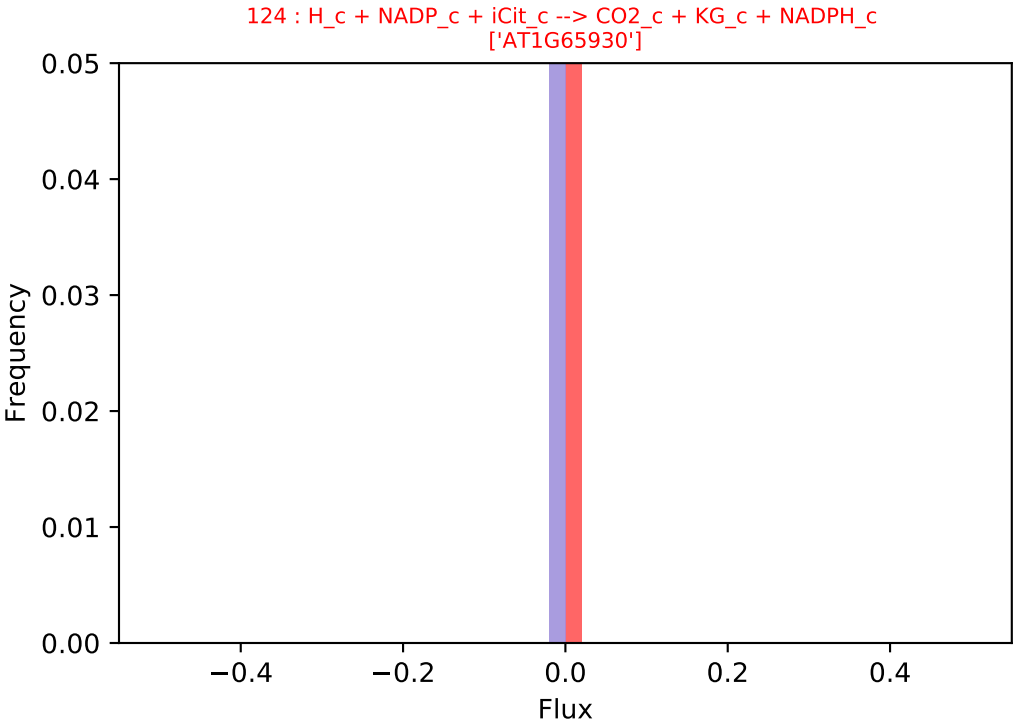
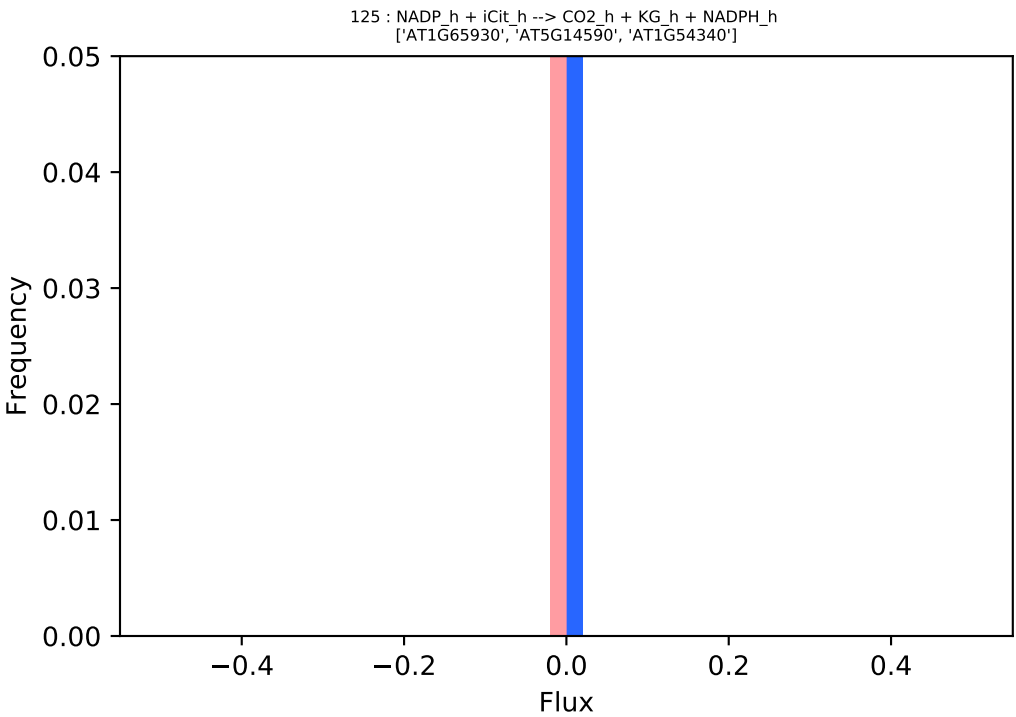
0.4
Flux


124 : H_c + NADP_c + iCit_c --> CO2_c + KG_c + NADPH_c
['AT1G65930']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


125 : NADP_h + iCit_h --> CO2_h + KG_h + NADPH_h
['AT1G65930', 'AT5G14590', 'AT1G54340']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
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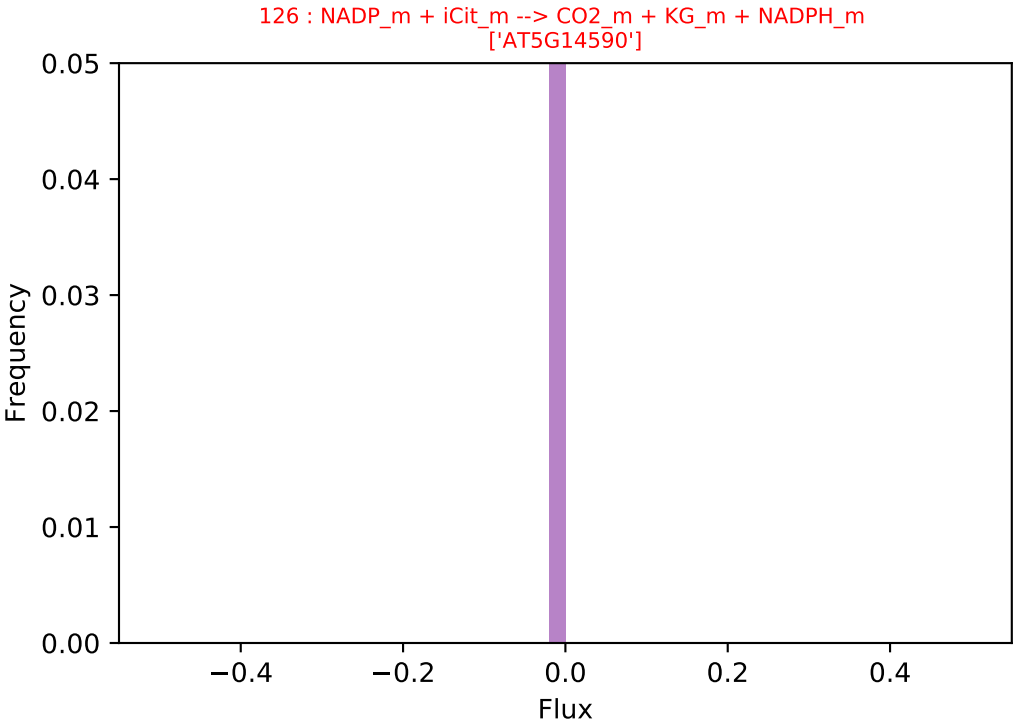
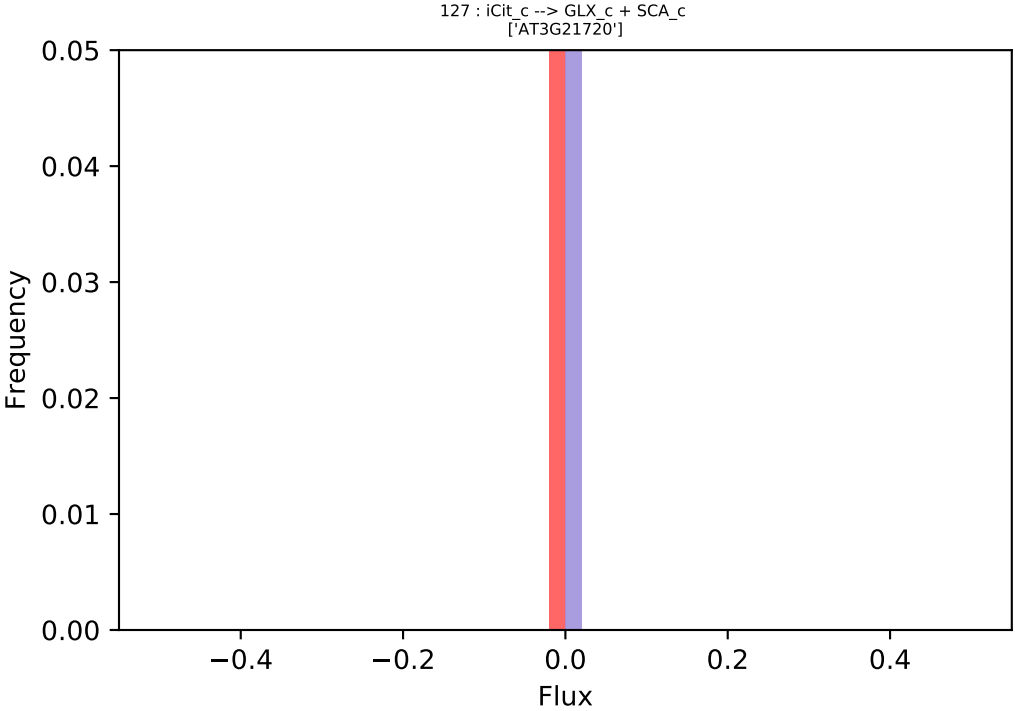
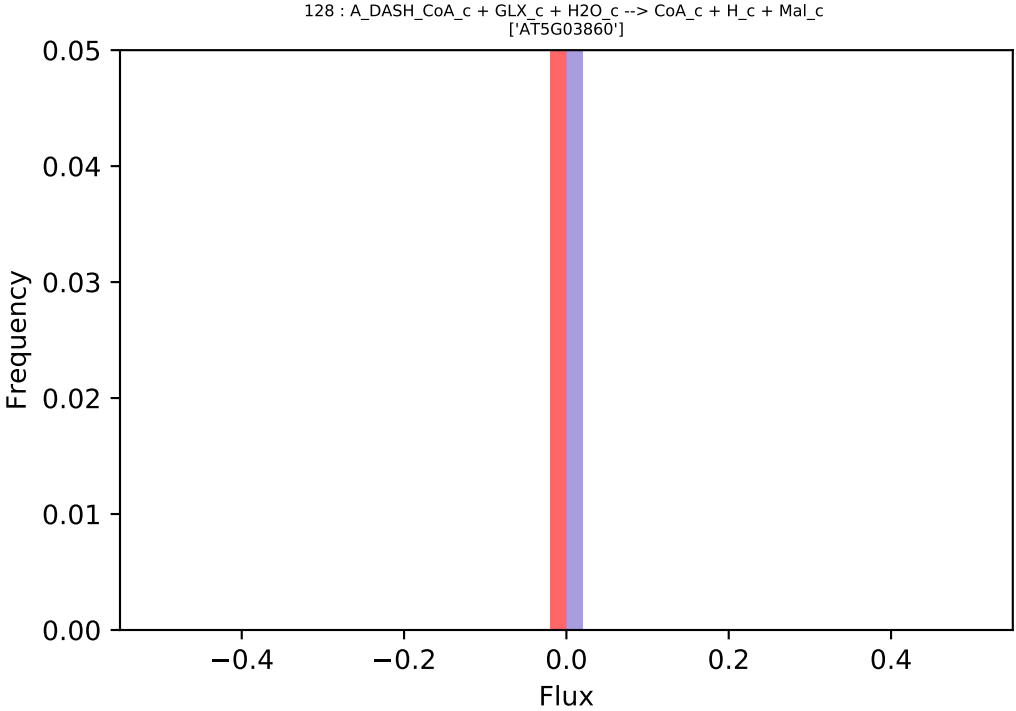
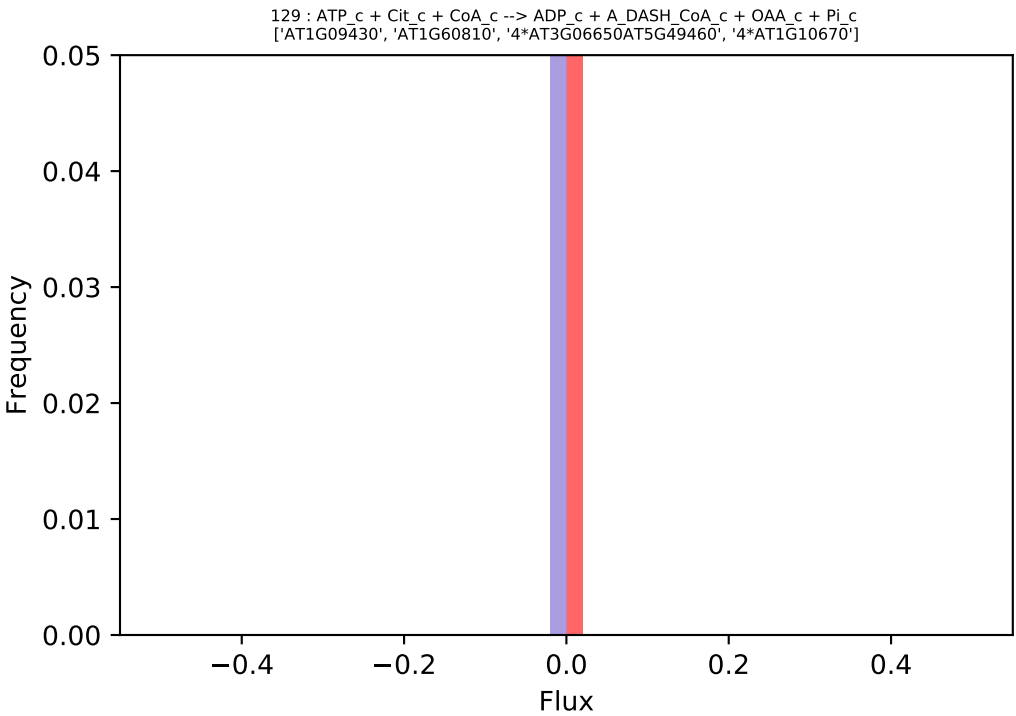
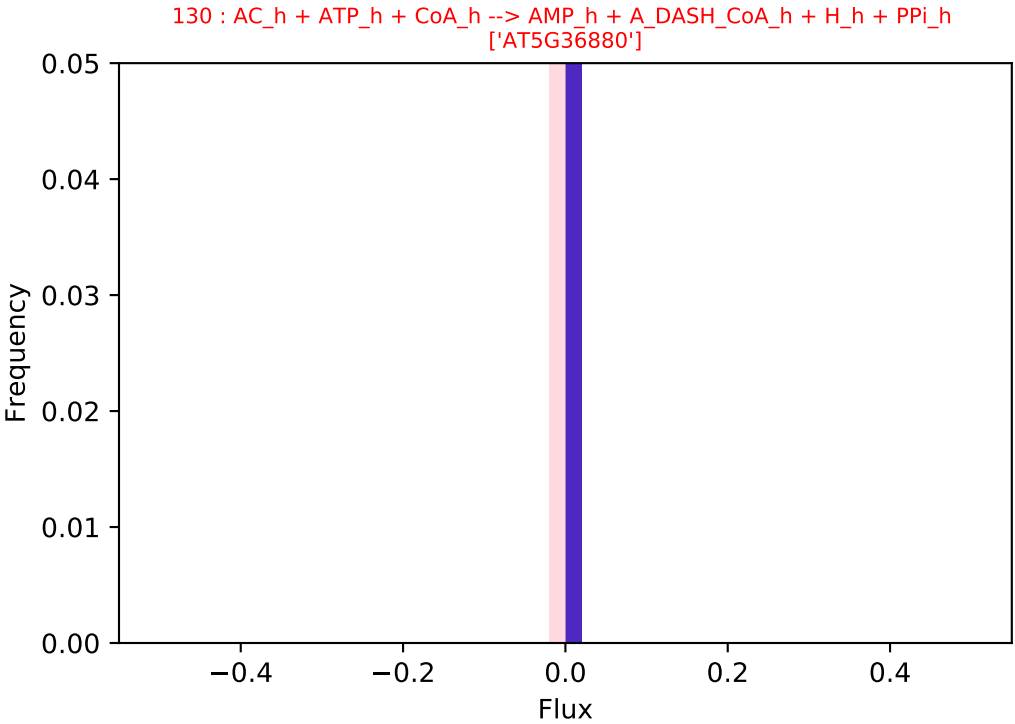
0.2
0.4
Flux

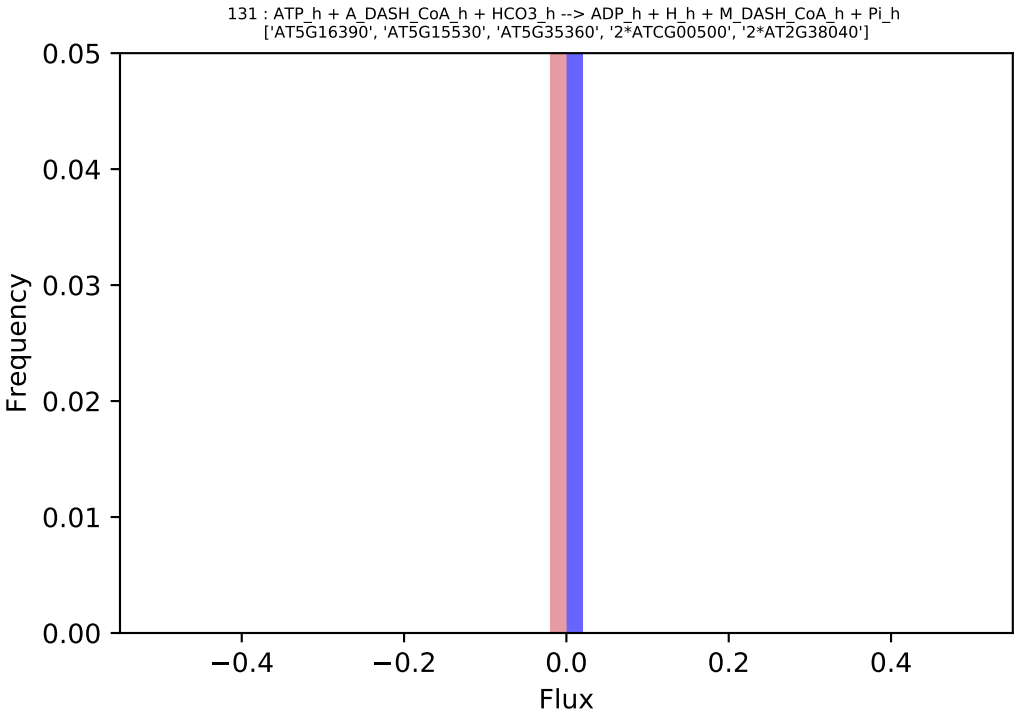

126 : NADP_m + iCit_m --> CO2_m + KG_m + NADPH_m
['AT5G14590']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

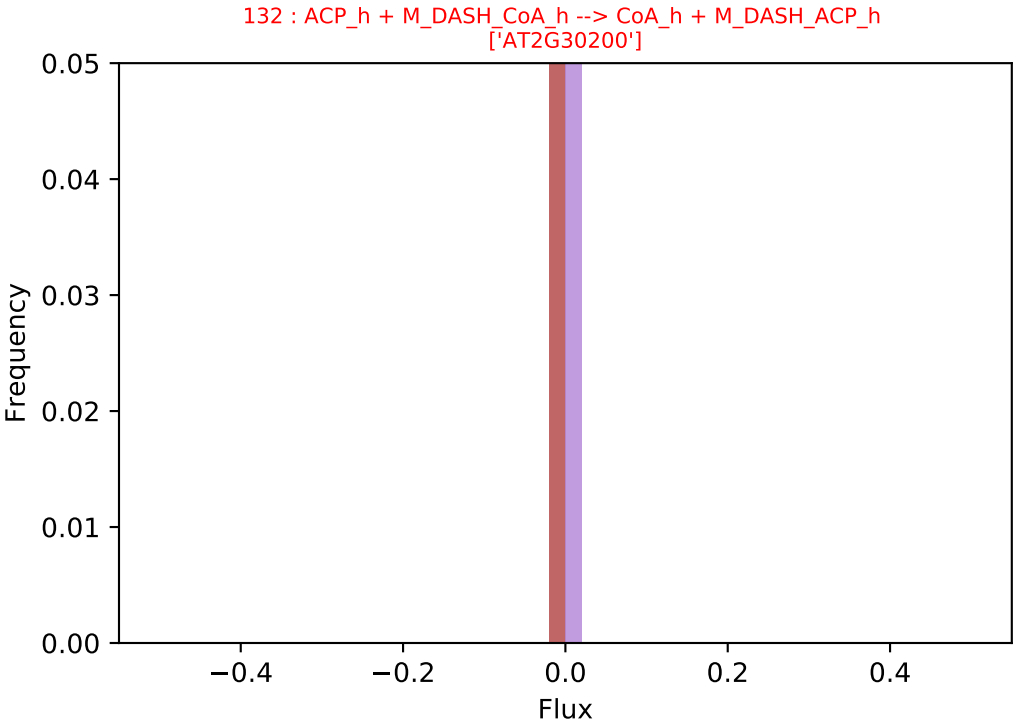

127 : iCit_c --> GLX_c + SCA_c
['AT3G21720']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

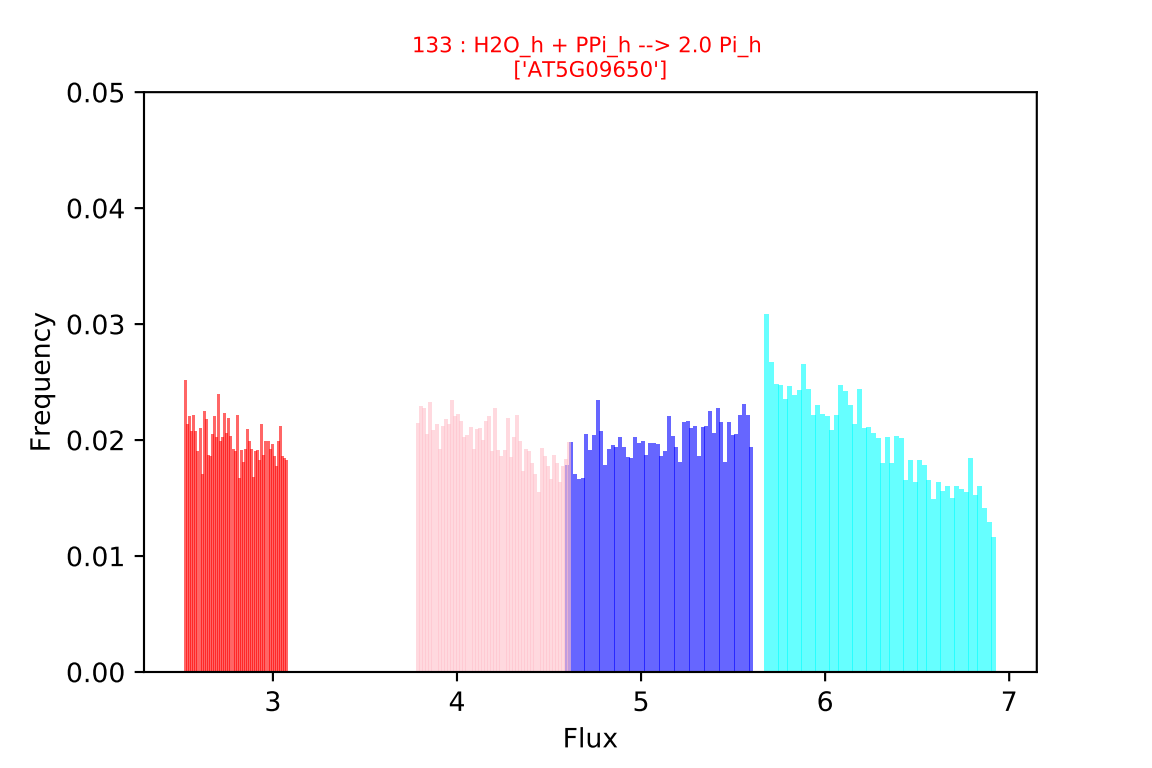

128 : A_DASH_CoA_c + GLX_c + H2O_c --> CoA_c + H_c + Mal_c
['AT5G03860']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


129 : ATP_c + Cit_c + CoA_c --> ADP_c + A_DASH_CoA_c + OAA_c + Pi_c
['AT1G09430', 'AT1G60810', '4*AT3G06650AT5G49460', '4*AT1G10670']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


130 : AC_h + ATP_h + CoA_h --> AMP_h + A_DASH_CoA_h + H_h + PPi_h
['AT5G36880']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


131 : ATP_h + A_DASH_CoA_h + HCO3_h --> ADP_h + H_h + M_DASH_CoA_h + Pi_h
['AT5G16390', 'AT5G15530', 'AT5G35360', '2*ATCG00500', '2*AT2G38040']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


132 : ACP_h + M_DASH_CoA_h --> CoA_h + M_DASH_ACP_h
['AT2G30200']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


133 : H2O_h + PPi_h --> 2.0 Pi_h
['AT5G09650']
Frequency
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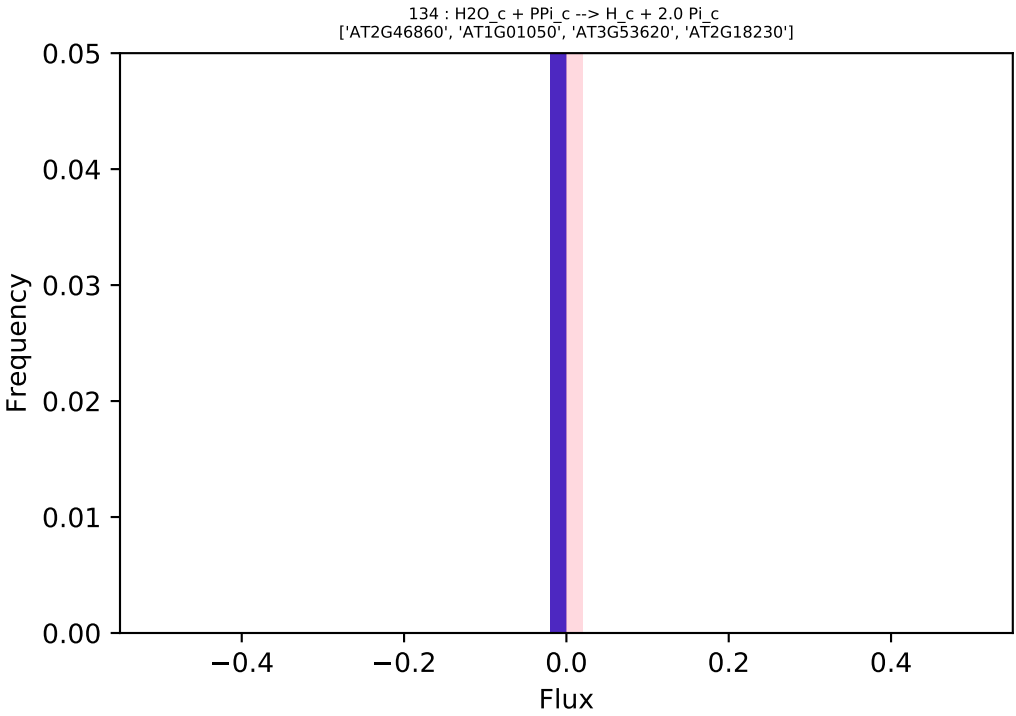
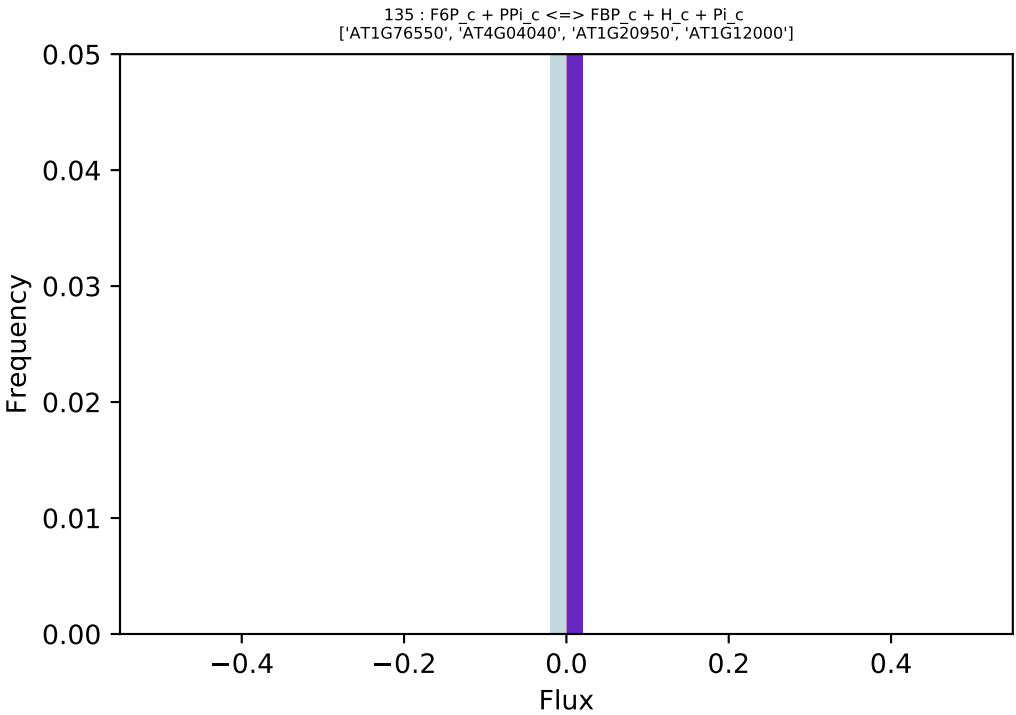
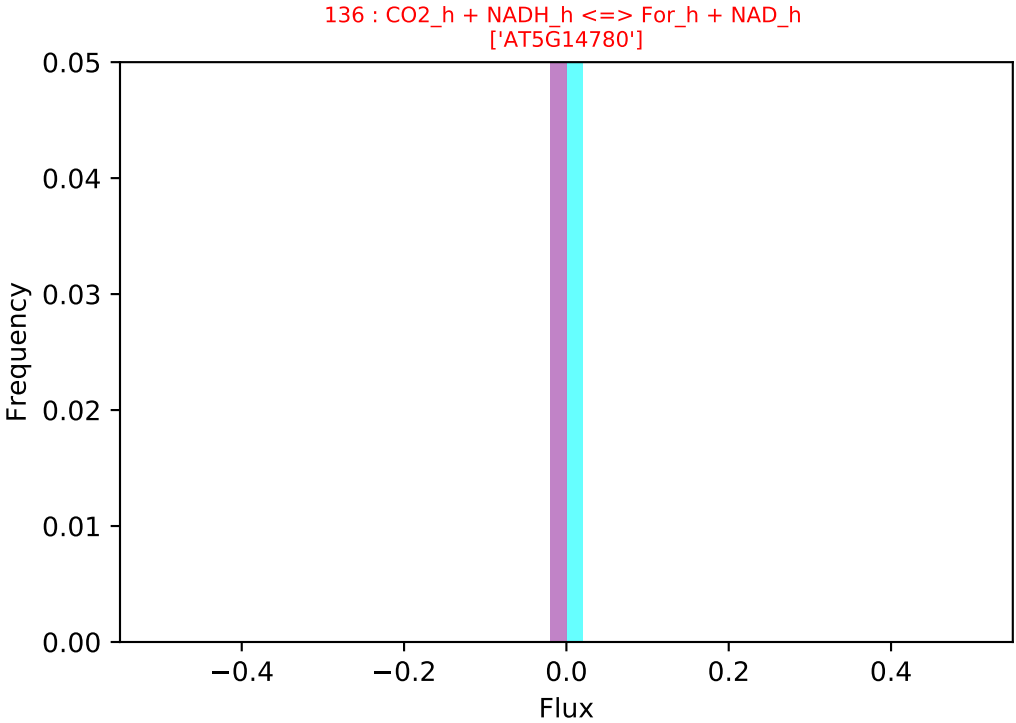
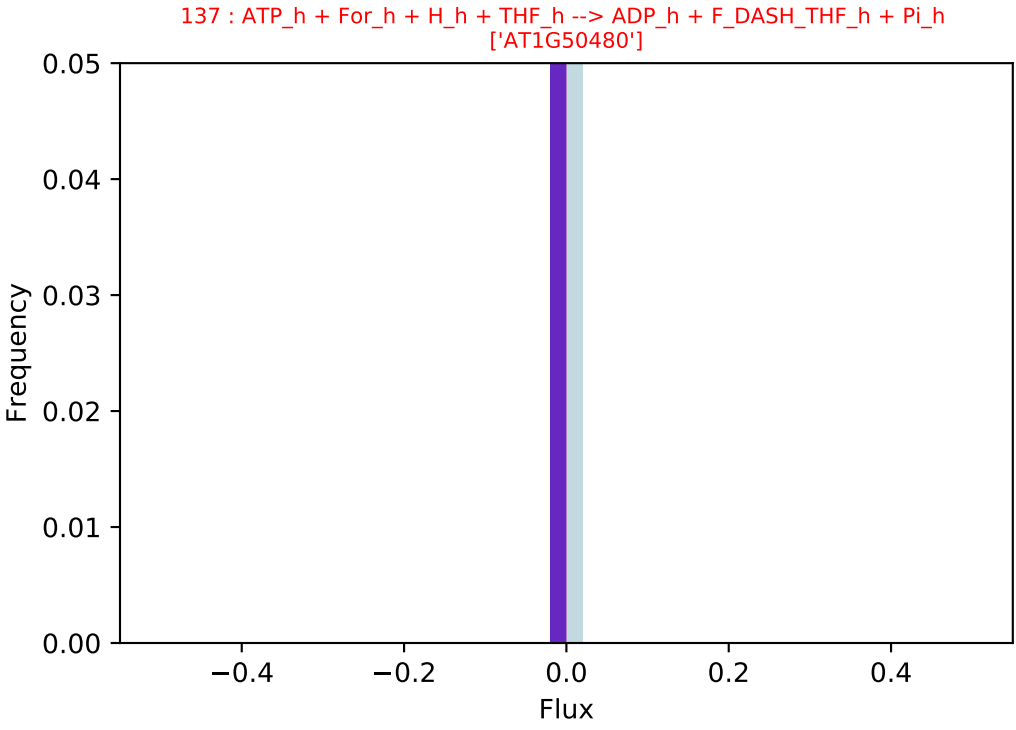
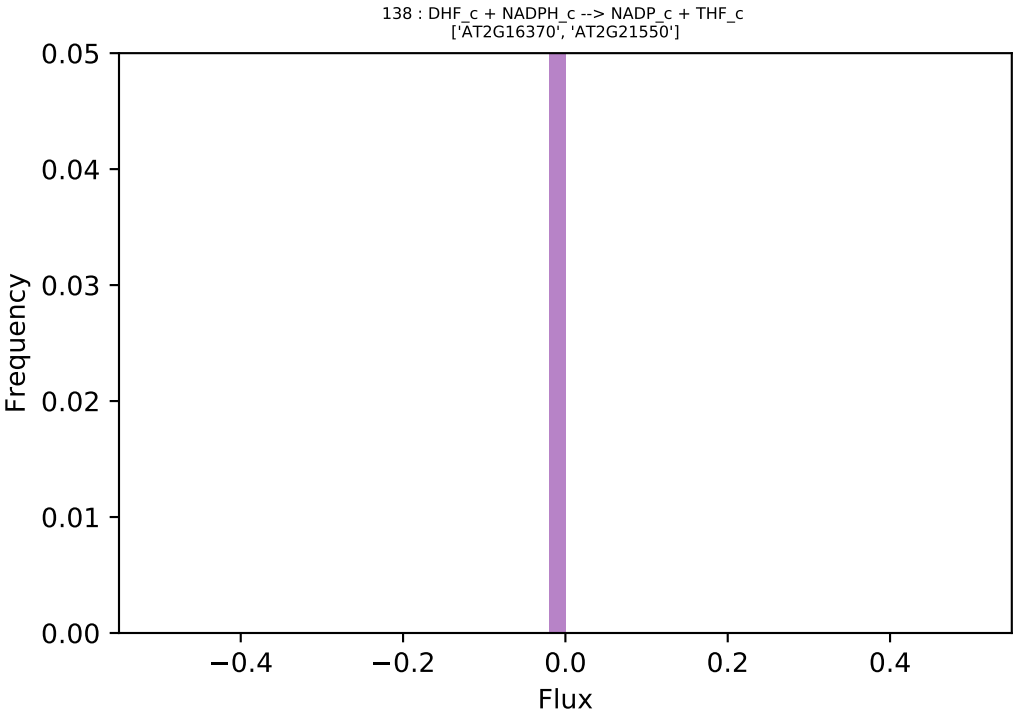
0.04
0.03
0.02
0.01
0.00
3
4
5
6
7
Flux

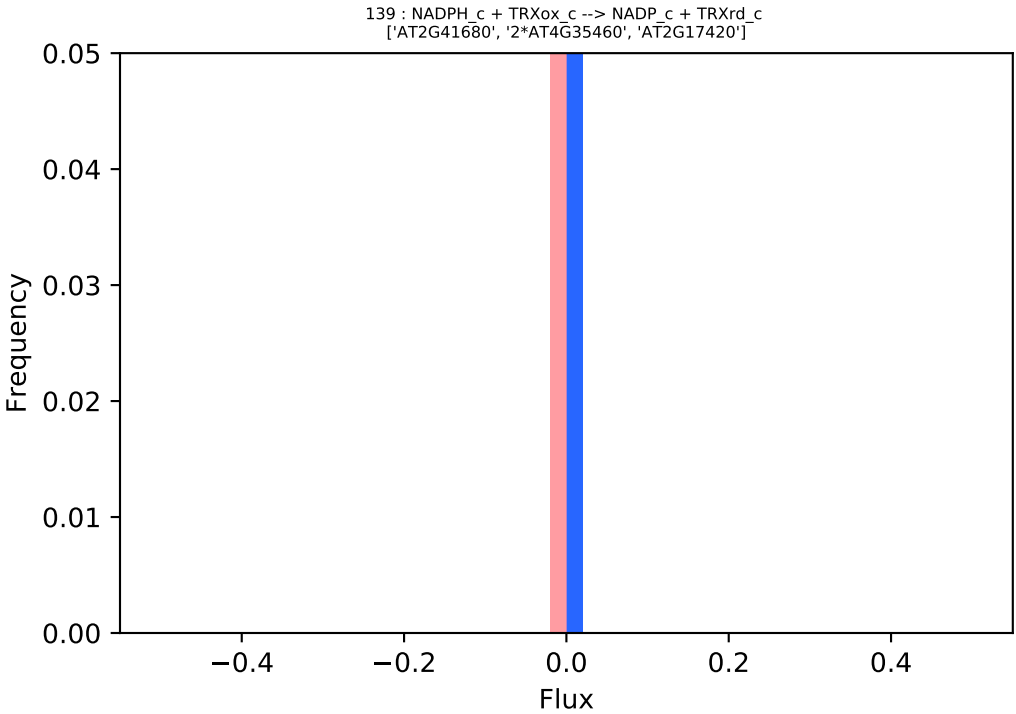

134 : H2O_c + PPi_c --> H_c + 2.0 Pi_c
['AT2G46860', 'AT1G01050', 'AT3G53620', 'AT2G18230']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

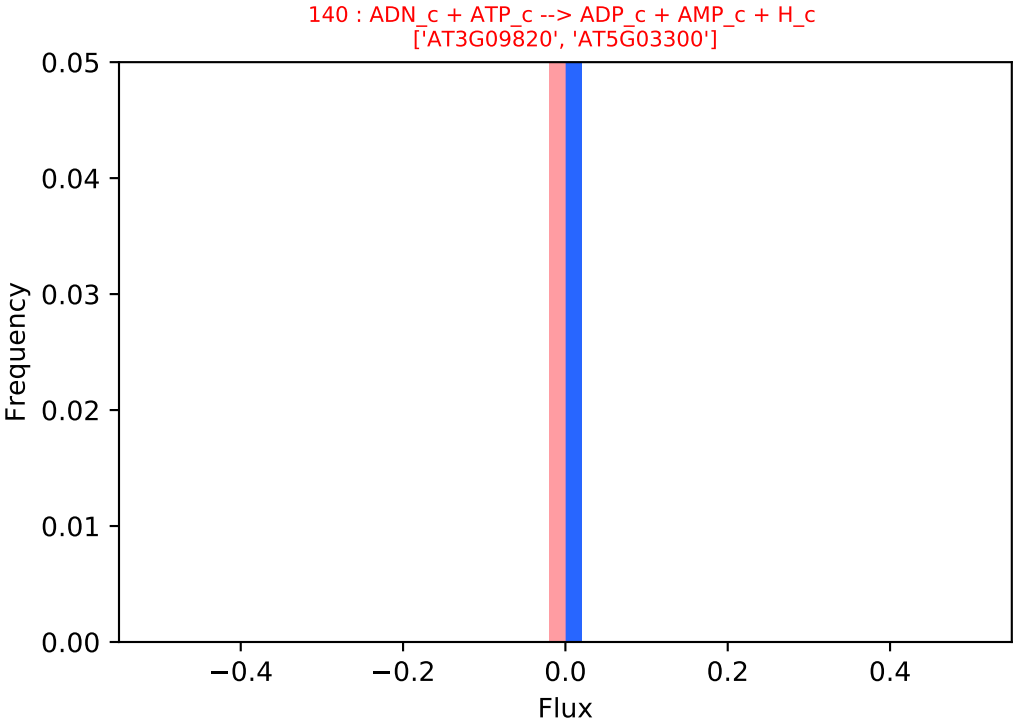

135 : F6P_c + PPi_c <=> FBP_c + H_c + Pi_c
['AT1G76550', 'AT4G04040', 'AT1G20950', 'AT1G12000']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

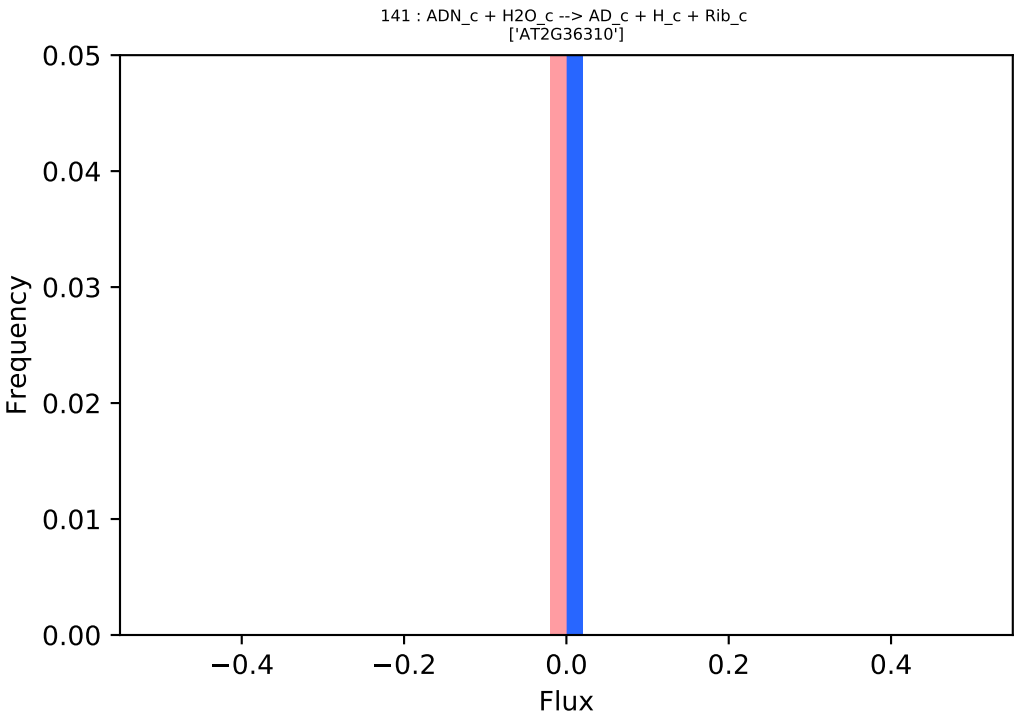

136 : CO2_h + NADH_h <=> For_h + NAD_h
['AT5G14780']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

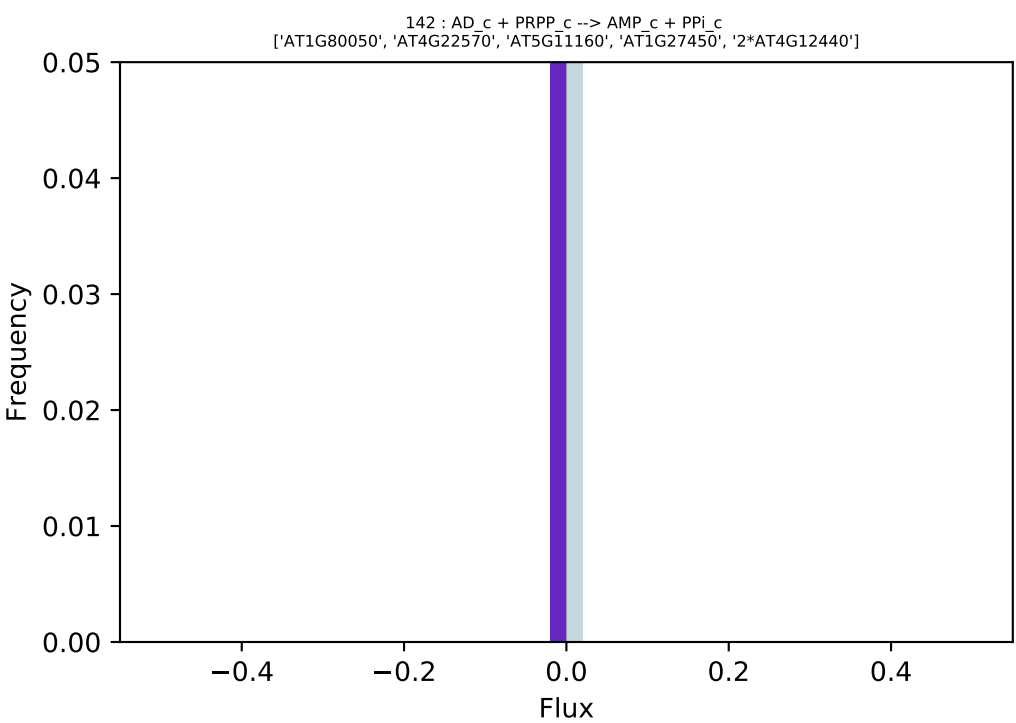

137 : ATP_h + For_h + H_h + THF_h --> ADP_h + F_DASH_THF_h + Pi_h
['AT1G50480']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

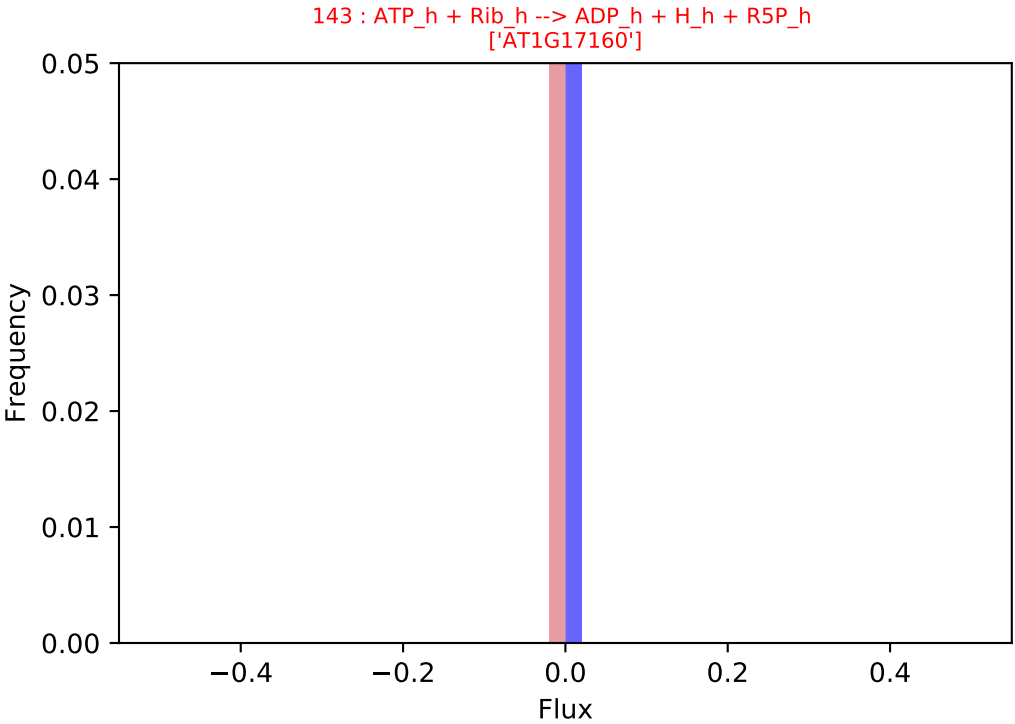

138 : DHF_c + NADPH_c --> NADP_c + THF_c
['AT2G16370', 'AT2G21550']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

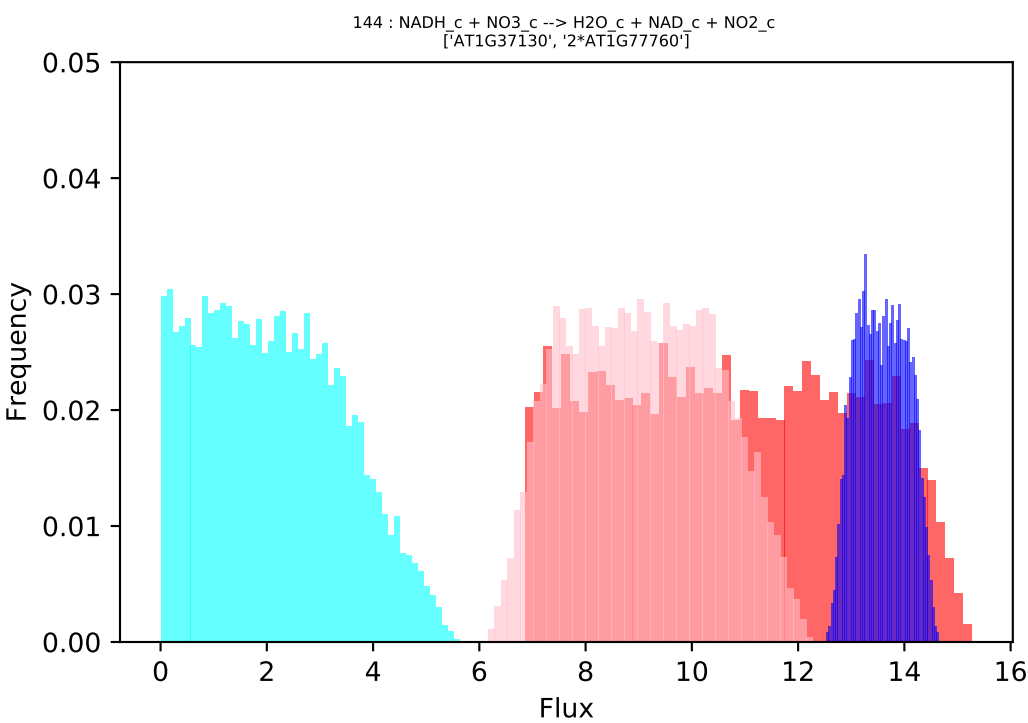

139 : NADPH_c + TRXox_c --> NADP_c + TRXrd_c
['AT2G41680', '2*AT4G35460', 'AT2G17420']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

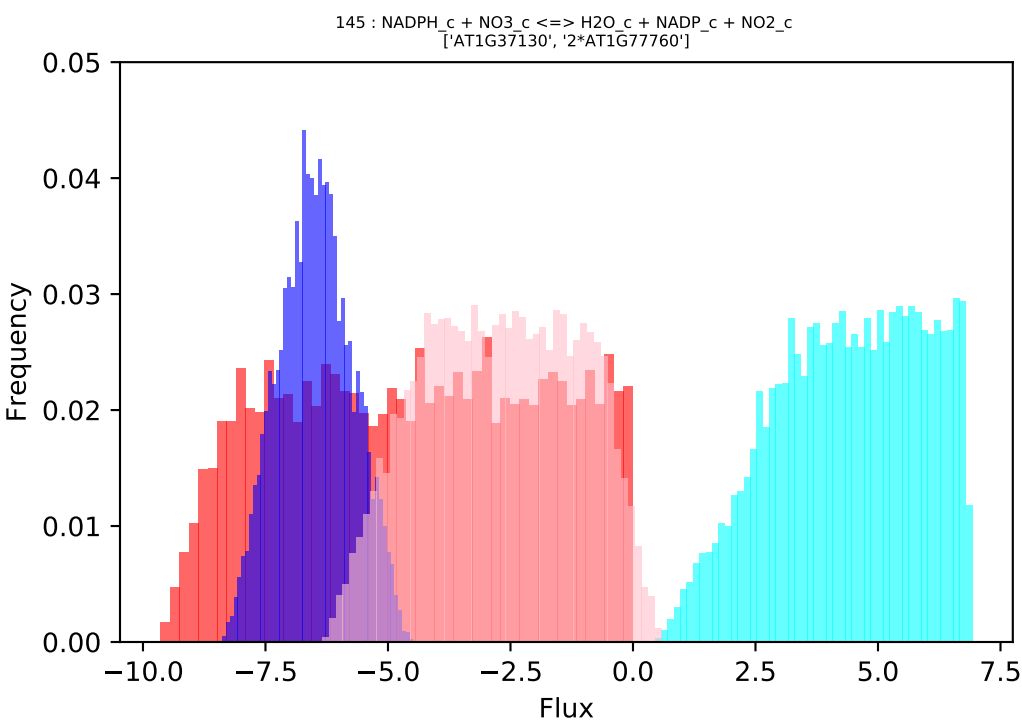

140 : ADN_c + ATP_c --> ADP_c + AMP_c + H_c
['AT3G09820', 'AT5G03300']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

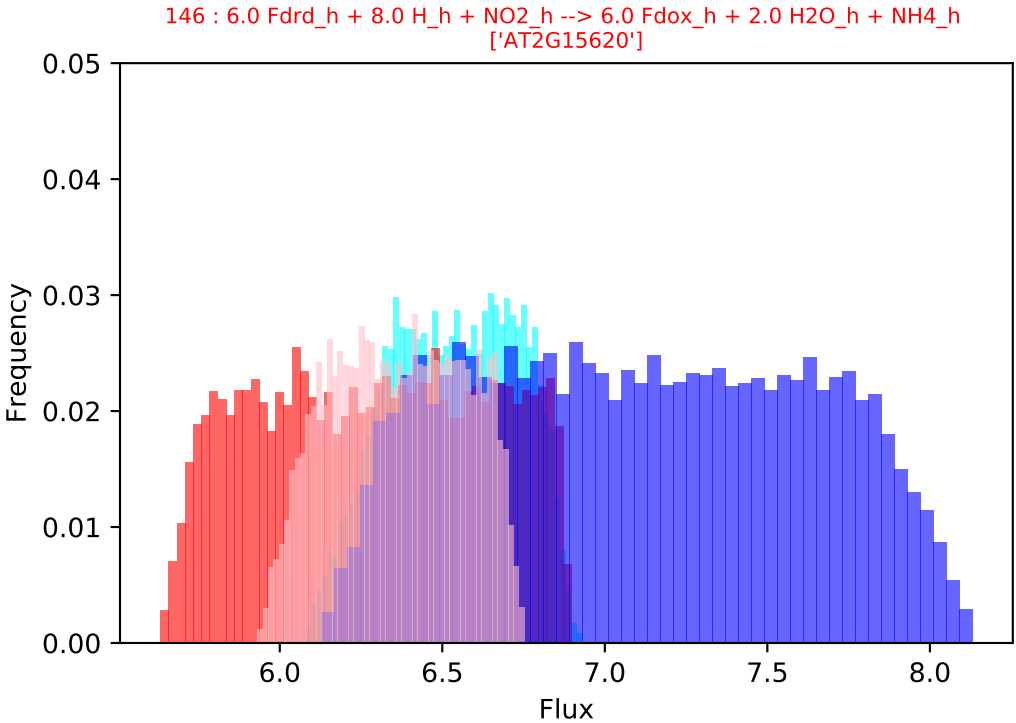

141 : ADN_c + H2O_c --> AD_c + H_c + Rib_c
['AT2G36310']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

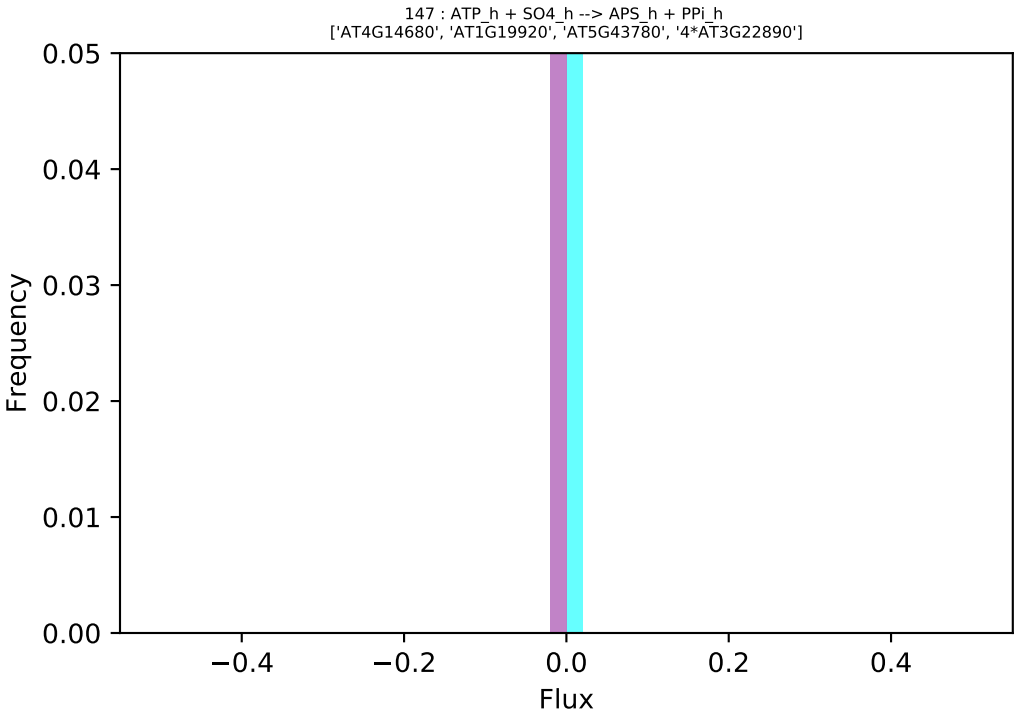

142 : AD_c + PRPP_c --> AMP_c + PPi_c
['AT1G80050', 'AT4G22570', 'AT5G11160', 'AT1G27450', '2*AT4G12440']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

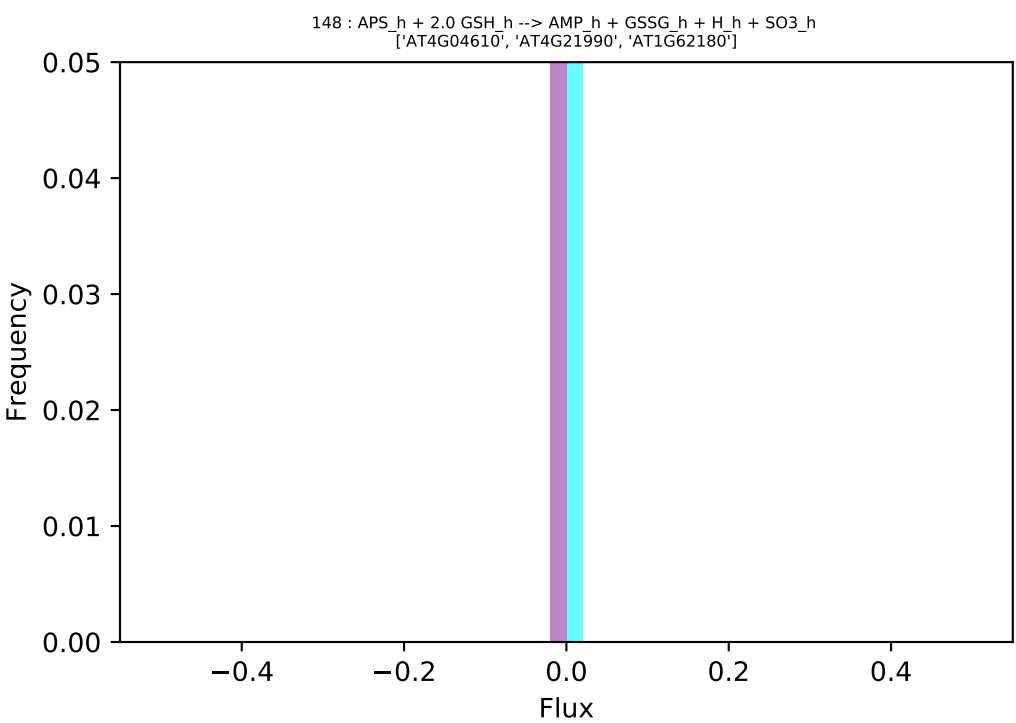

143 : ATP_h + Rib_h --> ADP_h + H_h + R5P_h
['AT1G17160']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

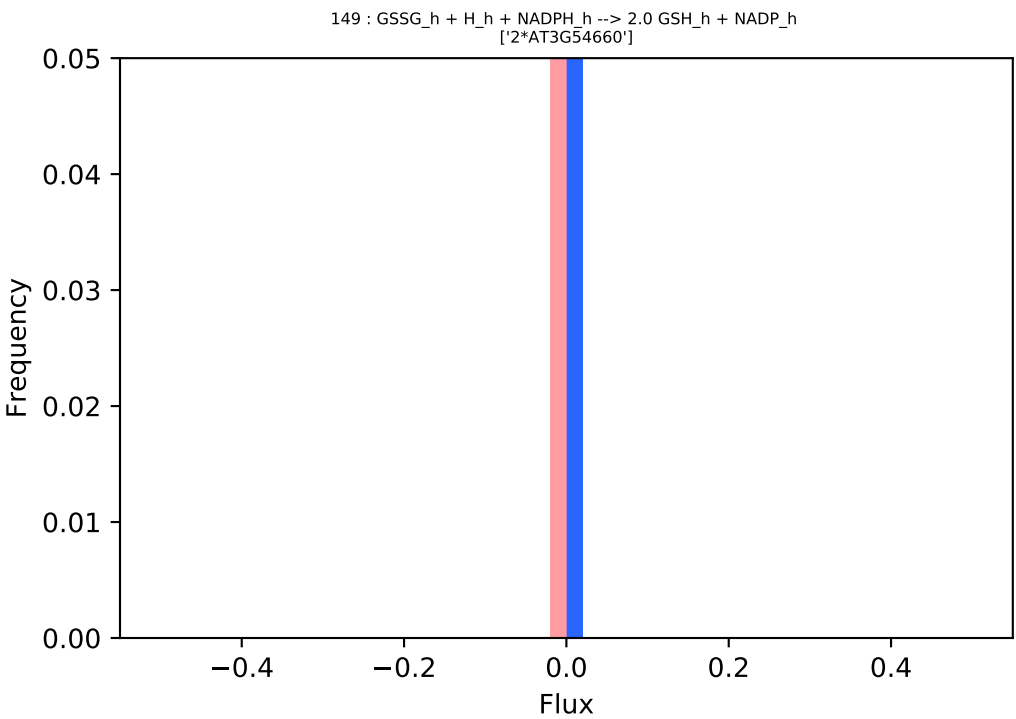

144 : NADH_c + NO3_c --> H2O_c + NAD_c + NO2_c
['AT1G37130', '2*AT1G77760']
Frequency
Flux
0.00
0.01
0.02
0.03
0.04
0.05
0
2
4
6
8
10
12
14
16

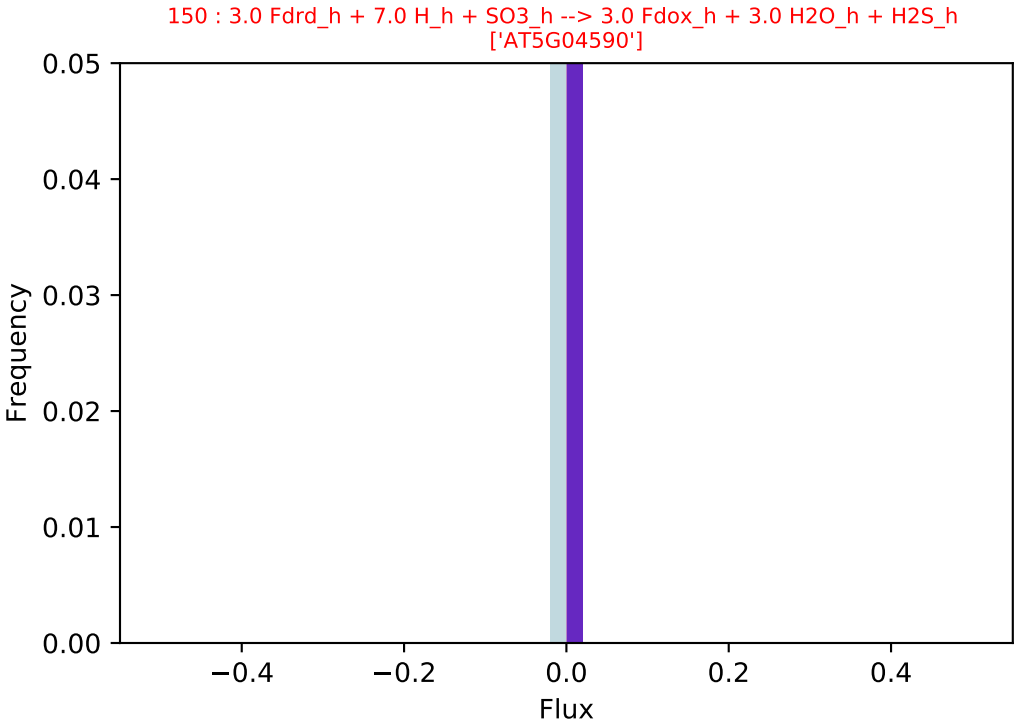

145 : NADPH_c + NO3_c <=> H2O_c + NADP_c + NO2_c
['AT1G37130', '2*AT1G77760']
Frequency
Flux
0.05
0.04
0.03
0.02
0.01
0.00
−10.0
−7.5
−5.0
−2.5
0.0
2.5
5.0
7.5

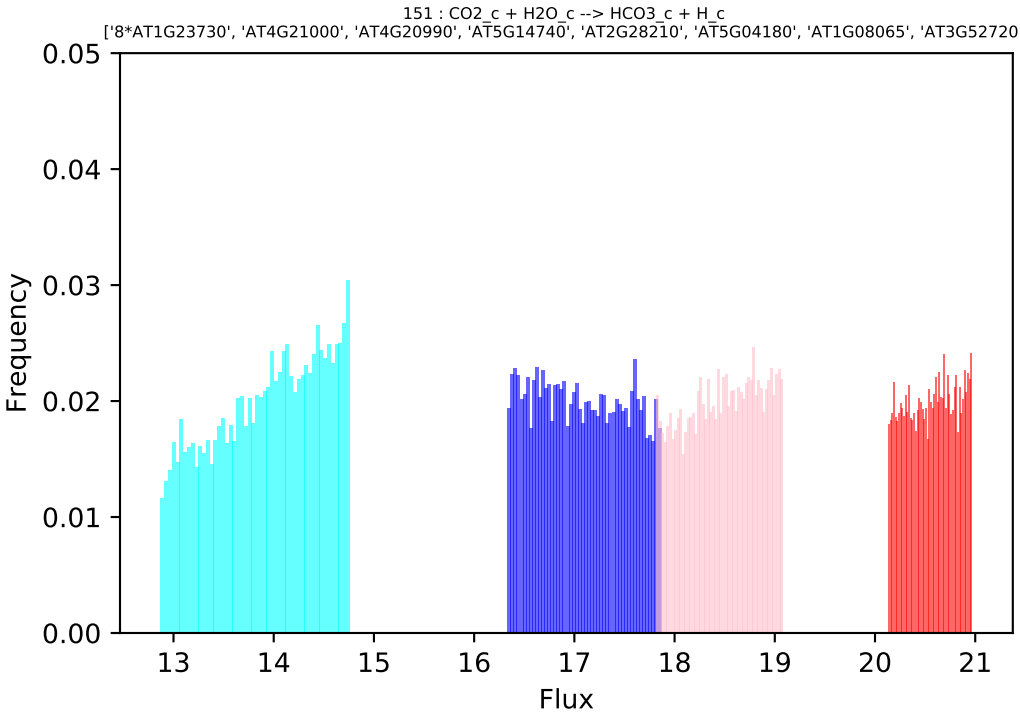

146 : 6.0 Fdrd_h + 8.0 H_h + NO2_h --> 6.0 Fdox_h + 2.0 H2O_h + NH4_h
['AT2G15620']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
6.0
6.5
7.0
7.5
8.0
Flux

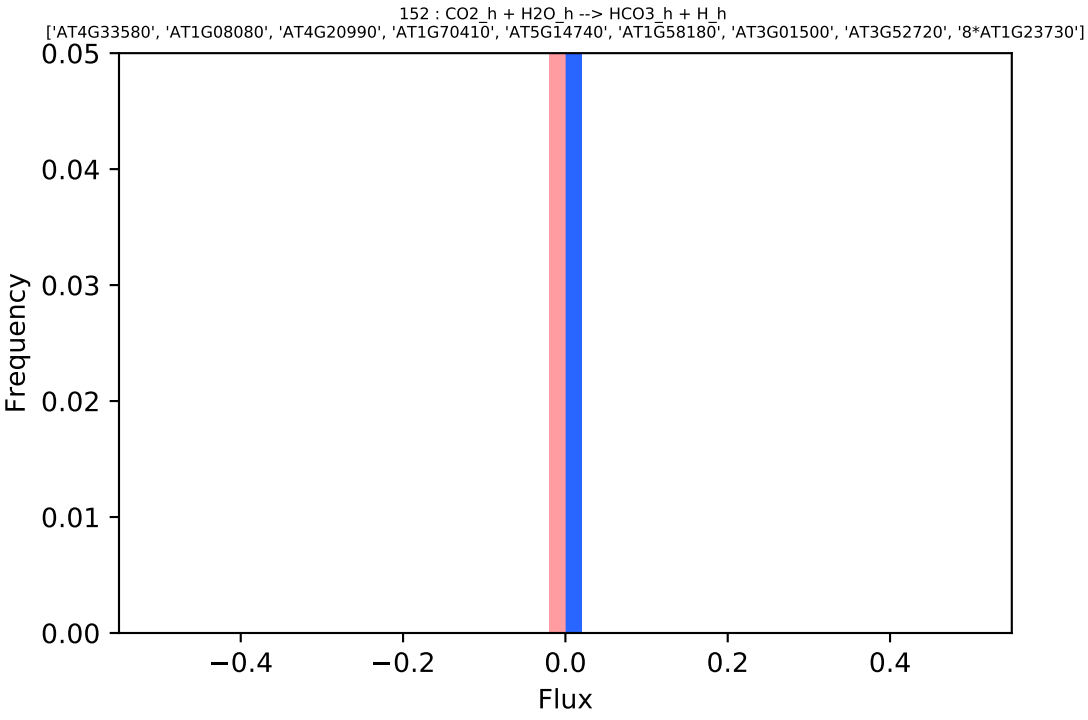

147 : ATP_h + SO4_h --> APS_h + PPi_h
['AT4G14680', 'AT1G19920', 'AT5G43780', '4*AT3G22890']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

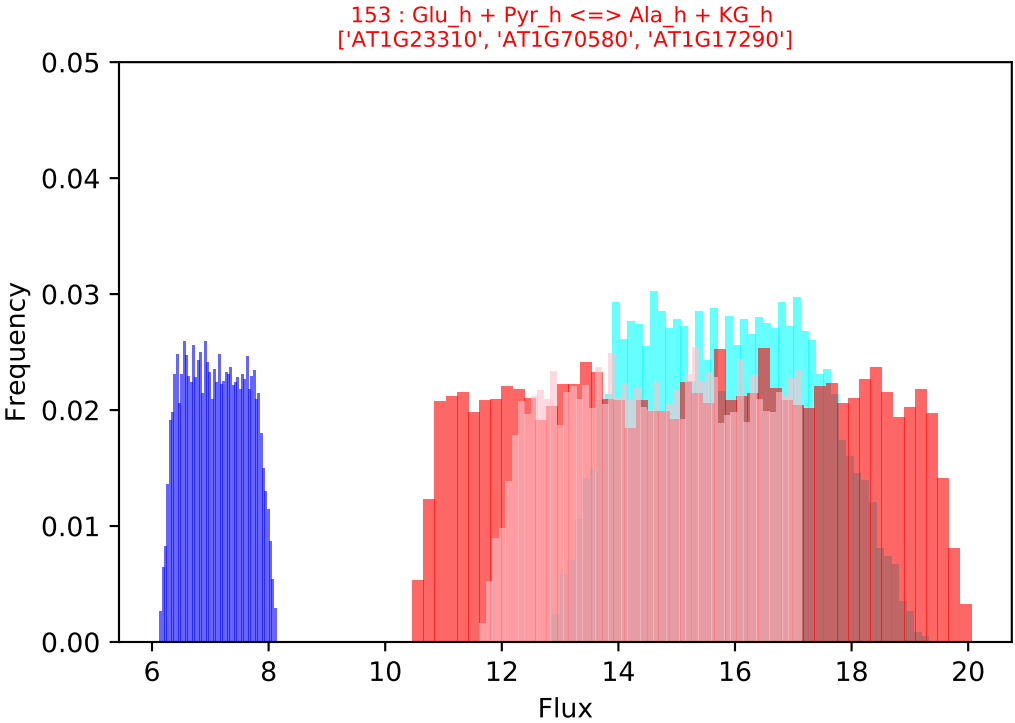

148 : APS_h + 2.0 GSH_h --> AMP_h + GSSG_h + H_h + SO3_h
['AT4G04610', 'AT4G21990', 'AT1G62180']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

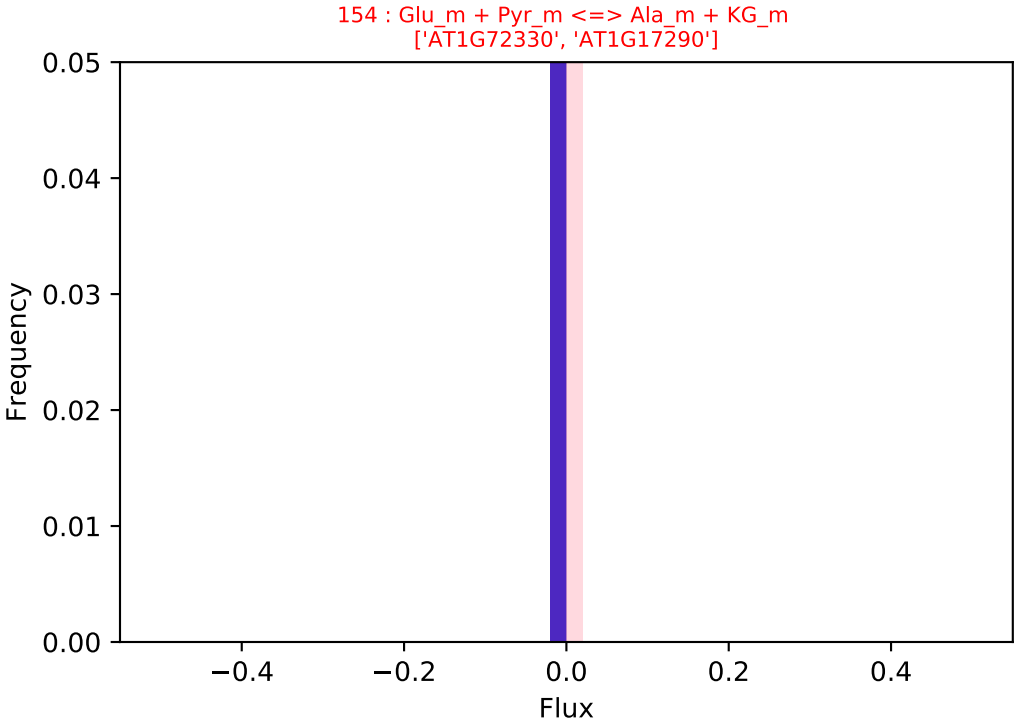

149 : GSSG_h + H_h + NADPH_h --> 2.0 GSH_h + NADP_h
['2*AT3G54660']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

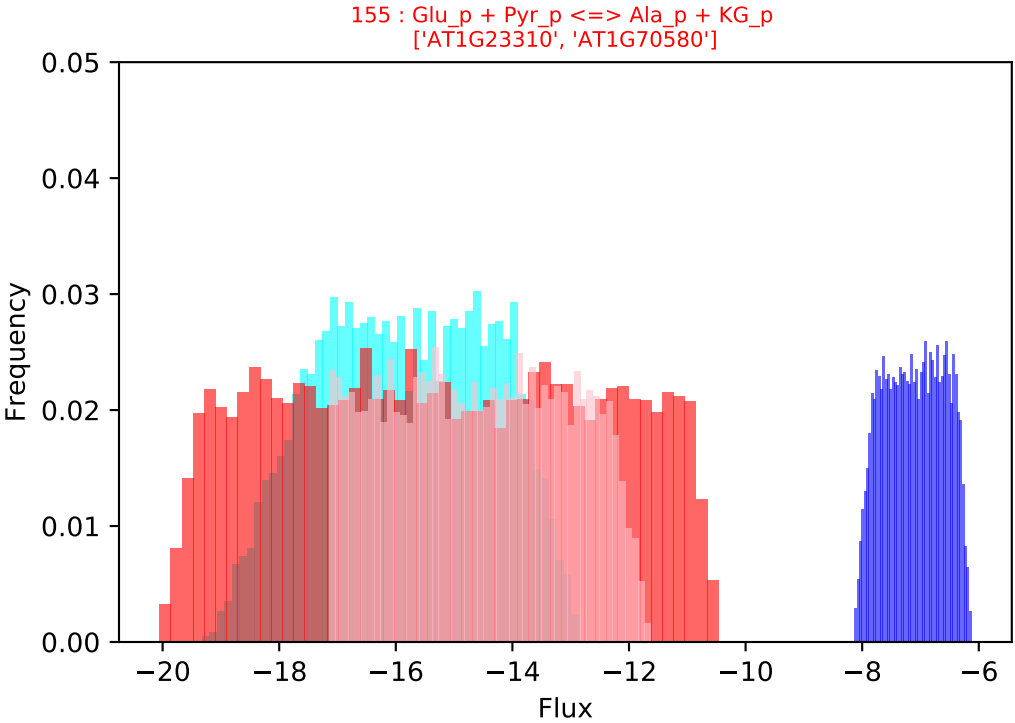

150 : 3.0 Fdrd_h + 7.0 H_h + SO3_h --> 3.0 Fdox_h + 3.0 H2O_h + H2S_h
['AT5G04590']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

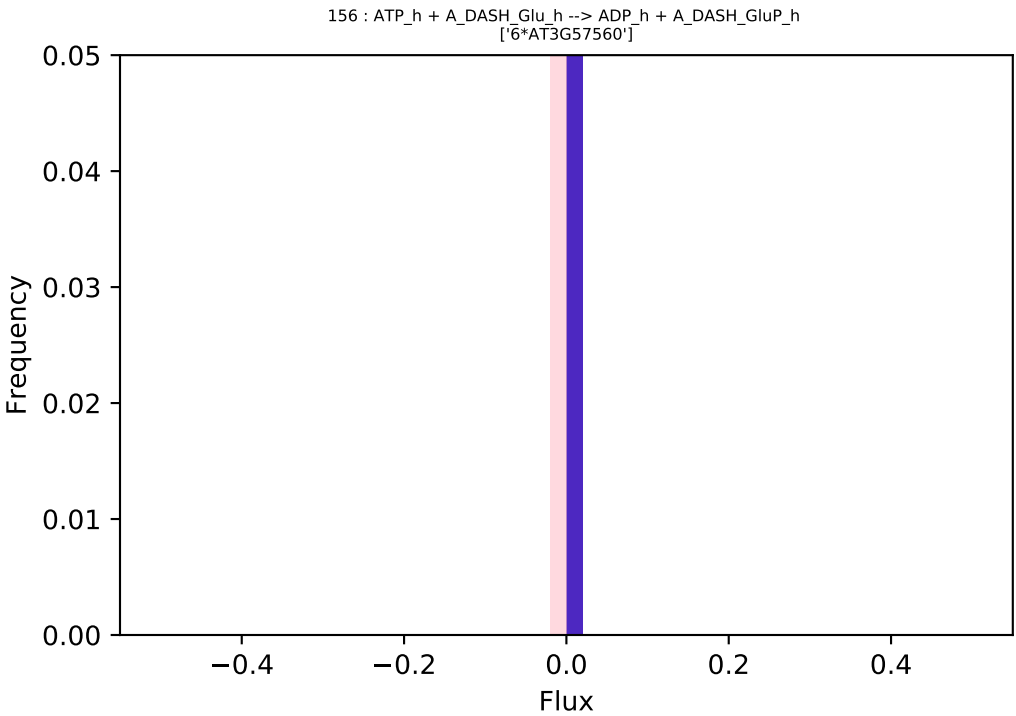

151 : CO2_c + H2O_c --> HCO3_c + H_c
['8*AT1G23730', 'AT4G21000', 'AT4G20990', 'AT5G14740', 'AT2G28210', 'AT5G04180', 'AT1G08065', 'AT3G52720']
Frequency
0.05
0.04
0.03
0.02
0.01
0.00
13
14
15
16
17
18
19
20
21
Flux

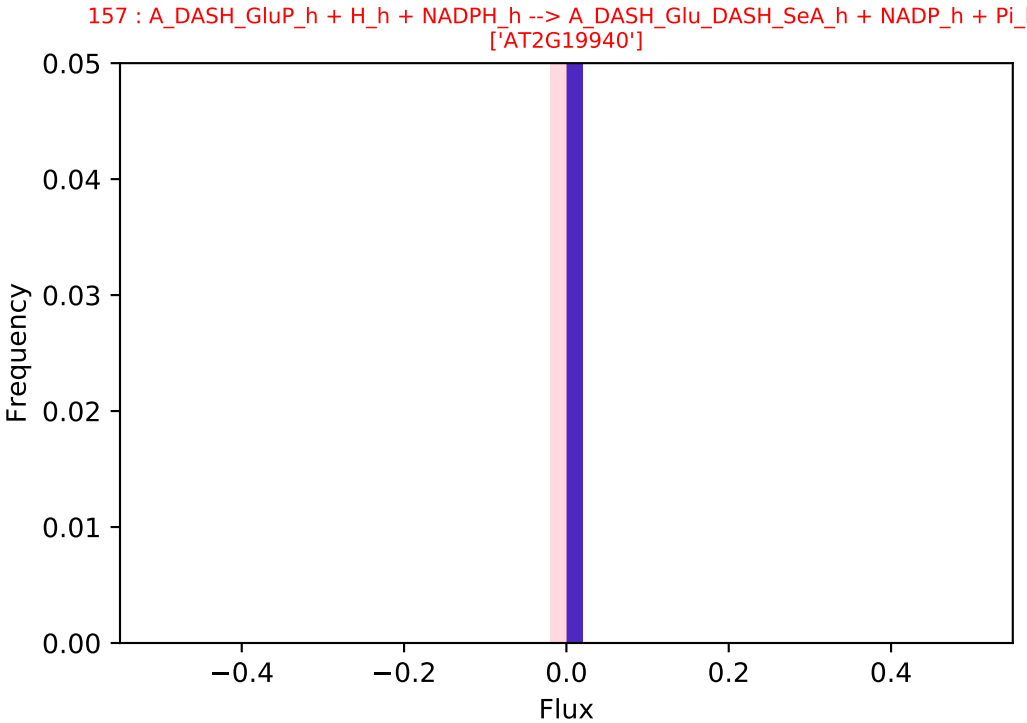

152 : CO2_h + H2O_h --> HCO3_h + H_h
['AT4G33580', 'AT1G08080', 'AT4G20990', 'AT1G70410', 'AT5G14740', 'AT1G58180', 'AT3G01500', 'AT3G52720', '8*AT1G23730']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

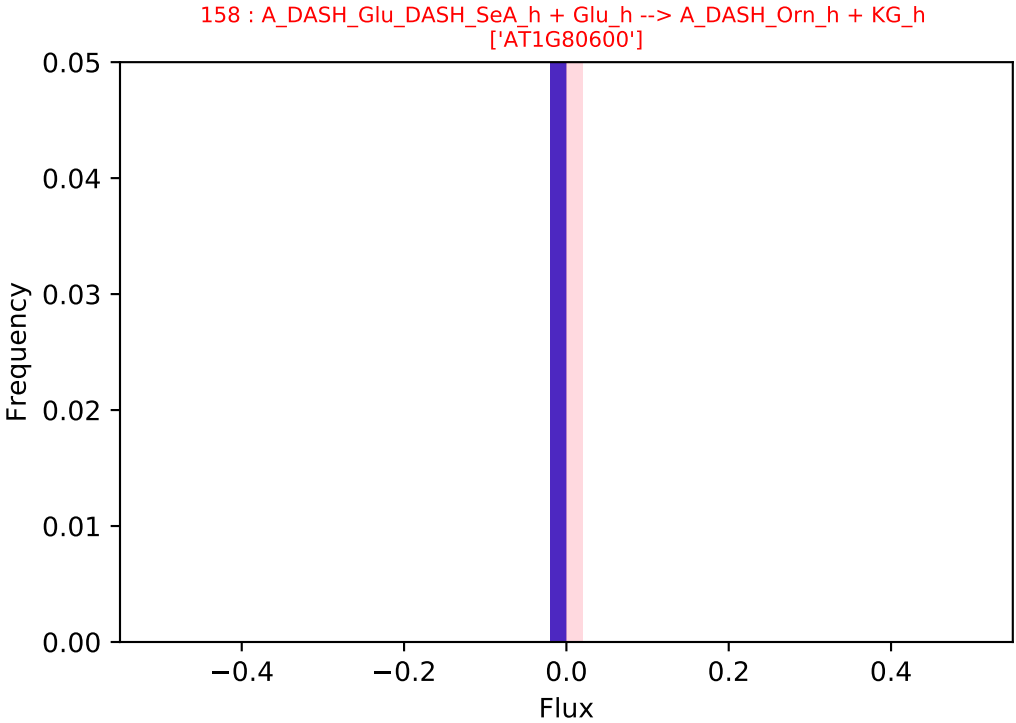

153 : Glu_h + Pyr_h <=> Ala_h + KG_h
['AT1G23310', 'AT1G70580', 'AT1G17290']
Frequency
0.05
0.04
0.03
0.02
0.01
0.00
6
8
10
12
14
16
18
20
Flux

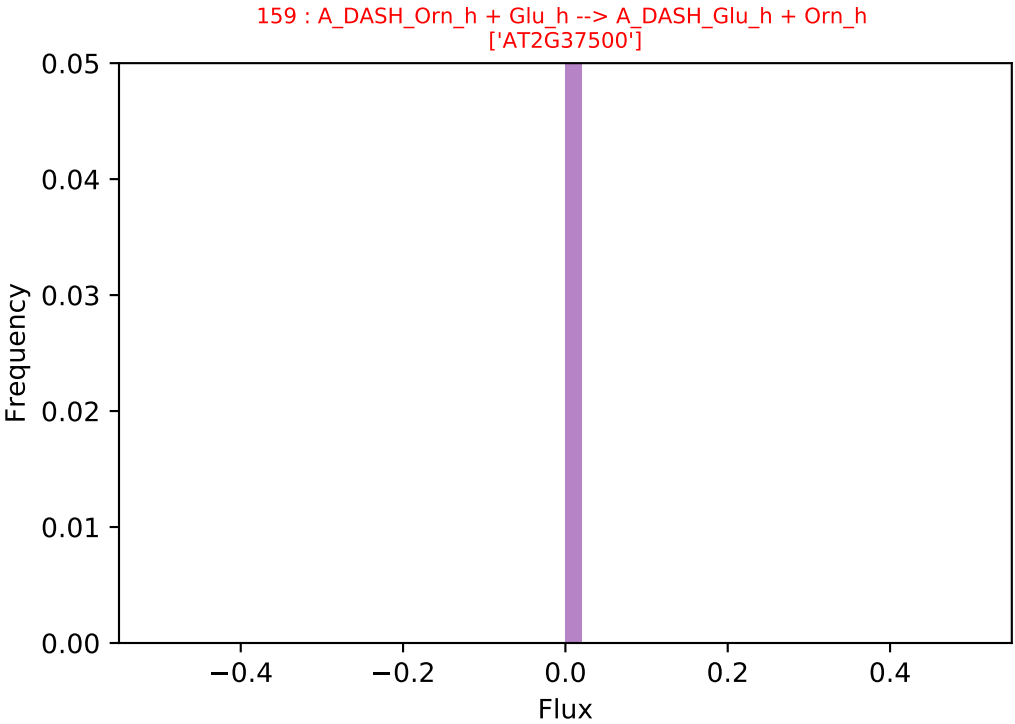

154 : Glu_m + Pyr_m <=> Ala_m + KG_m
['AT1G72330', 'AT1G17290']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

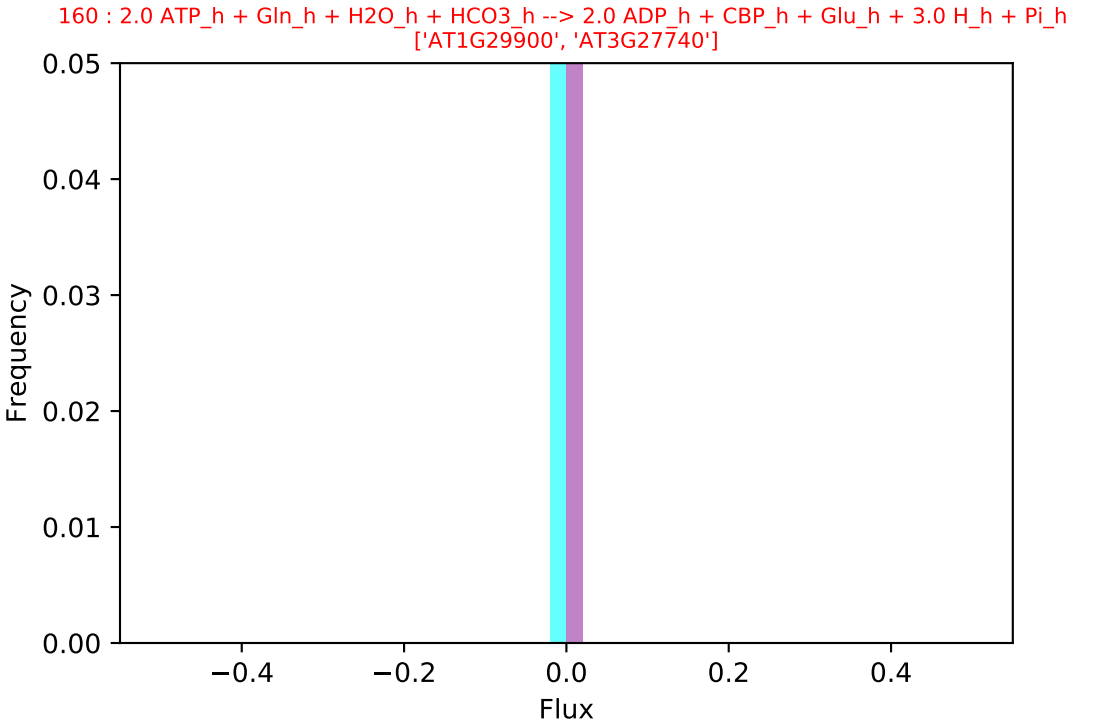

155 : Glu_p + Pyr_p <=> Ala_p + KG_p
['AT1G23310', 'AT1G70580']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−20
−18
−16
−14
−12
−10
−8
−6
Flux

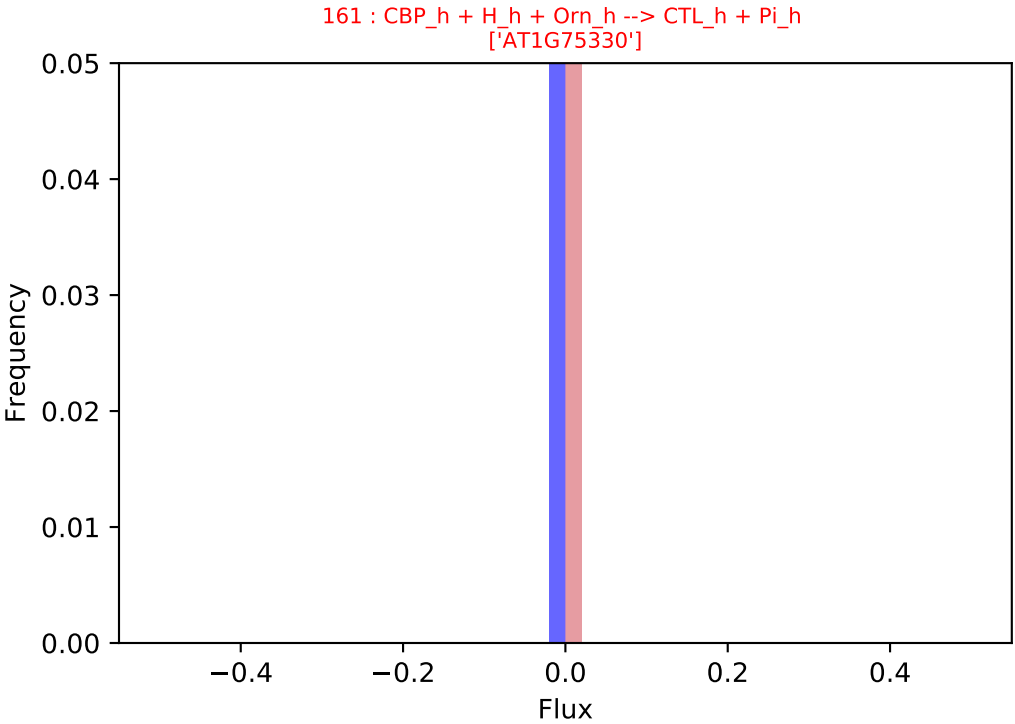

156 : ATP_h + A_DASH_Glu_h --> ADP_h + A_DASH_GluP_h
['6*AT3G57560']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

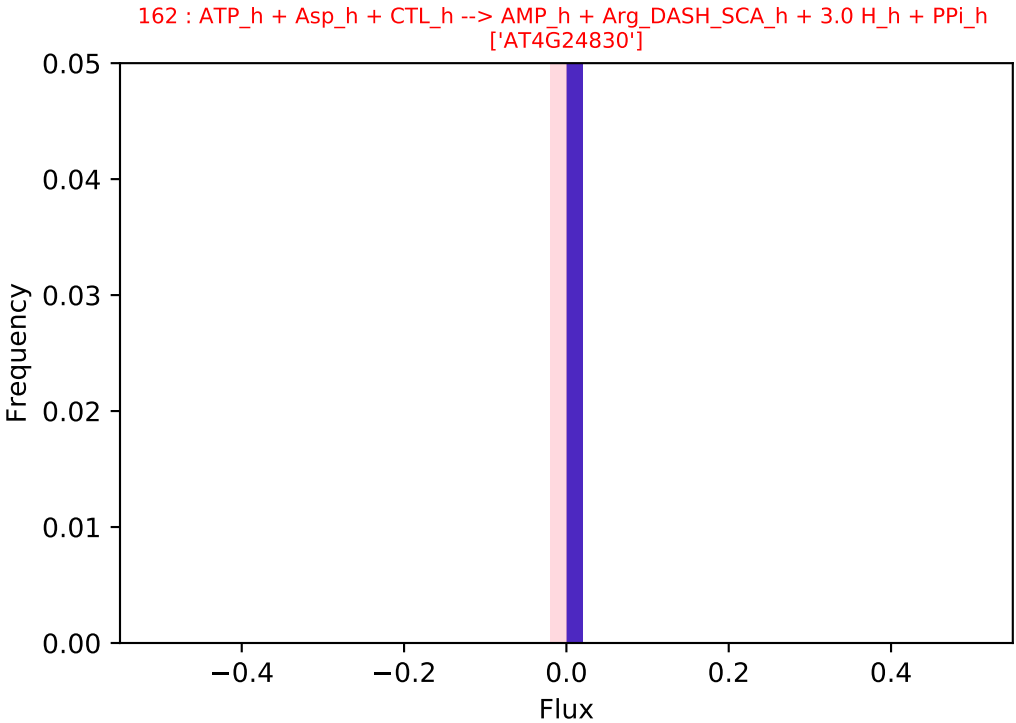

157 : A_DASH_GluP_h + H_h + NADPH_h --> A_DASH_Glu_DASH_SeA_h + NADP_h + Pi_h
['AT2G19940']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

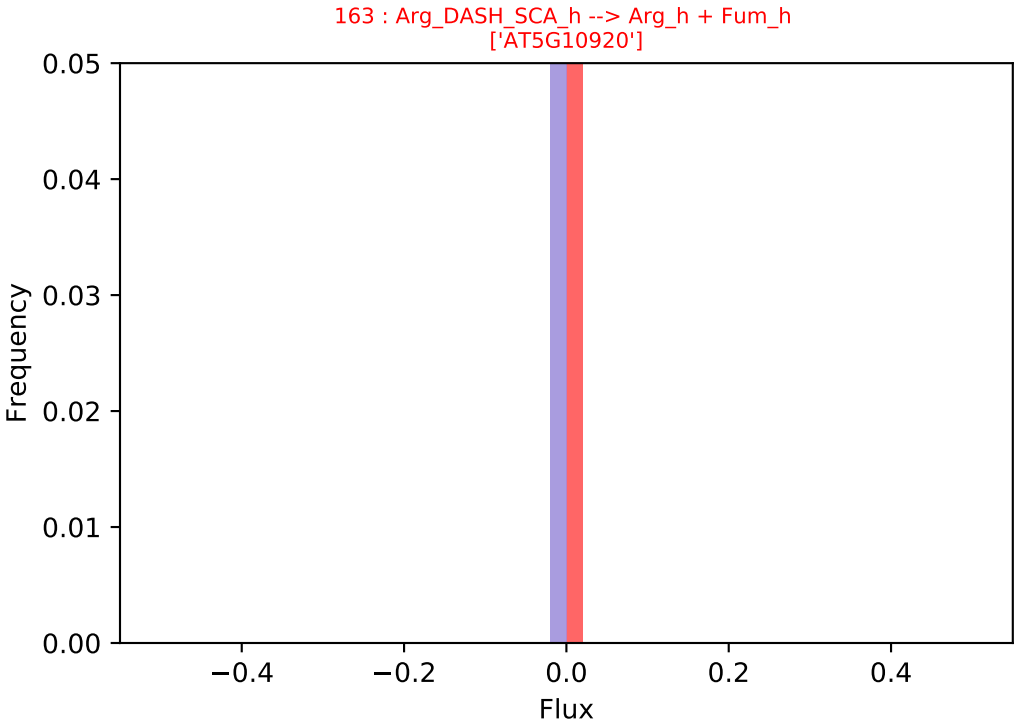

158 : A_DASH_Glu_DASH_SeA_h + Glu_h --> A_DASH_Orn_h + KG_h
['AT1G80600']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

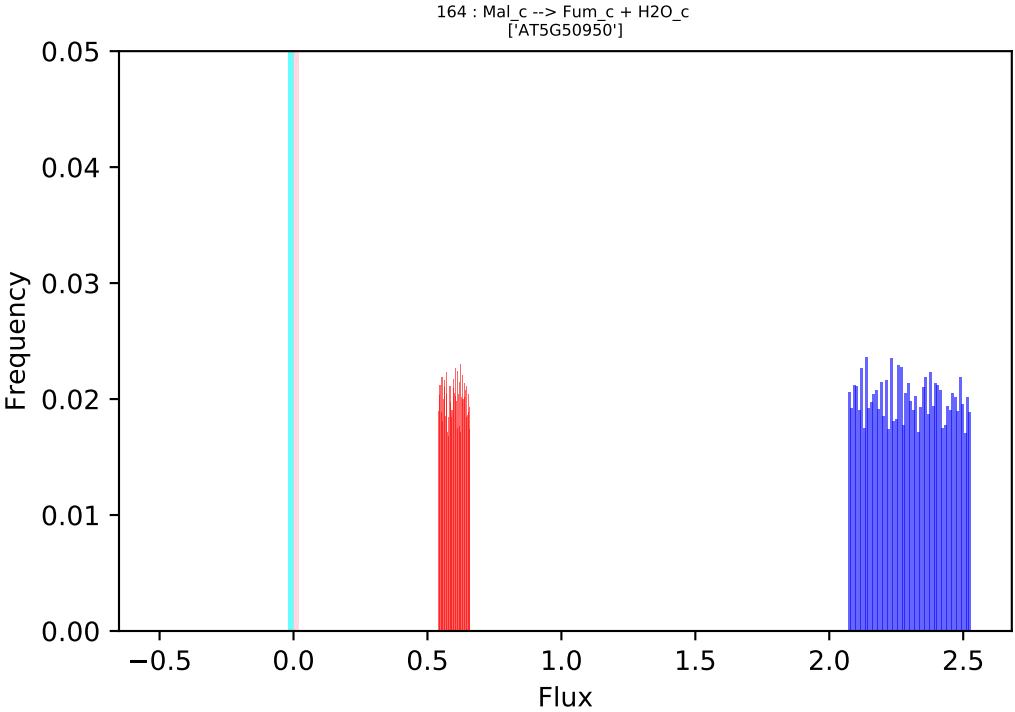

159 : A_DASH_Orn_h + Glu_h --> A_DASH_Glu_h + Orn_h
['AT2G37500']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

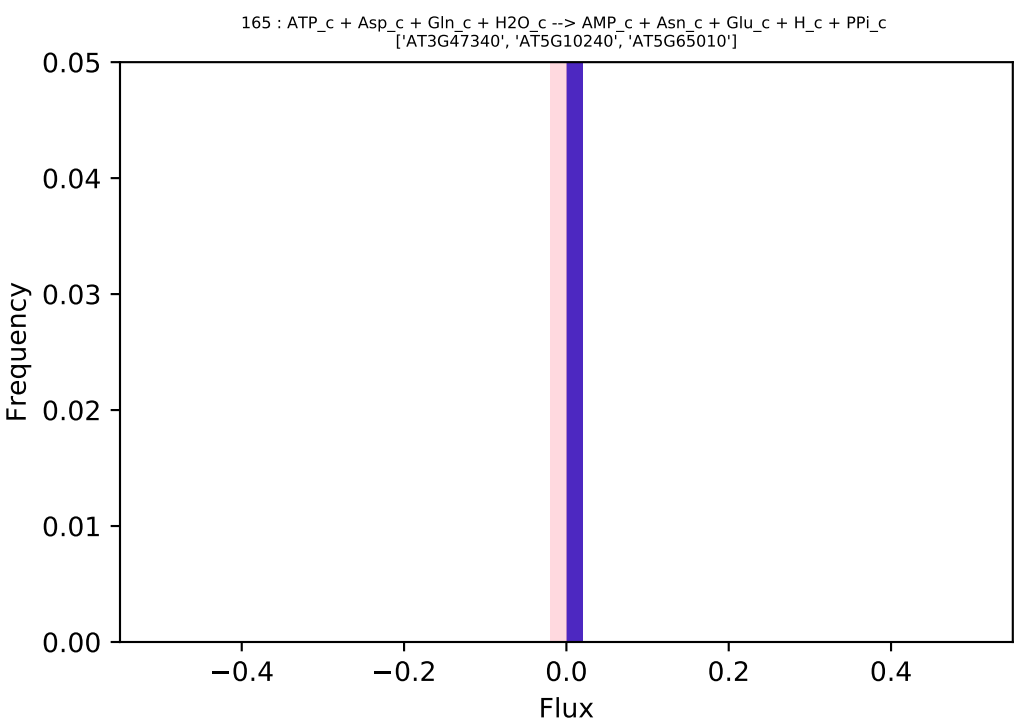

160 : 2.0 ATP_h + Gln_h + H2O_h + HCO3_h --> 2.0 ADP_h + CBP_h + Glu_h + 3.0 H_h + Pi_h
['AT1G29900', 'AT3G27740']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

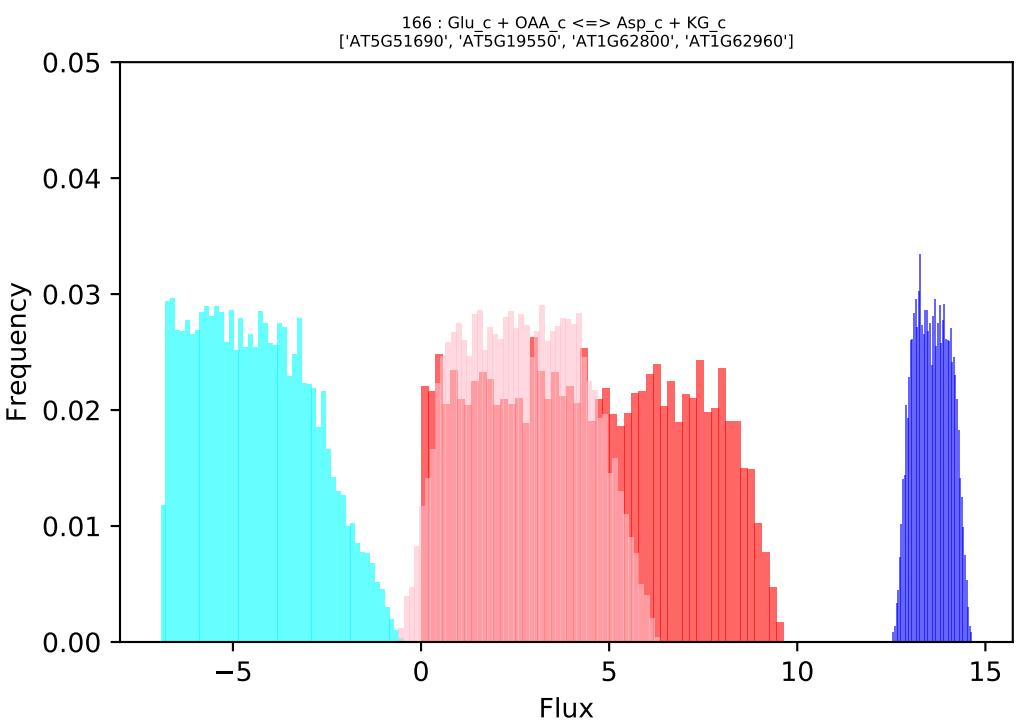

161 : CBP_h + H_h + Orn_h --> CTL_h + Pi_h
['AT1G75330']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

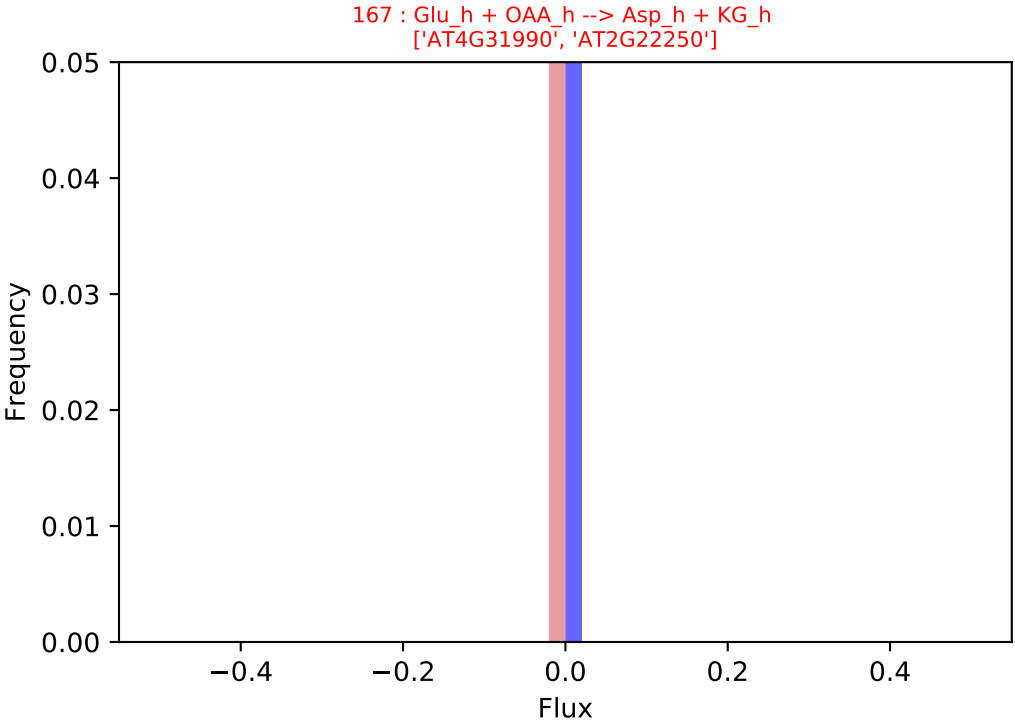

162 : ATP_h + Asp_h + CTL_h --> AMP_h + Arg_DASH_SCA_h + 3.0 H_h + PPi_h
['AT4G24830']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

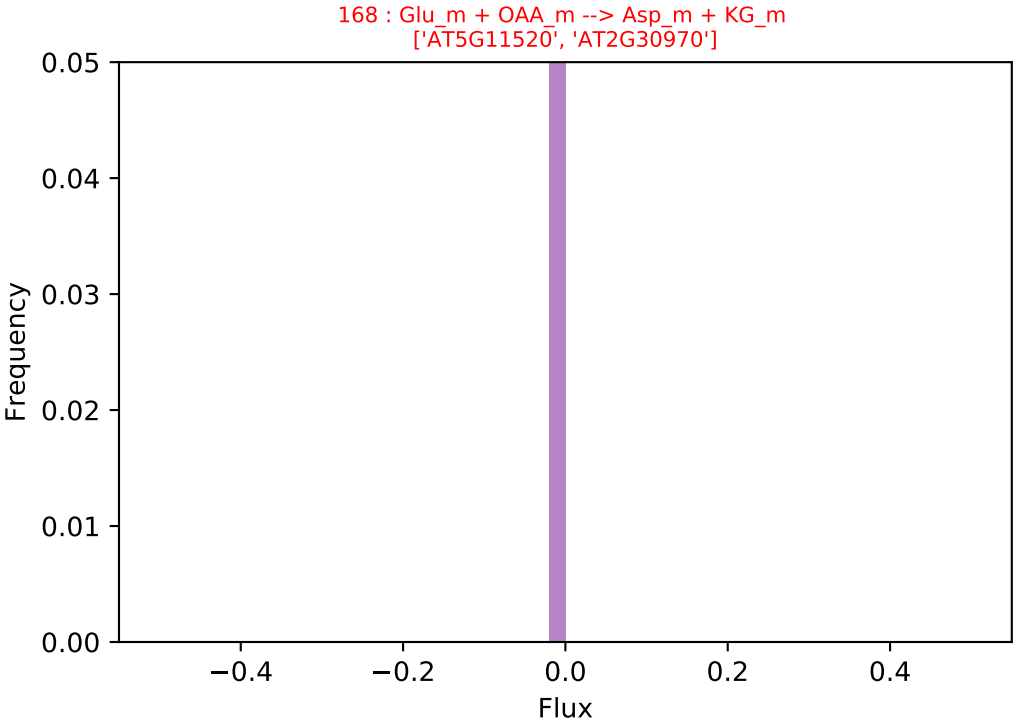

163 : Arg_DASH_SCA_h --> Arg_h + Fum_h
['AT5G10920']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

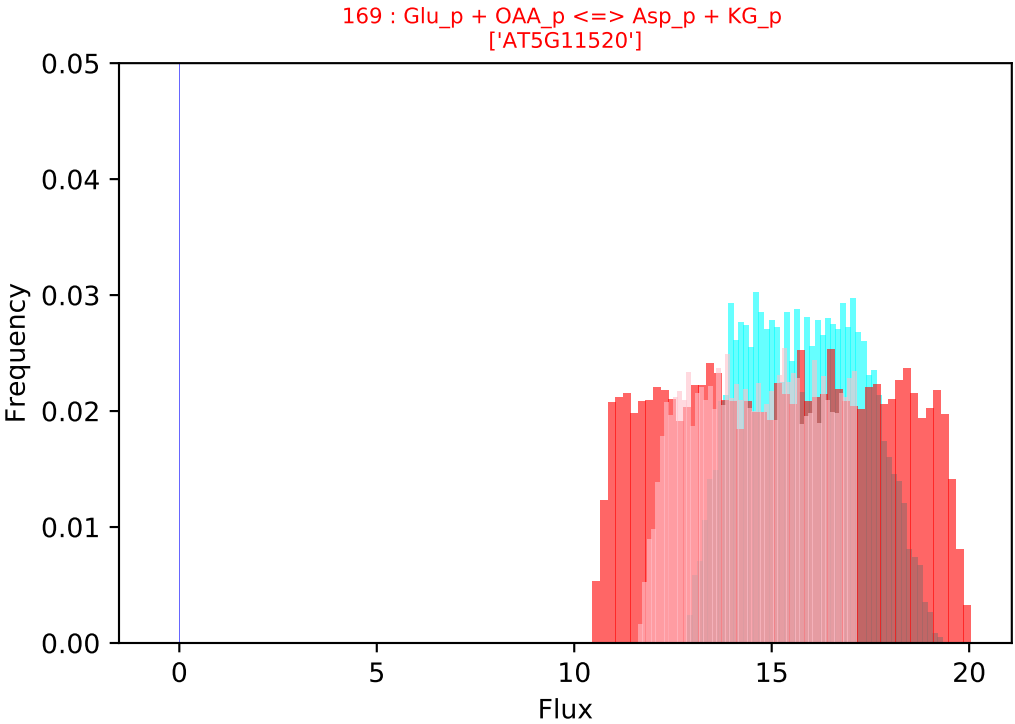

164 : Mal_c --> Fum_c + H2O_c
['AT5G50950']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.5
0.0
0.5
1.0
1.5
2.0
2.5
Flux

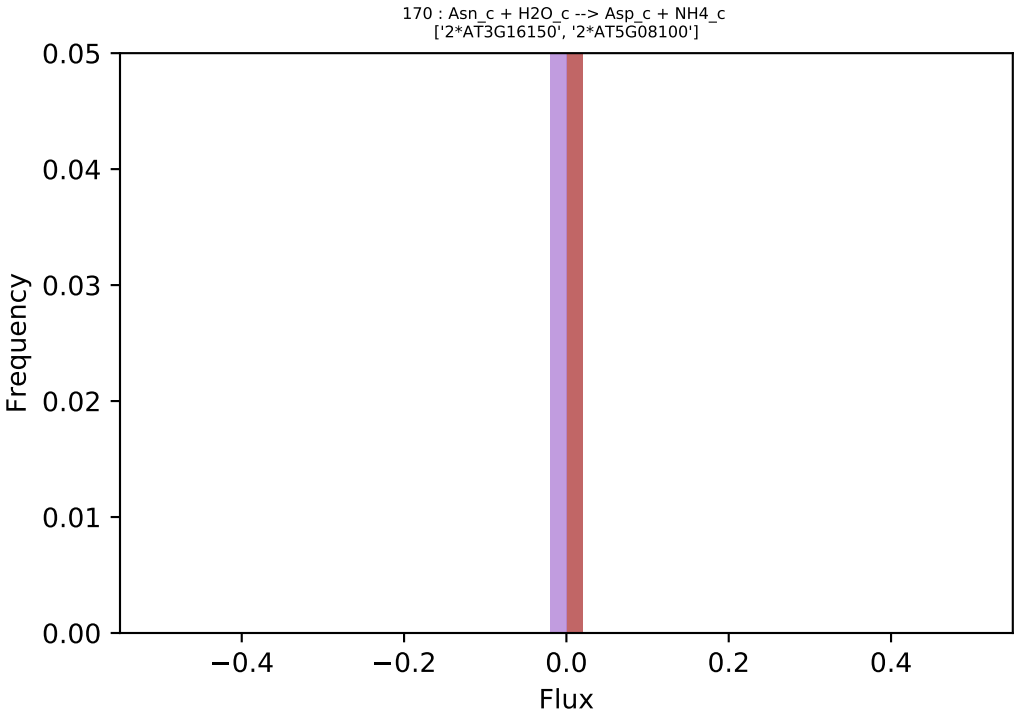

165 : ATP_c + Asp_c + Gln_c + H2O_c --> AMP_c + Asn_c + Glu_c + H_c + PPi_c
['AT3G47340', 'AT5G10240', 'AT5G65010']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

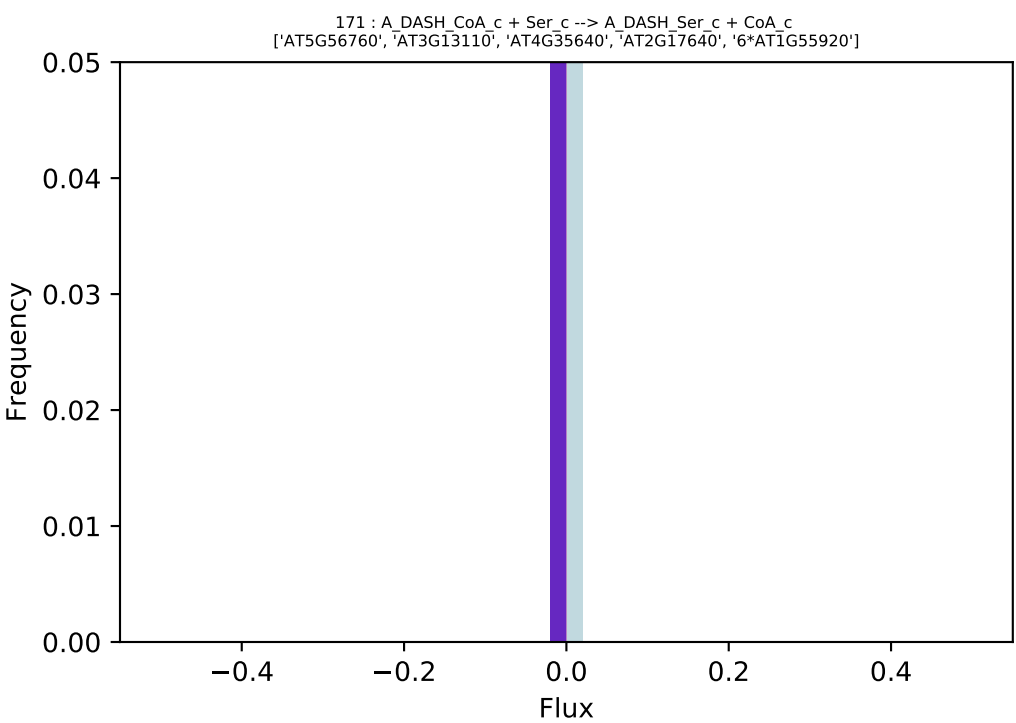

166 : Glu_c + OAA_c <=> Asp_c + KG_c
['AT5G51690', 'AT5G19550', 'AT1G62800', 'AT1G62960']
Frequency
Flux
0.05
0.04
0.03
0.02
0.01
0.00
−5
0
5
10
15

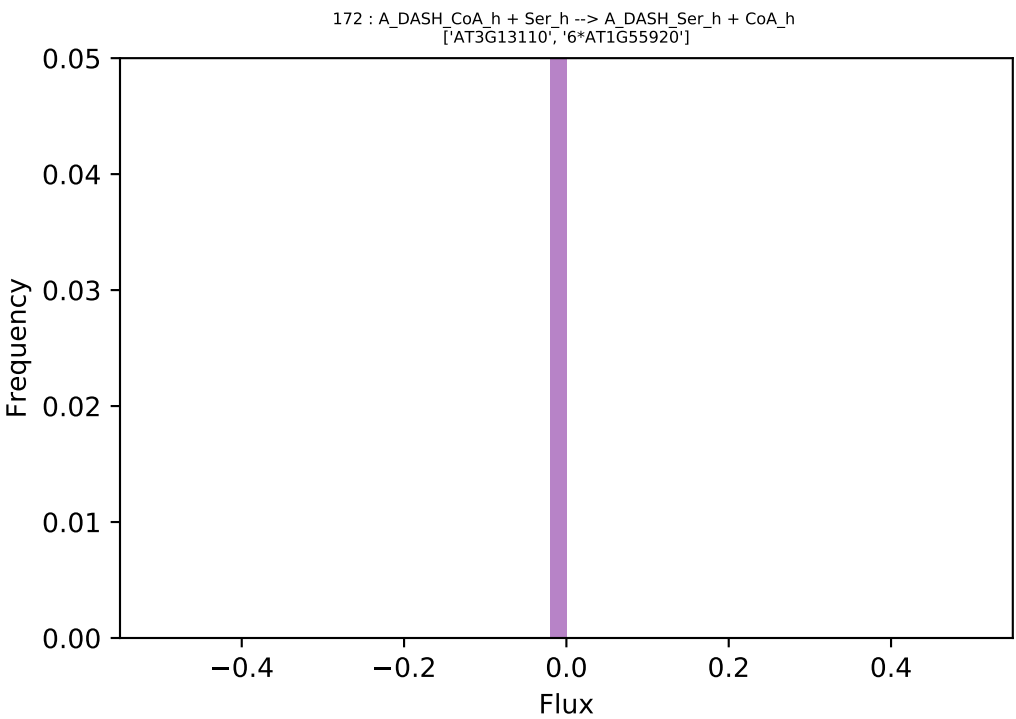

167 : Glu_h + OAA_h --> Asp_h + KG_h
['AT4G31990', 'AT2G22250']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

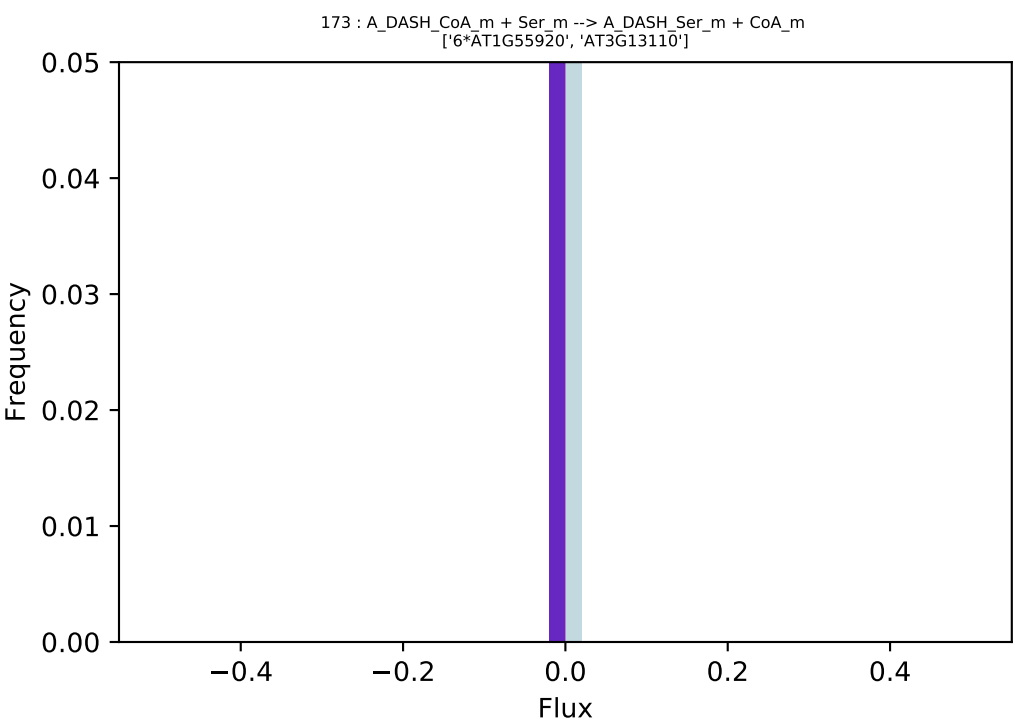

168 : Glu_m + OAA_m --> Asp_m + KG_m
['AT5G11520', 'AT2G30970']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

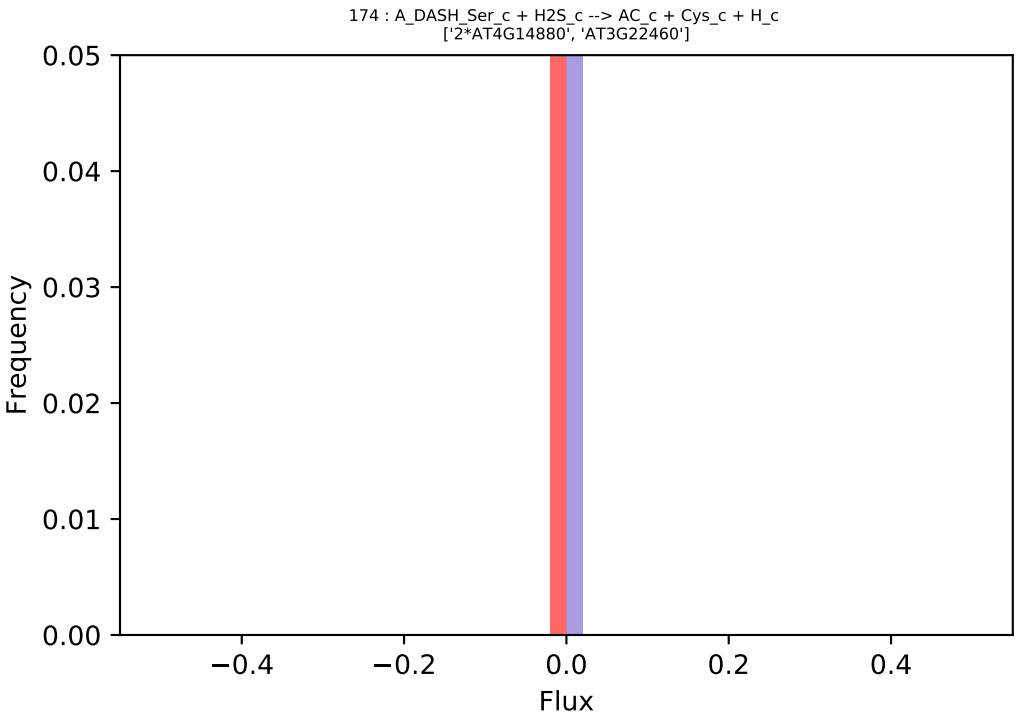

169 : Glu_p + OAA_p <=> Asp_p + KG_p
['AT5G11520']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
0
5
10
15
20
Flux

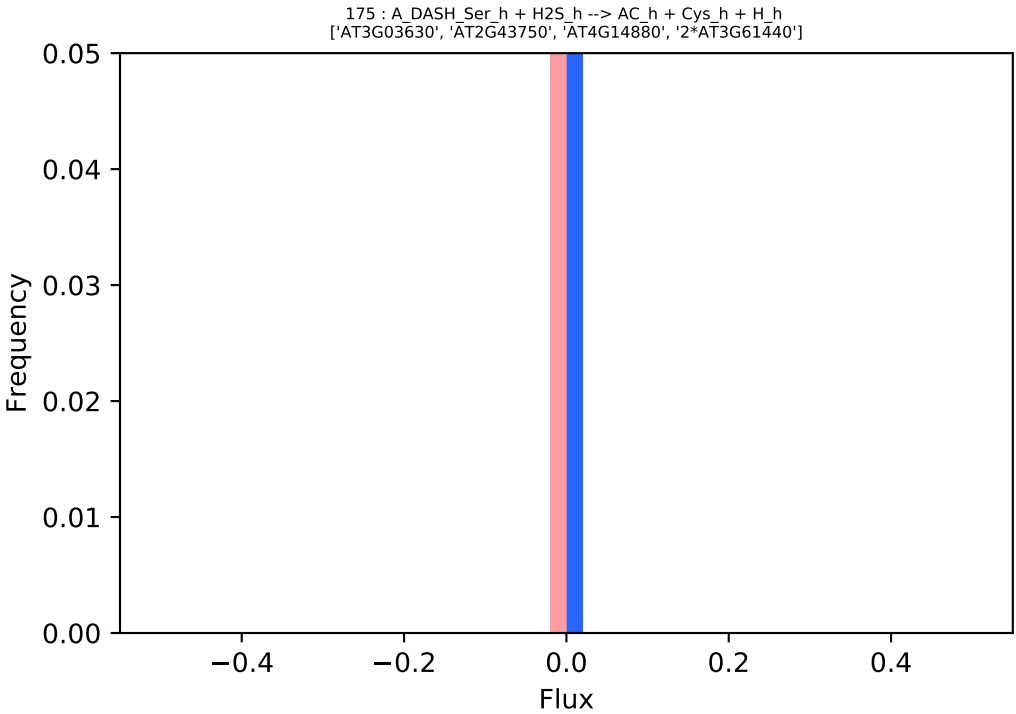

170 : Asn_c + H2O_c --> Asp_c + NH4_c
['2*AT3G16150', '2*AT5G08100']
Frequency
0.05
0.04
0.03
0.02
0.01
0.00
−0.4
−0.2
0.0
0.2
0.4
Flux

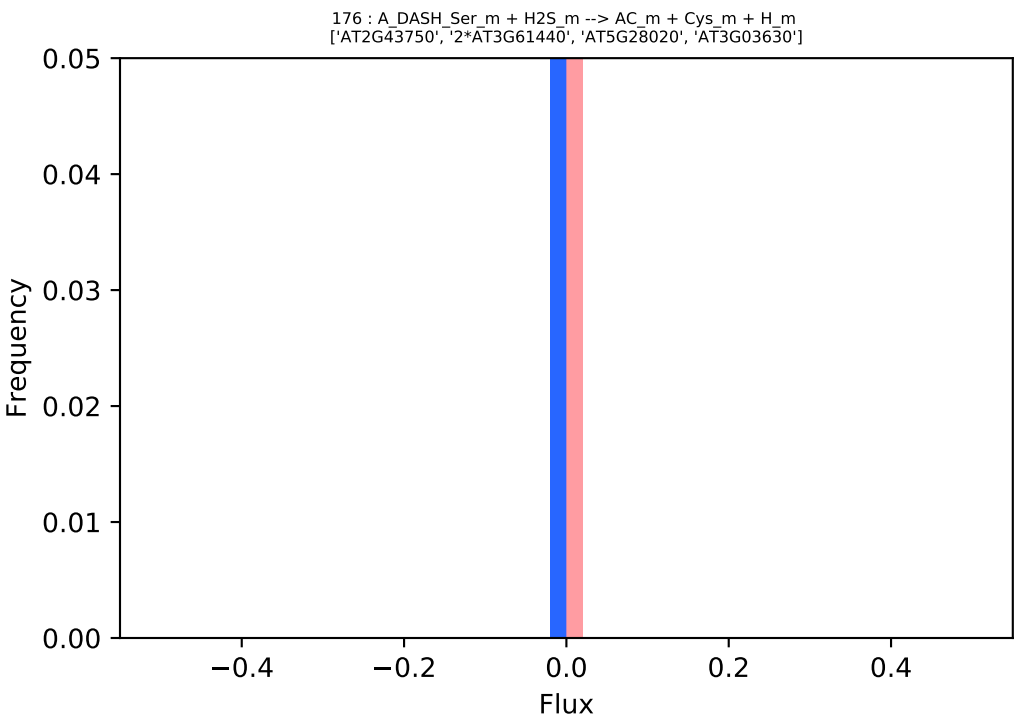

171 : A_DASH_CoA_c + Ser_c --> A_DASH_Ser_c + CoA_c
['AT5G56760', 'AT3G13110', 'AT4G35640', 'AT2G17640', '6*AT1G55920']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

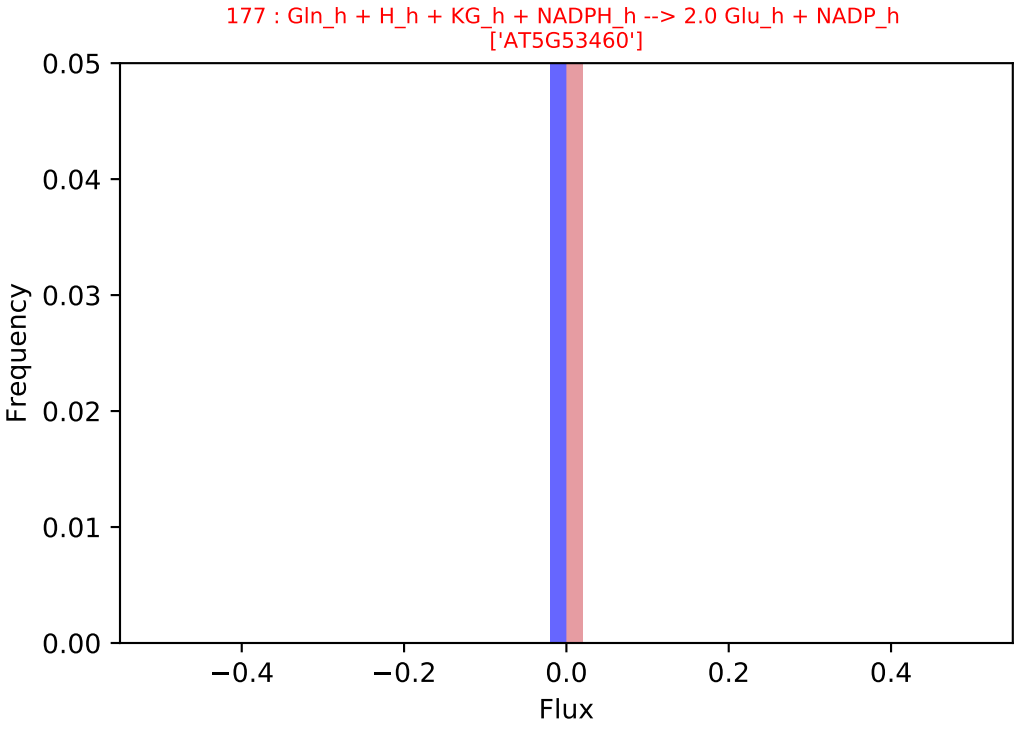

172 : A_DASH_CoA_h + Ser_h --> A_DASH_Ser_h + CoA_h
['AT3G13110', '6*AT1G55920']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

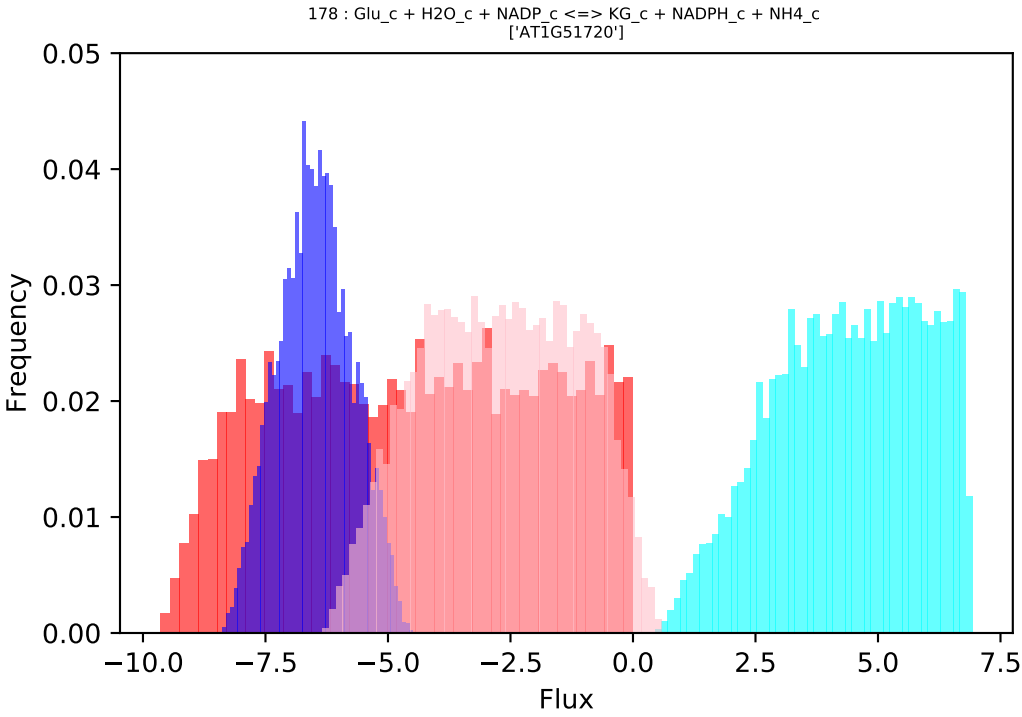

173 : A_DASH_CoA_m + Ser_m --> A_DASH_Ser_m + CoA_m
['6*AT1G55920', 'AT3G13110']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

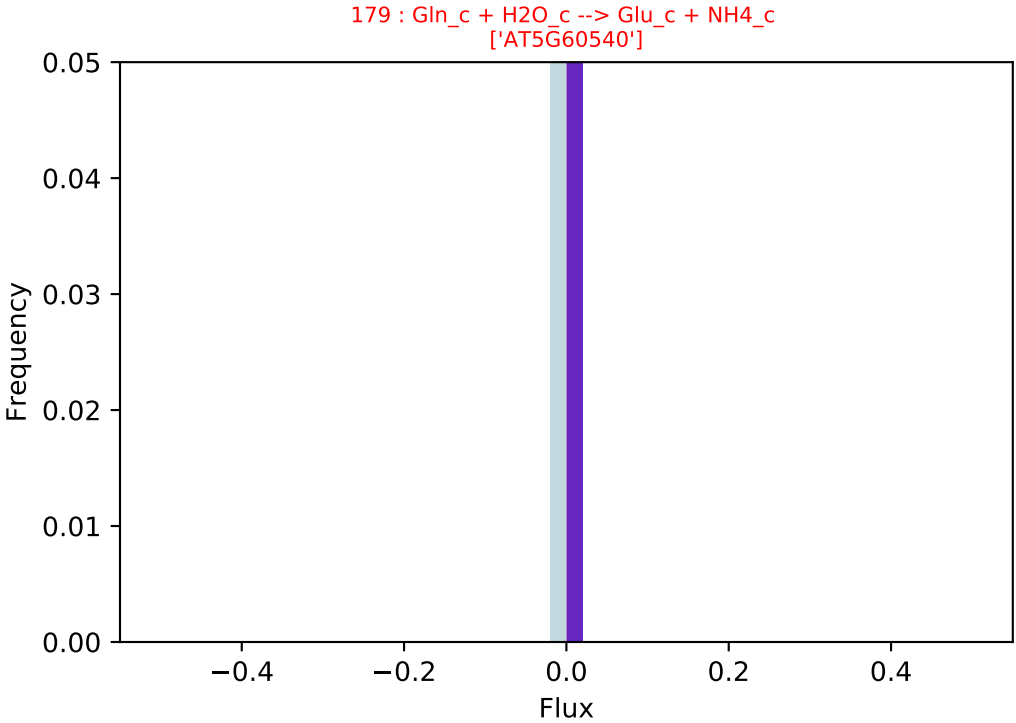

174 : A_DASH_Ser_c + H2S_c --> AC_c + Cys_c + H_c
['2*AT4G14880', 'AT3G22460']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

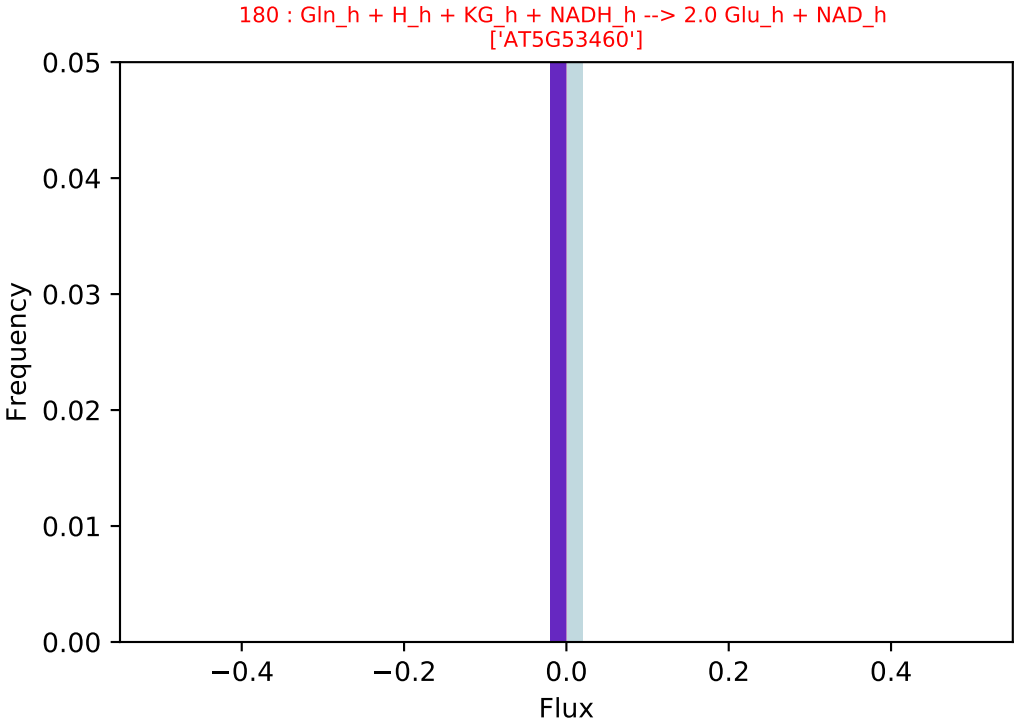

175 : A_DASH_Ser_h + H2S_h --> AC_h + Cys_h + H_h
['AT3G03630', 'AT2G43750', 'AT4G14880', '2*AT3G61440']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

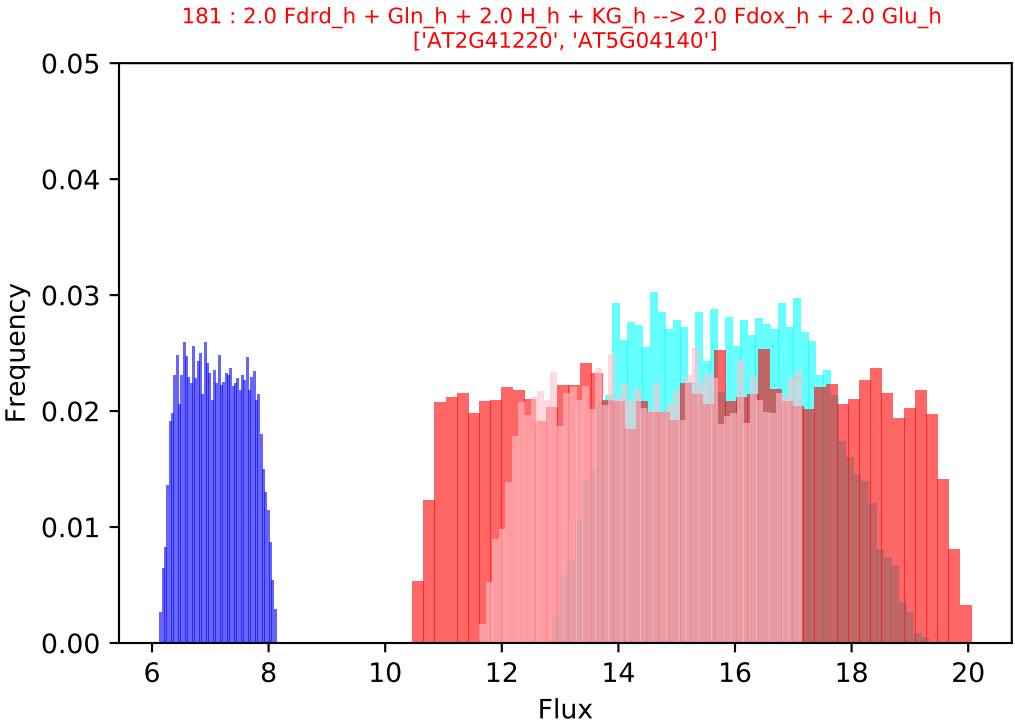

176 : A_DASH_Ser_m + H2S_m --> AC_m + Cys_m + H_m
['AT2G43750', '2*AT3G61440', 'AT5G28020', 'AT3G03630']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

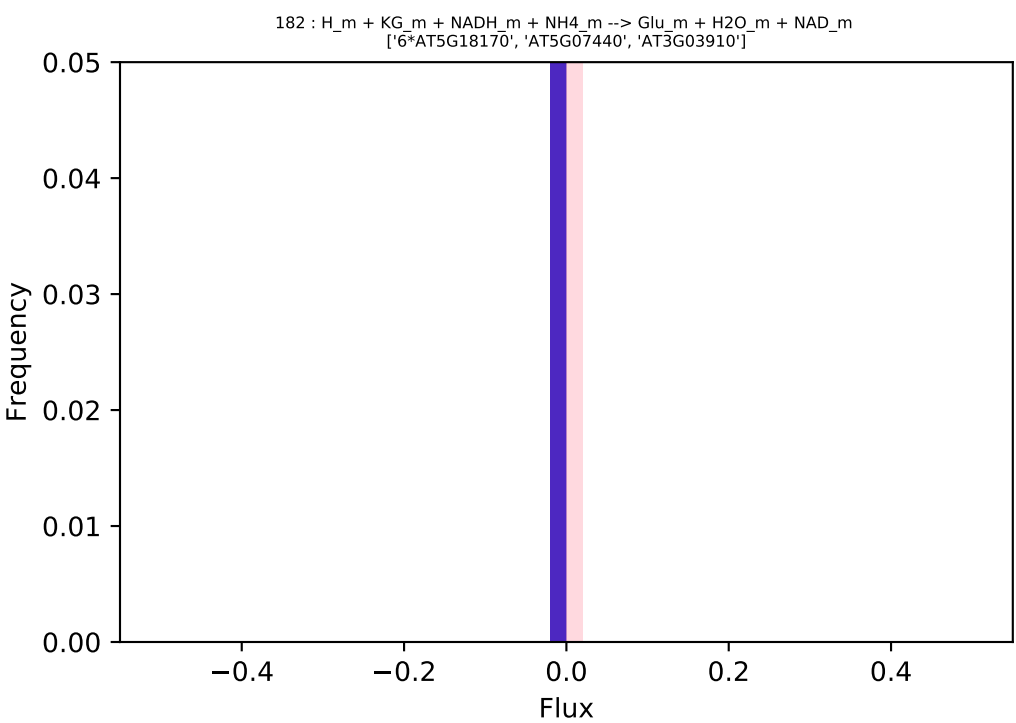

177 : Gln_h + H_h + KG_h + NADPH_h --> 2.0 Glu_h + NADP_h
['AT5G53460']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

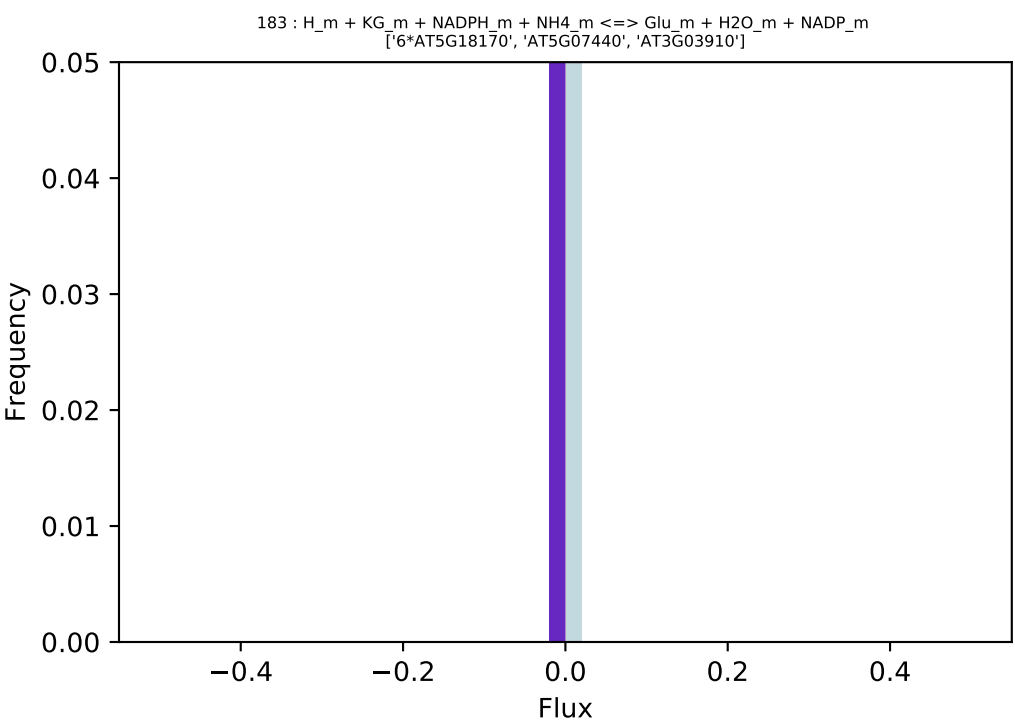

178 : Glu_c + H2O_c + NADP_c <=> KG_c + NADPH_c + NH4_c
['AT1G51720']
Frequency
Flux
0.05
0.04
0.03
0.02
0.01
0.00
−10.0
−7.5
−5.0
−2.5
0.0
2.5
5.0
7.5

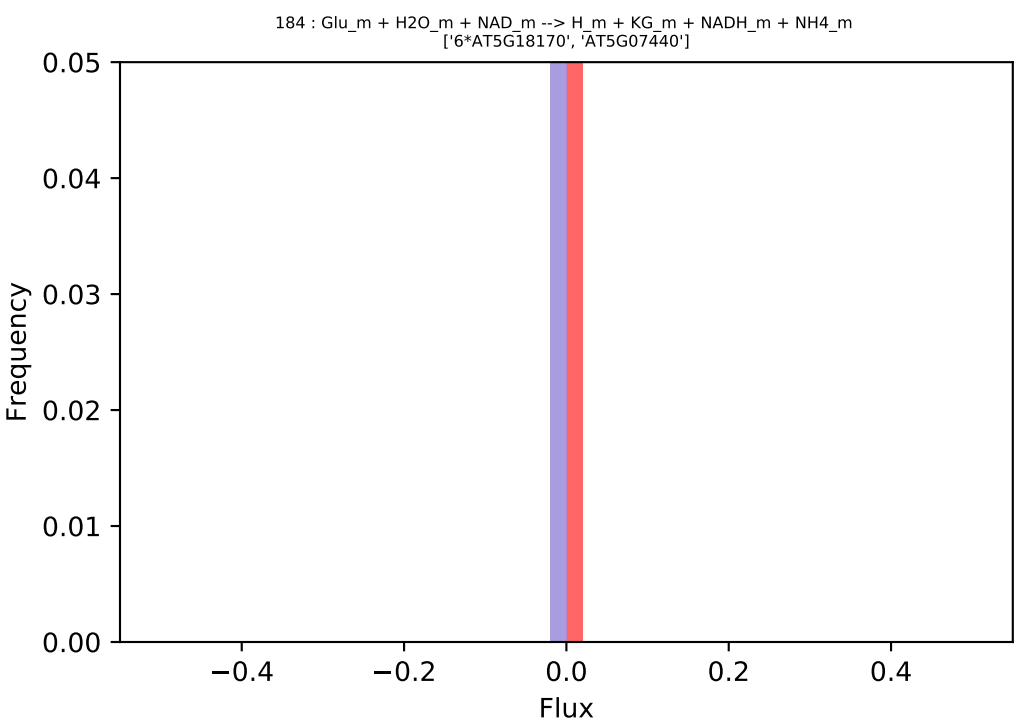

179 : Gln_c + H2O_c --> Glu_c + NH4_c
['AT5G60540']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

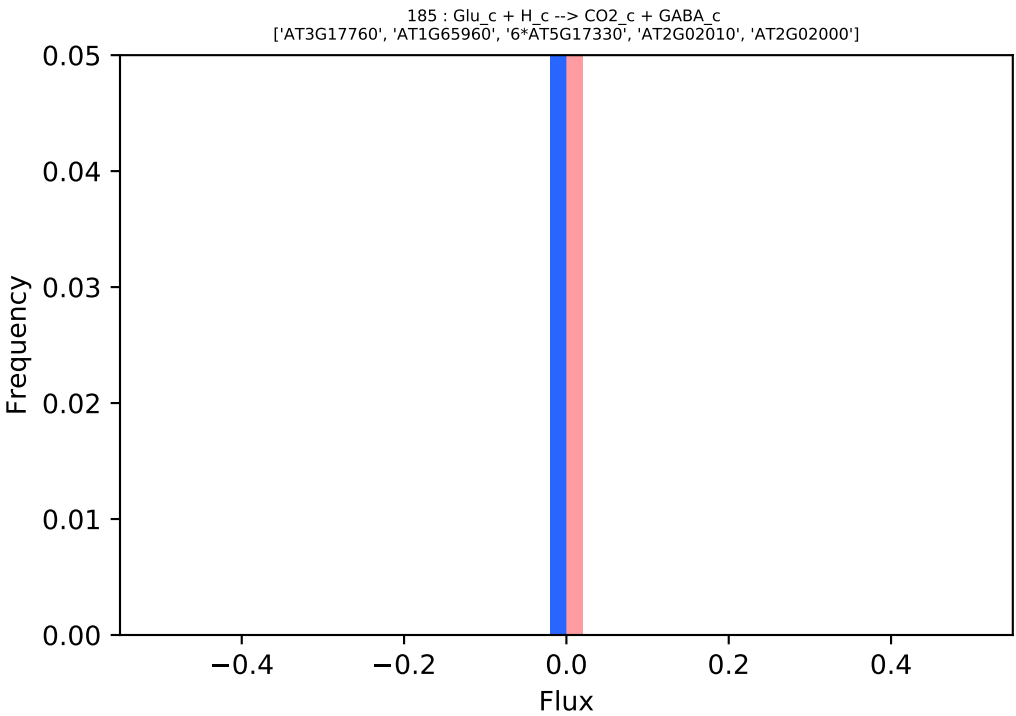

180 : Gln_h + H_h + KG_h + NADH_h --> 2.0 Glu_h + NAD_h
['AT5G53460']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

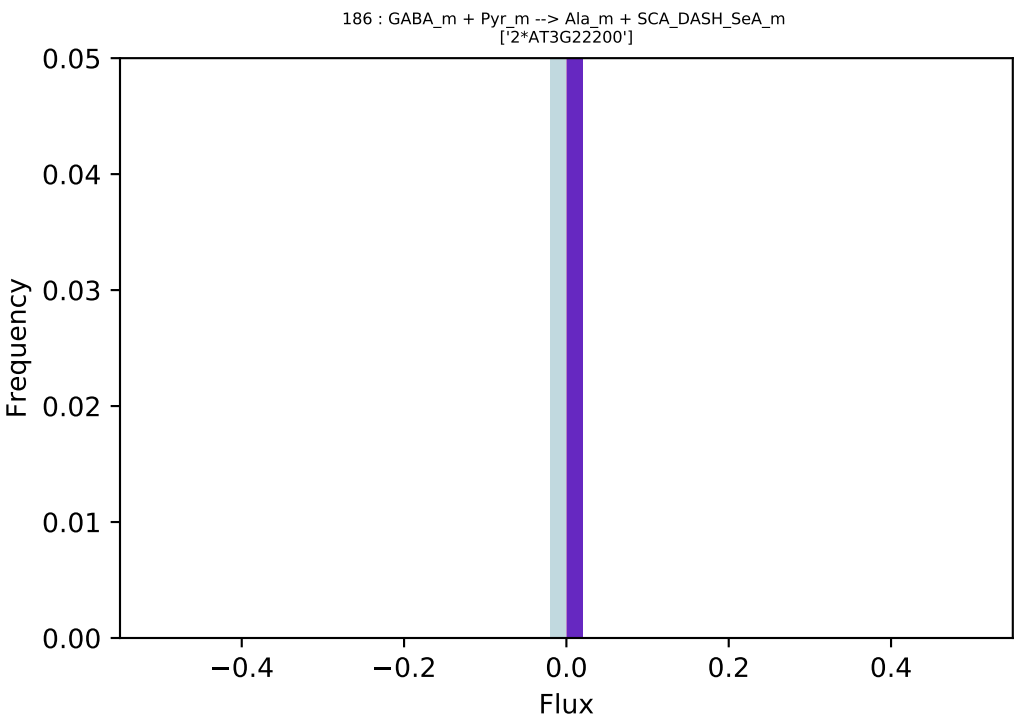

181 : 2.0 Fdrd_h + Gln_h + 2.0 H_h + KG_h --> 2.0 Fdox_h + 2.0 Glu_h
['AT2G41220', 'AT5G04140']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
6
8
10
12
14
16
18
20
Flux

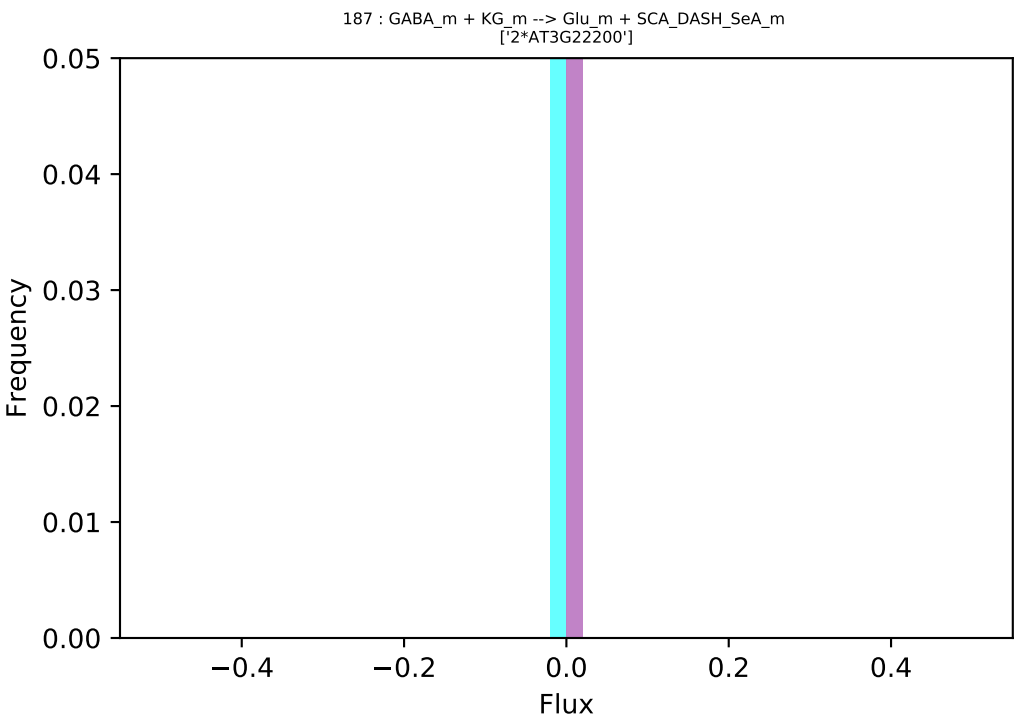

182 : H_m + KG_m + NADH_m + NH4_m --> Glu_m + H2O_m + NAD_m
['6*AT5G18170', 'AT5G07440', 'AT3G03910']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

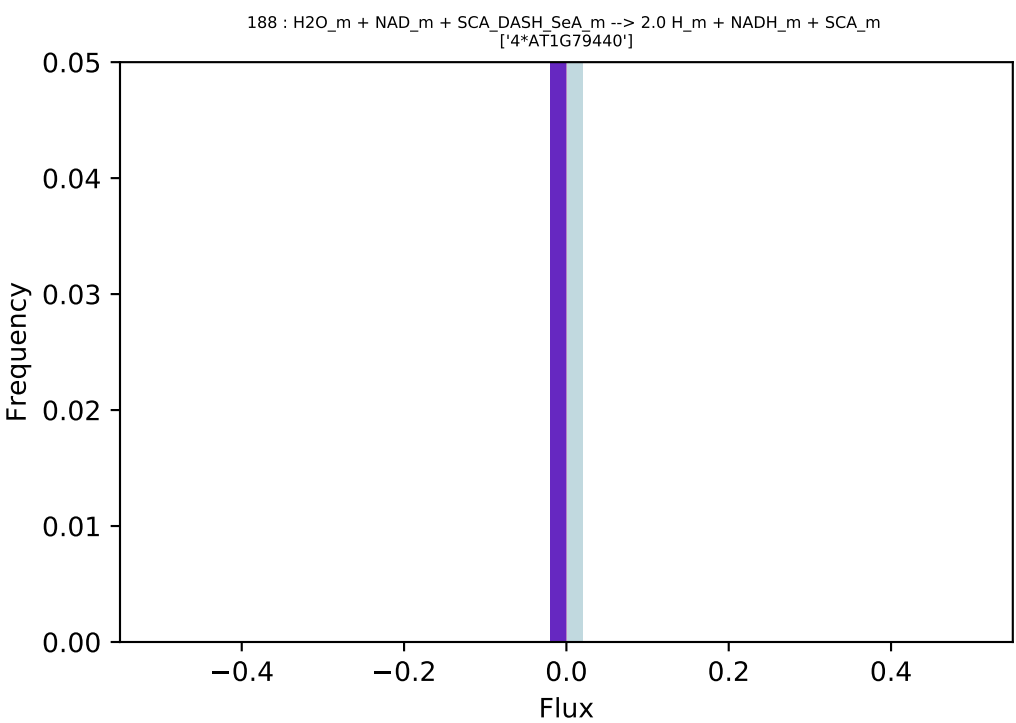

183 : H_m + KG_m + NADPH_m + NH4_m <=> Glu_m + H2O_m + NADP_m
['6*AT5G18170', 'AT5G07440', 'AT3G03910']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

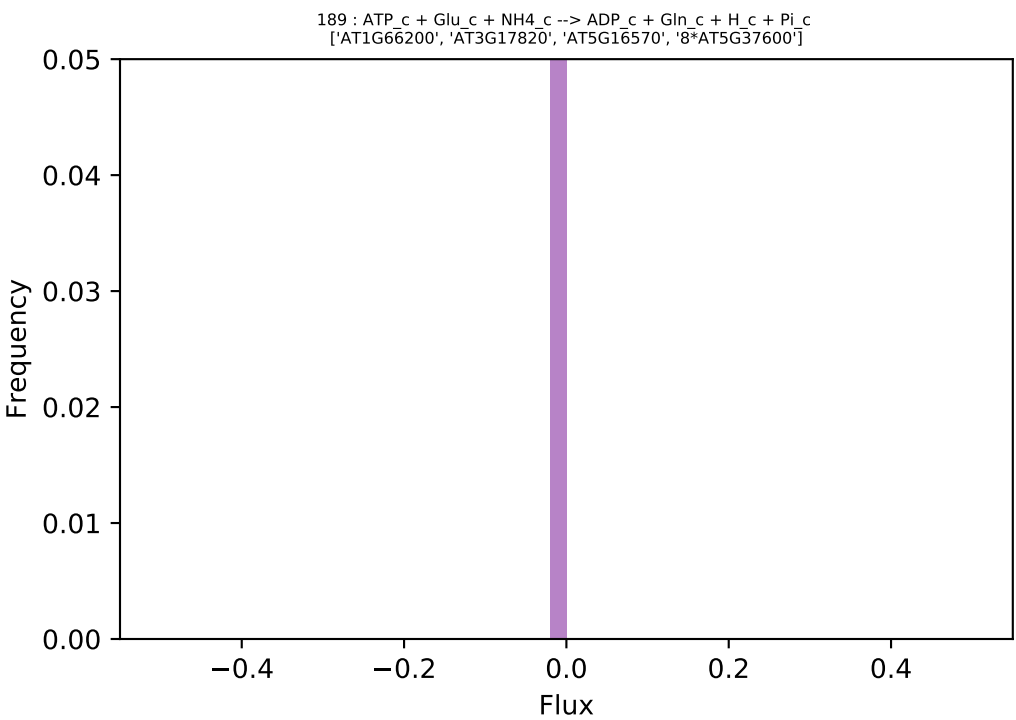

184 : Glu_m + H2O_m + NAD_m --> H_m + KG_m + NADH_m + NH4_m
['6*AT5G18170', 'AT5G07440']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

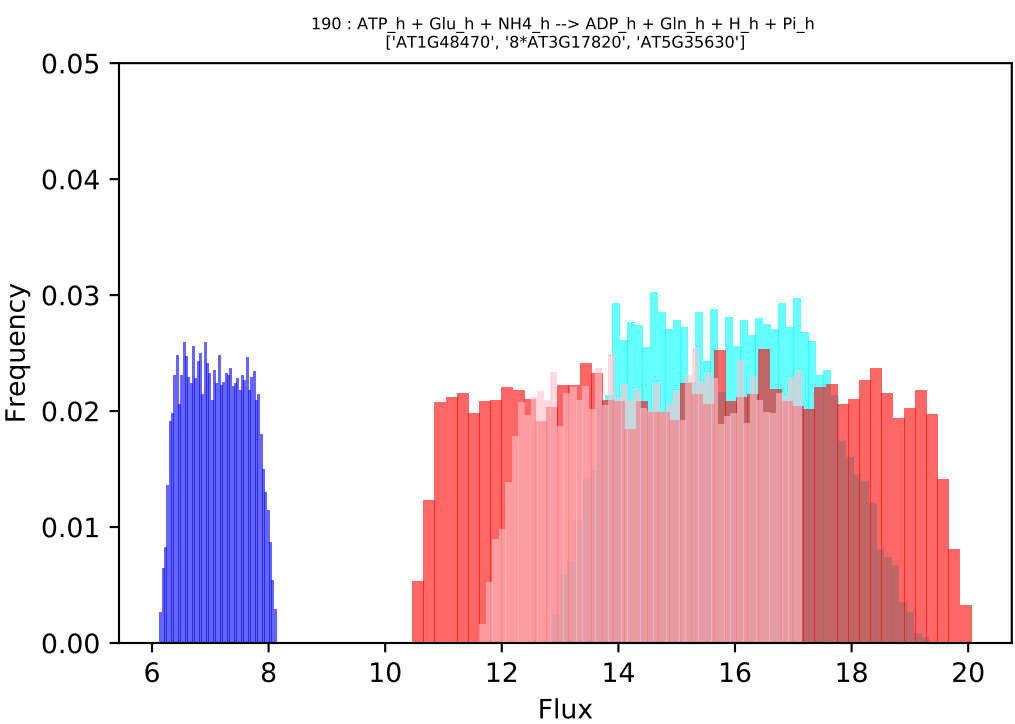

185 : Glu_c + H_c --> CO2_c + GABA_c
['AT3G17760', 'AT1G65960', '6*AT5G17330', 'AT2G02010', 'AT2G02000']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

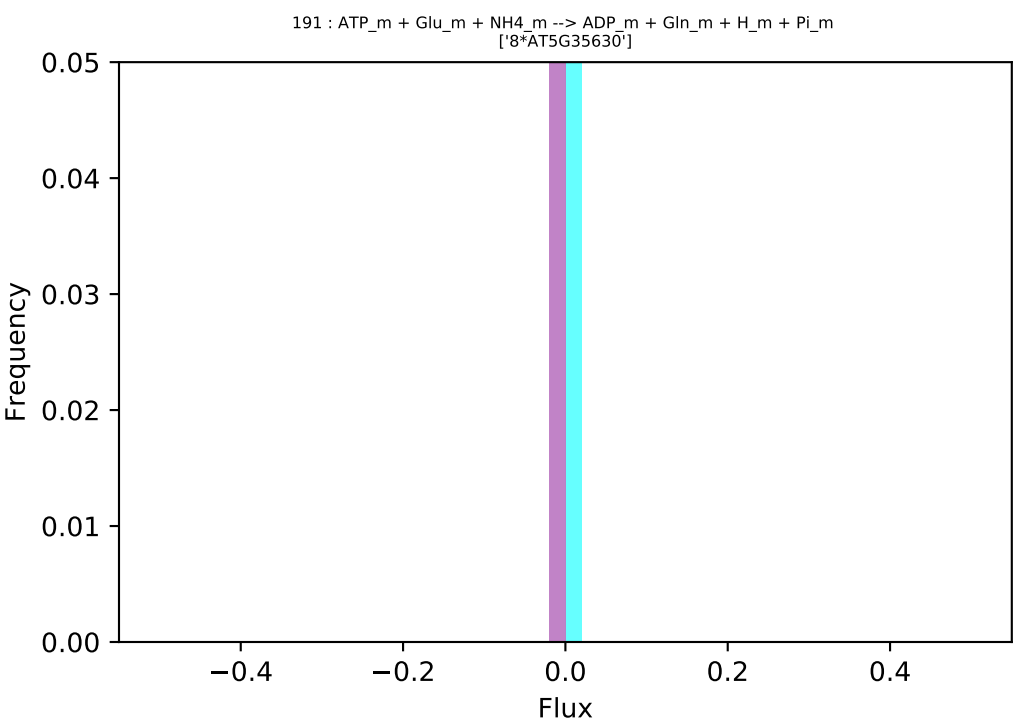

186 : GABA_m + Pyr_m --> Ala_m + SCA_DASH_SeA_m
['2*AT3G22200']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


187 : GABA_m + KG_m --> Glu_m + SCA_DASH_SeA_m
['2*AT3G22200']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


188 : H2O_m + NAD_m + SCA_DASH_SeA_m --> 2.0 H_m + NADH_m + SCA_m
['4*AT1G79440']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


189 : ATP_c + Glu_c + NH4_c --> ADP_c + Gln_c + H_c + Pi_c
['AT1G66200', 'AT3G17820', 'AT5G16570', '8*AT5G37600']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


190 : ATP_h + Glu_h + NH4_h --> ADP_h + Gln_h + H_h + Pi_h
['AT1G48470', '8*AT3G17820', 'AT5G35630']
Frequency
0.05
0.04
0.03
0.02
0.01
0.00
6
8
10
12
14
16
18
20
Flux


191 : ATP_m + Glu_m + NH4_m --> ADP_m + Gln_m + H_m + Pi_m
['8*AT5G35630']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
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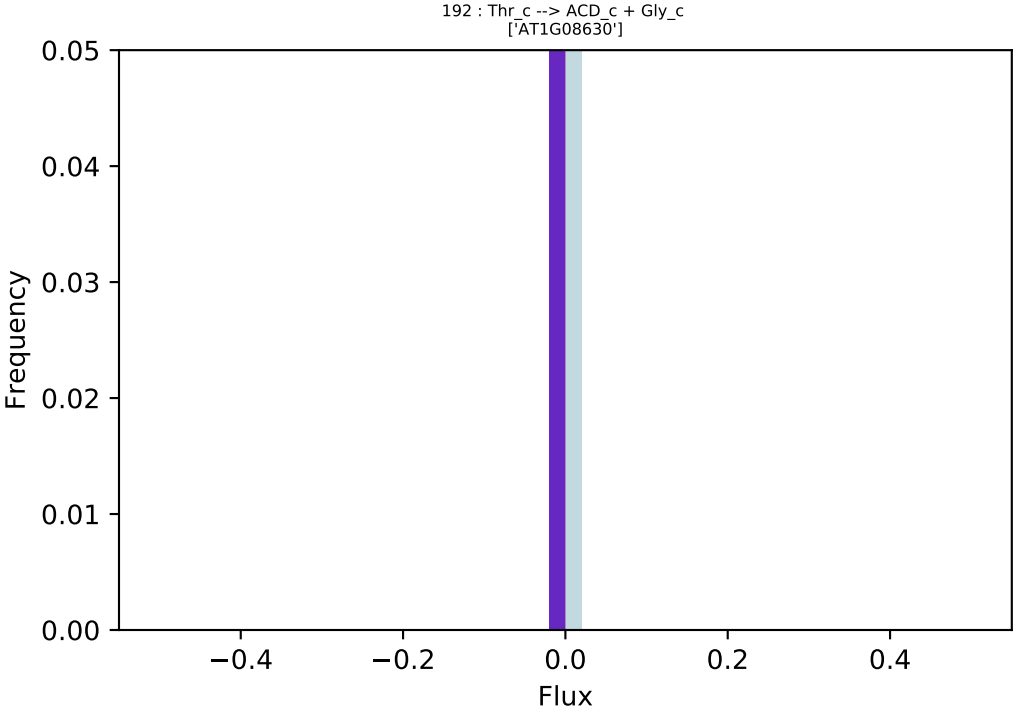
0.4
Flux


192 : Thr_c --> ACD_c + Gly_c
['AT1G08630']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
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−0.2
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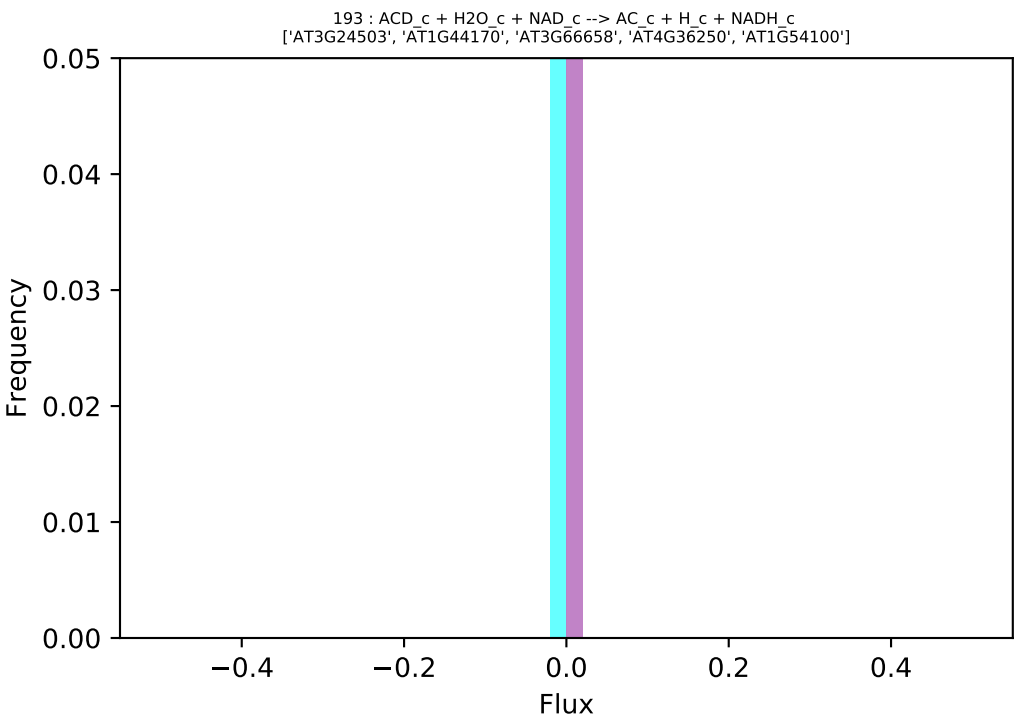
0.4
Flux


193 : ACD_c + H2O_c + NAD_c --> AC_c + H_c + NADH_c
['AT3G24503', 'AT1G44170', 'AT3G66658', 'AT4G36250', 'AT1G54100']
0.05
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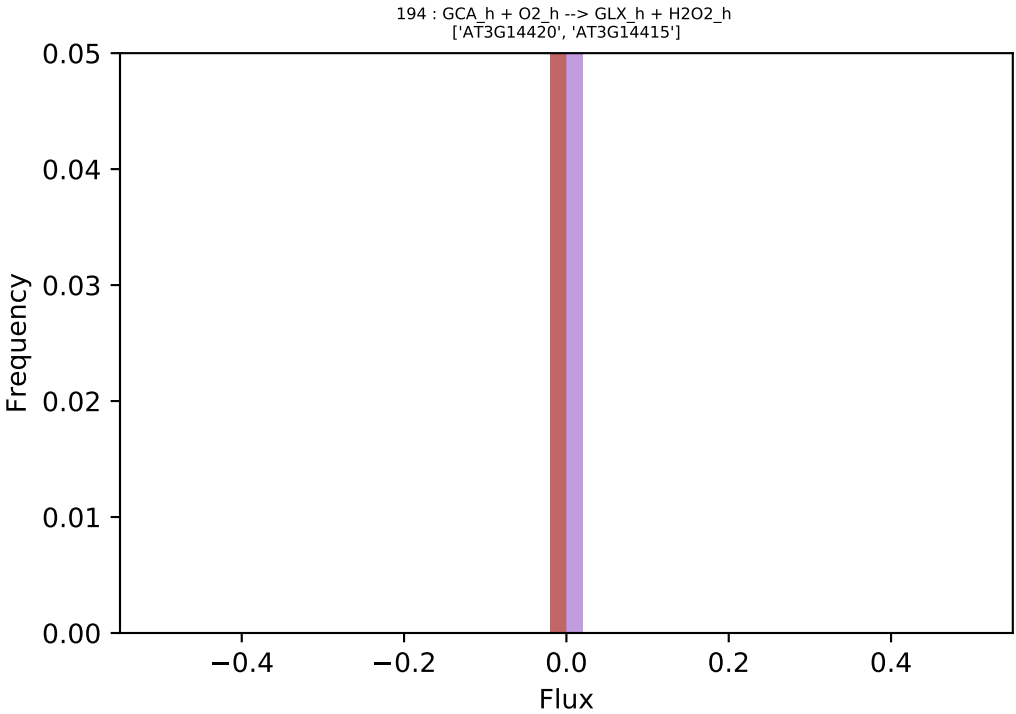
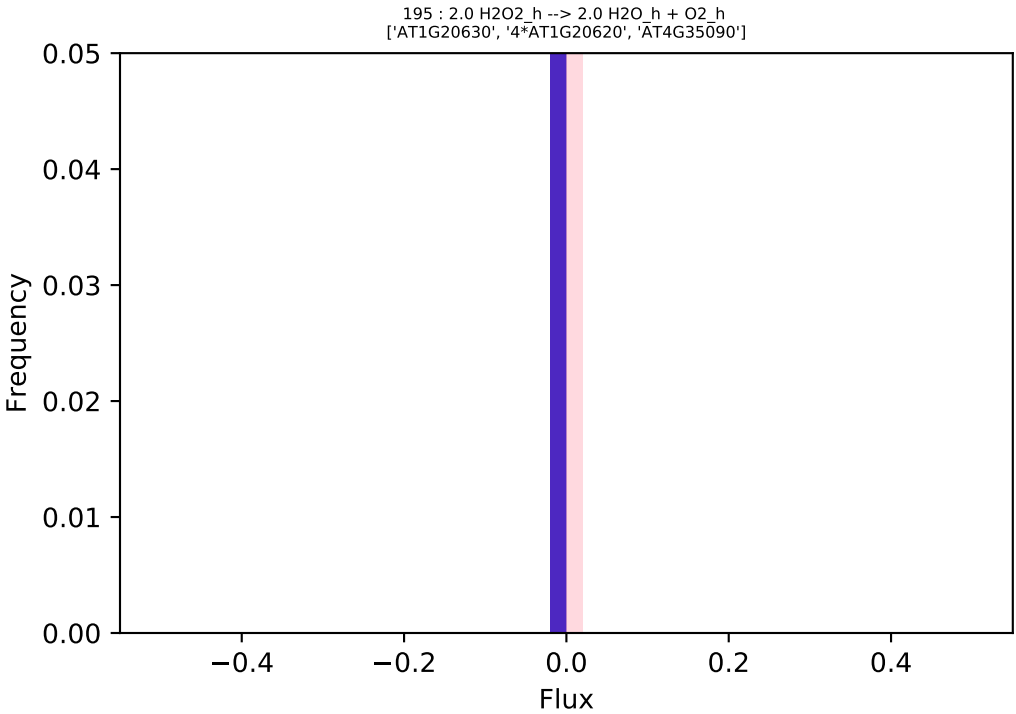
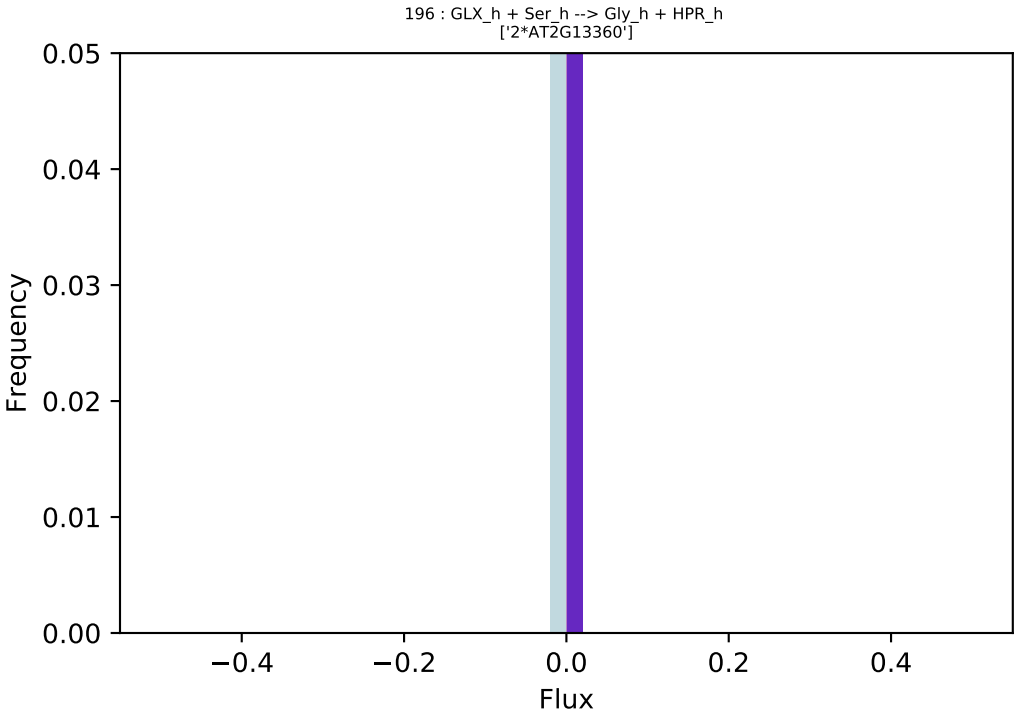
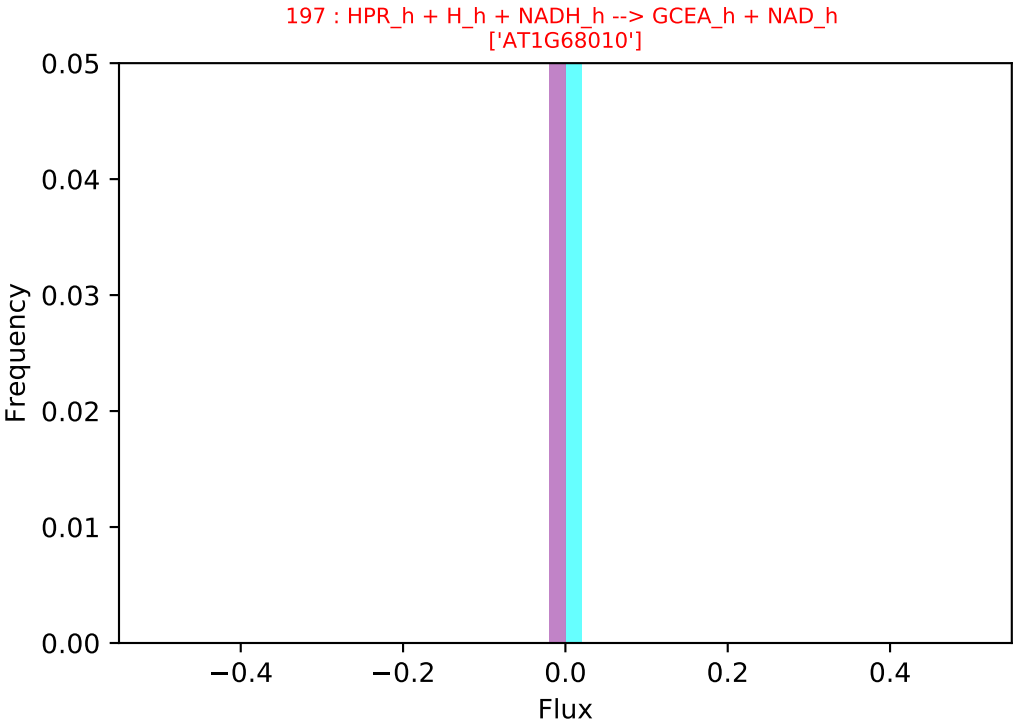
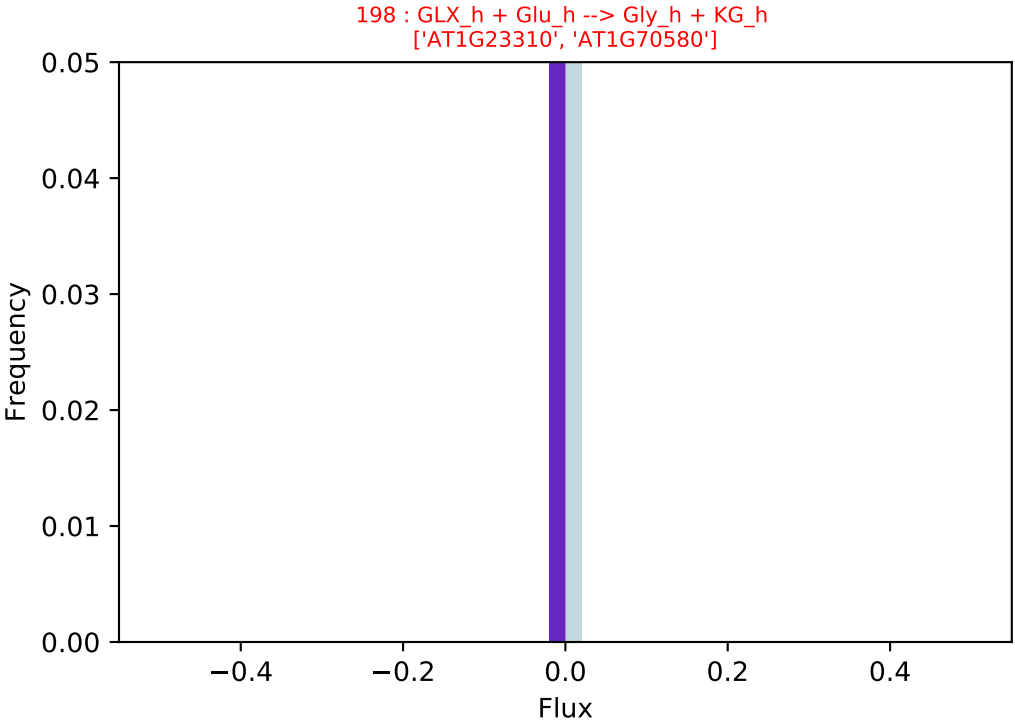
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

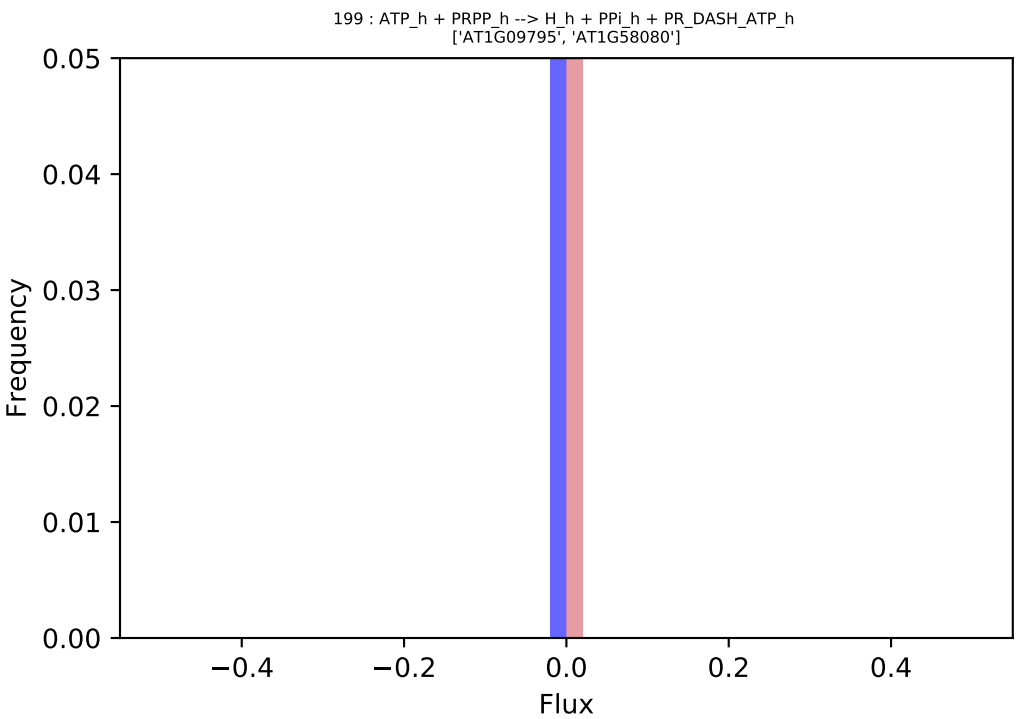

194 : GCA_h + O2_h --> GLX_h + H2O2_h
['AT3G14420', 'AT3G14415']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

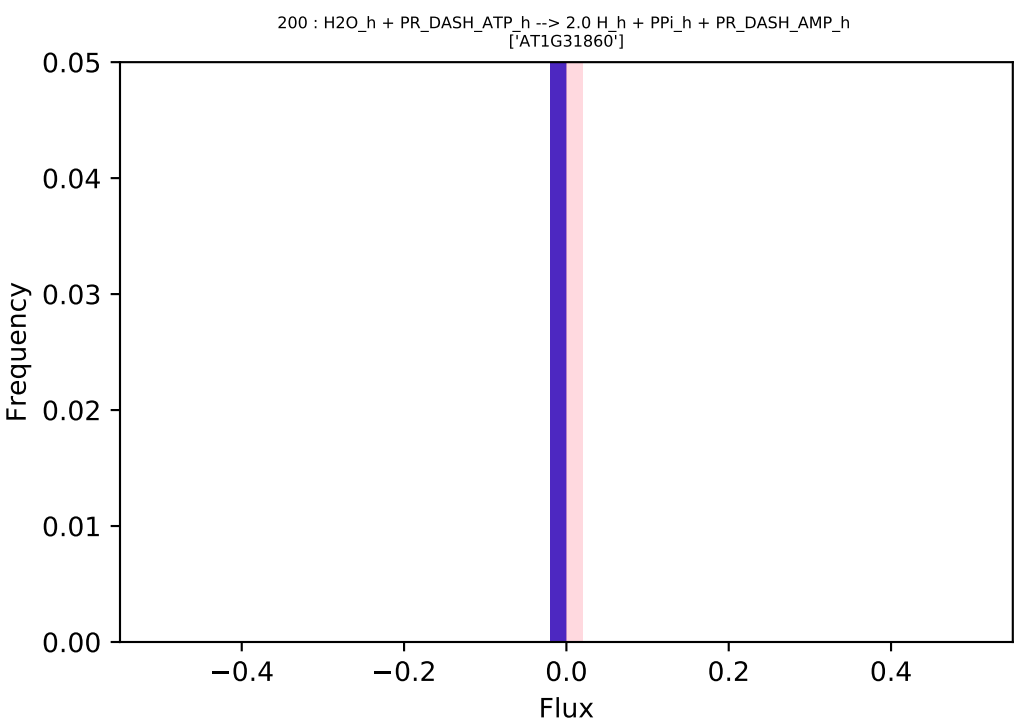

195 : 2.0 H2O2_h --> 2.0 H2O_h + O2_h
['AT1G20630', '4*AT1G20620', 'AT4G35090']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

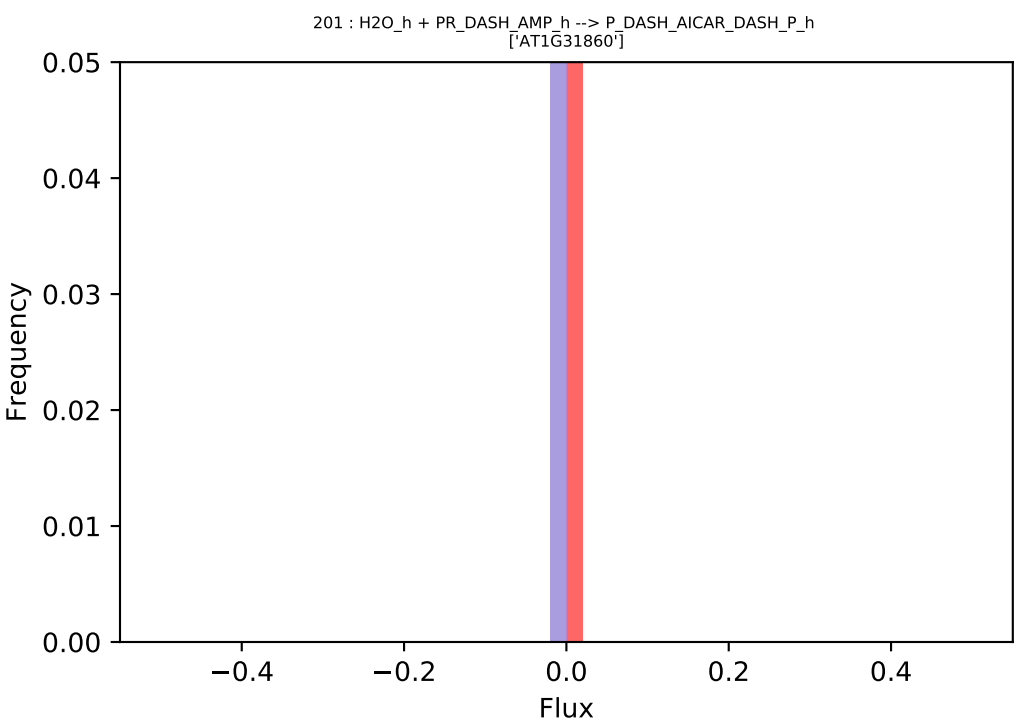

196 : GLX_h + Ser_h --> Gly_h + HPR_h
['2*AT2G13360']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

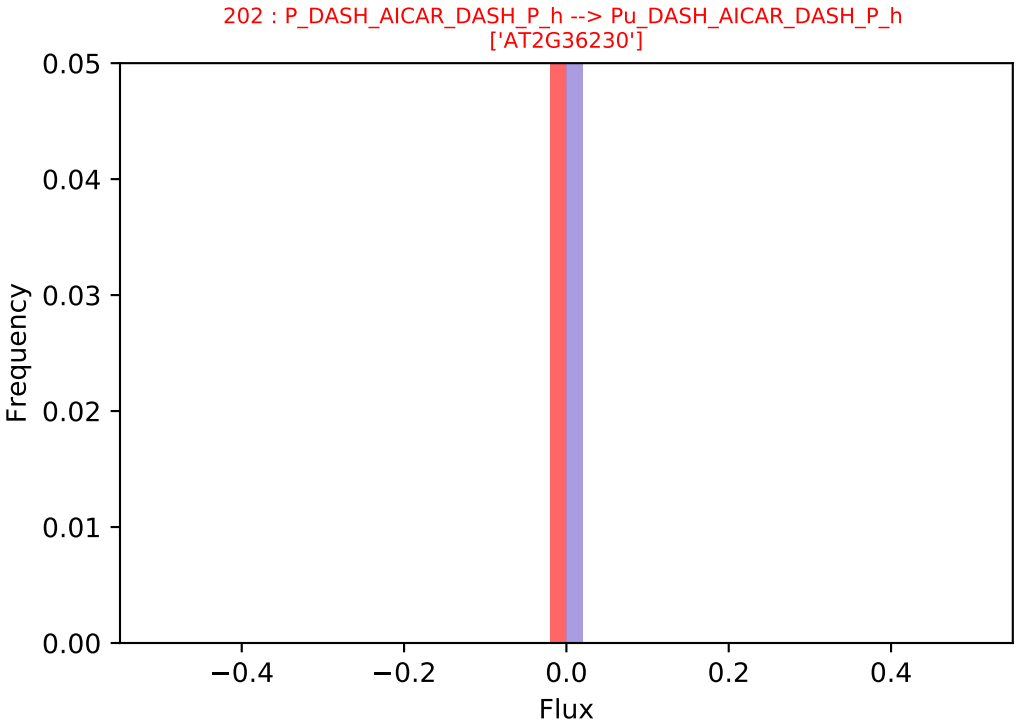

197 : HPR_h + H_h + NADH_h --> GCEA_h + NAD_h
['AT1G68010']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

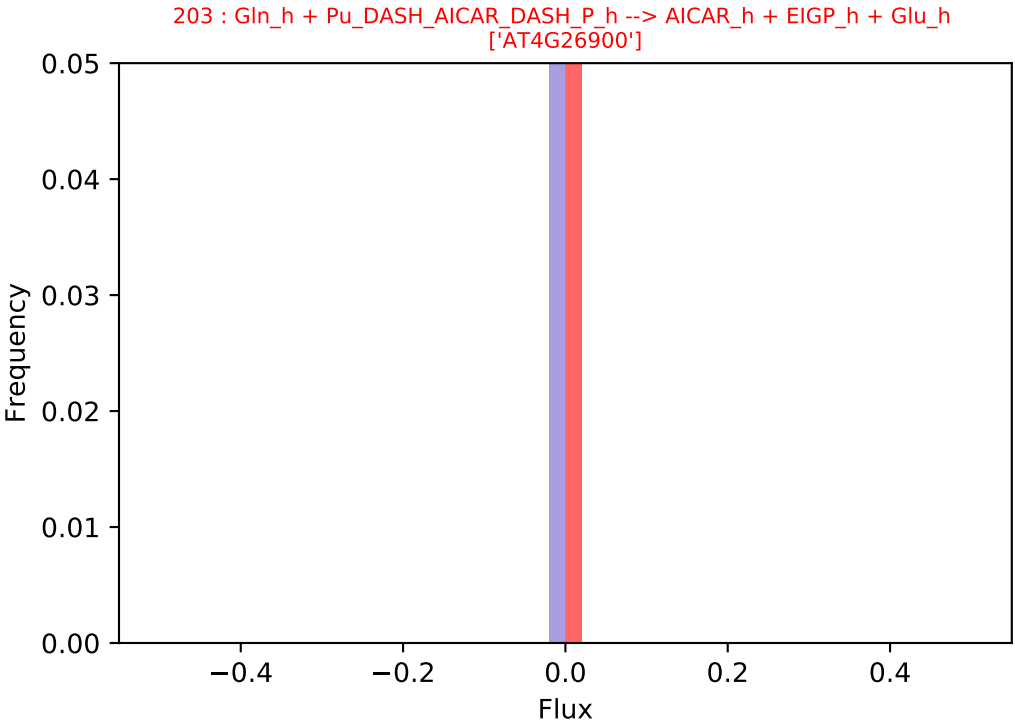

198 : GLX_h + Glu_h --> Gly_h + KG_h
['AT1G23310', 'AT1G70580']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

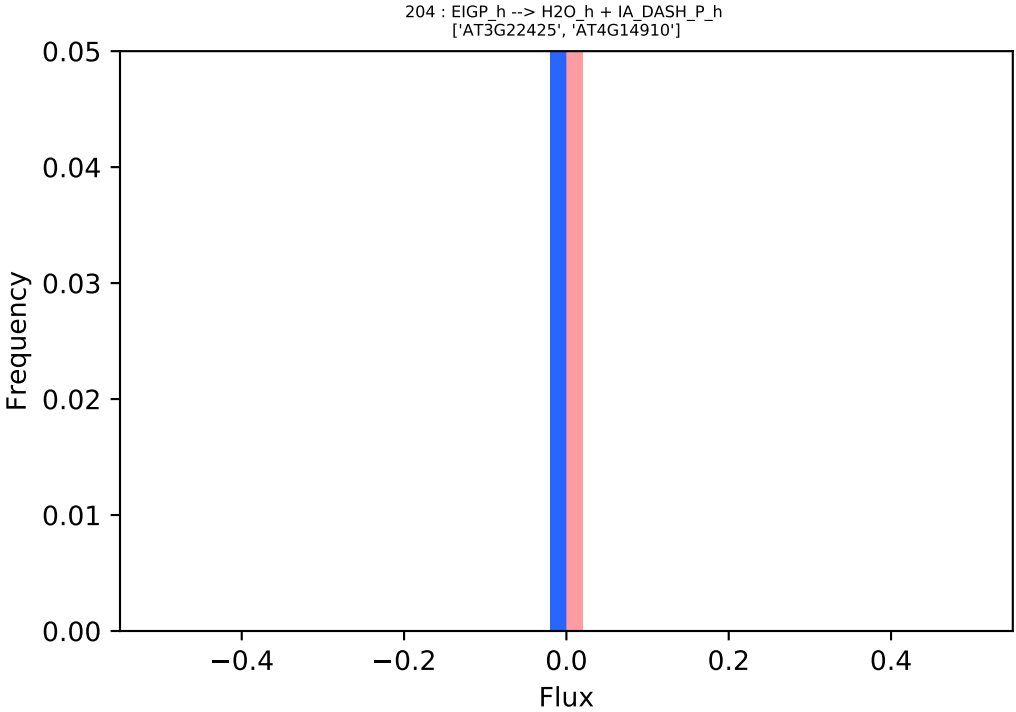

199 : ATP_h + PRPP_h --> H_h + PPi_h + PR_DASH_ATP_h
['AT1G09795', 'AT1G58080']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

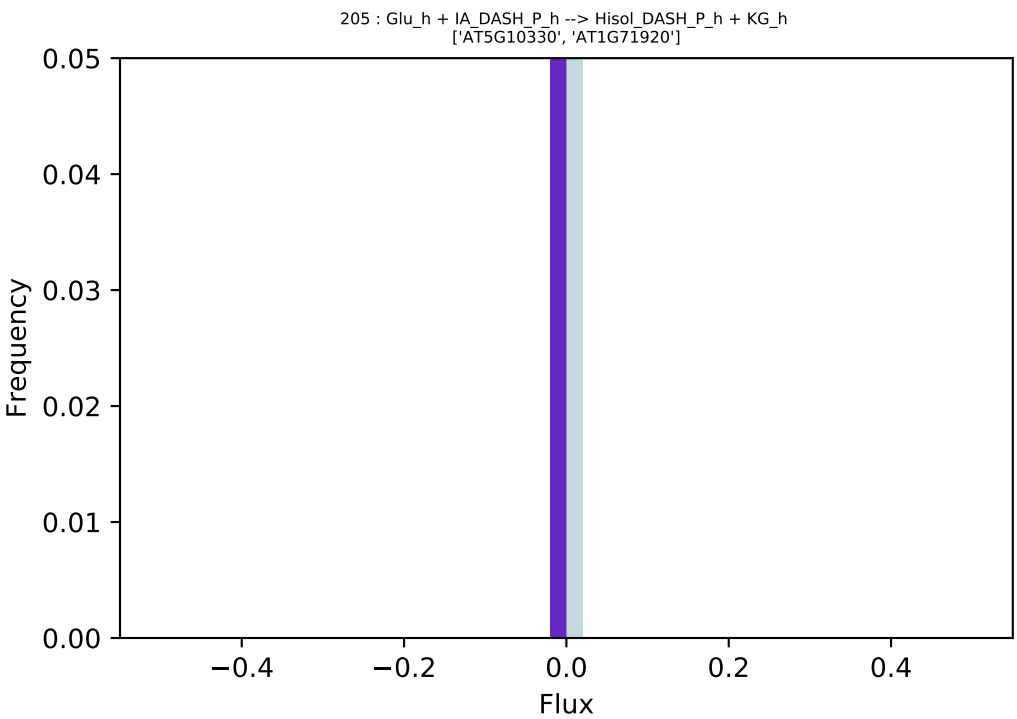

200 : H2O_h + PR_DASH_ATP_h --> 2.0 H_h + PPi_h + PR_DASH_AMP_h
['AT1G31860']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

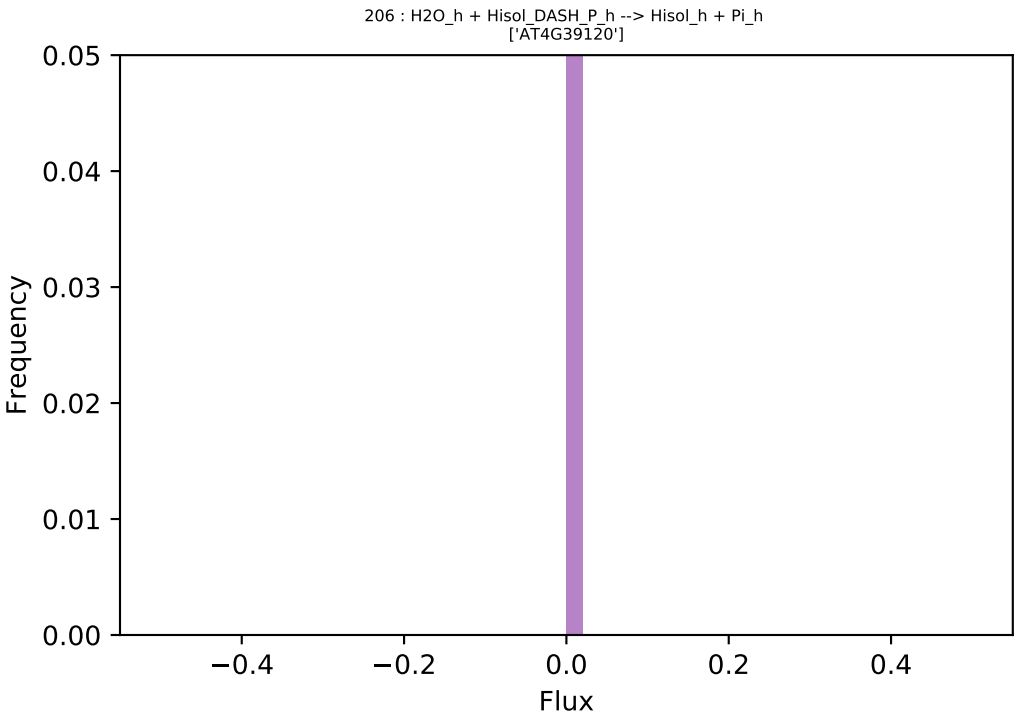

201 : H2O_h + PR_DASH_AMP_h --> P_DASH_AICAR_DASH_P_h
['AT1G31860']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

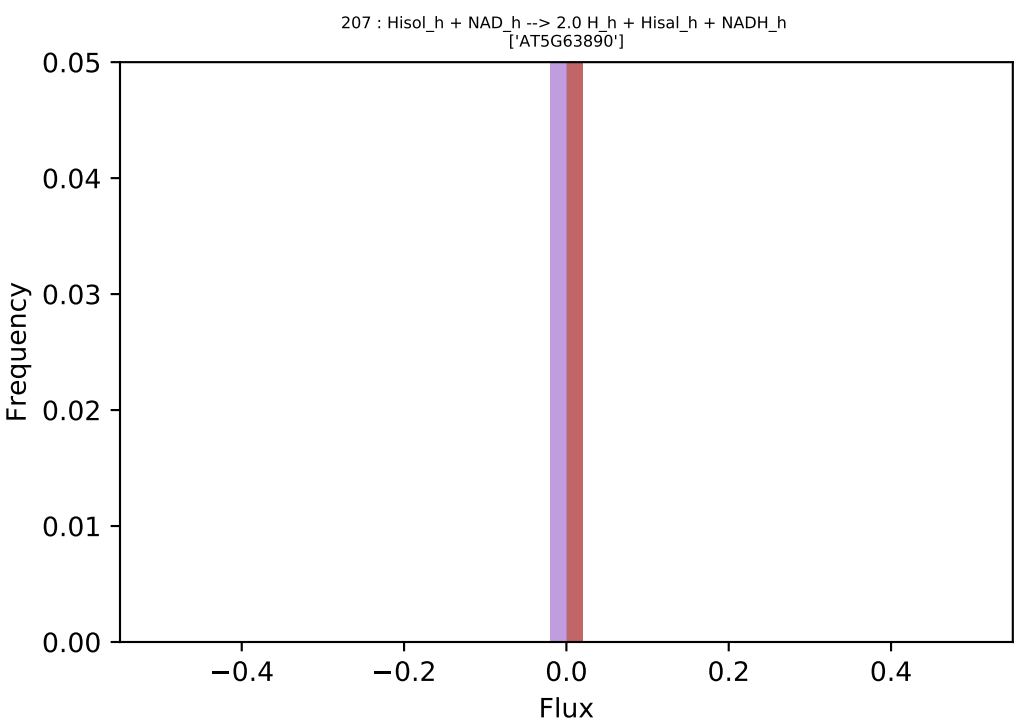

202 : P_DASH_AICAR_DASH_P_h --> Pu_DASH_AICAR_DASH_P_h
['AT2G36230']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

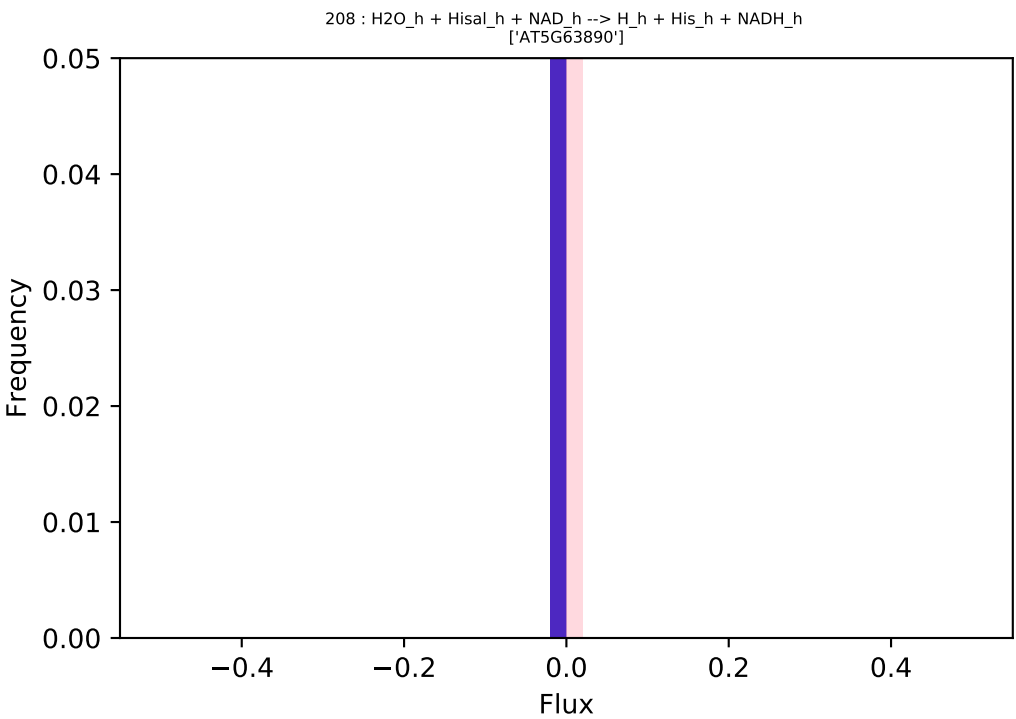

203 : Gln_h + Pu_DASH_AICAR_DASH_P_h --> AICAR_h + EIGP_h + Glu_h
['AT4G26900']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

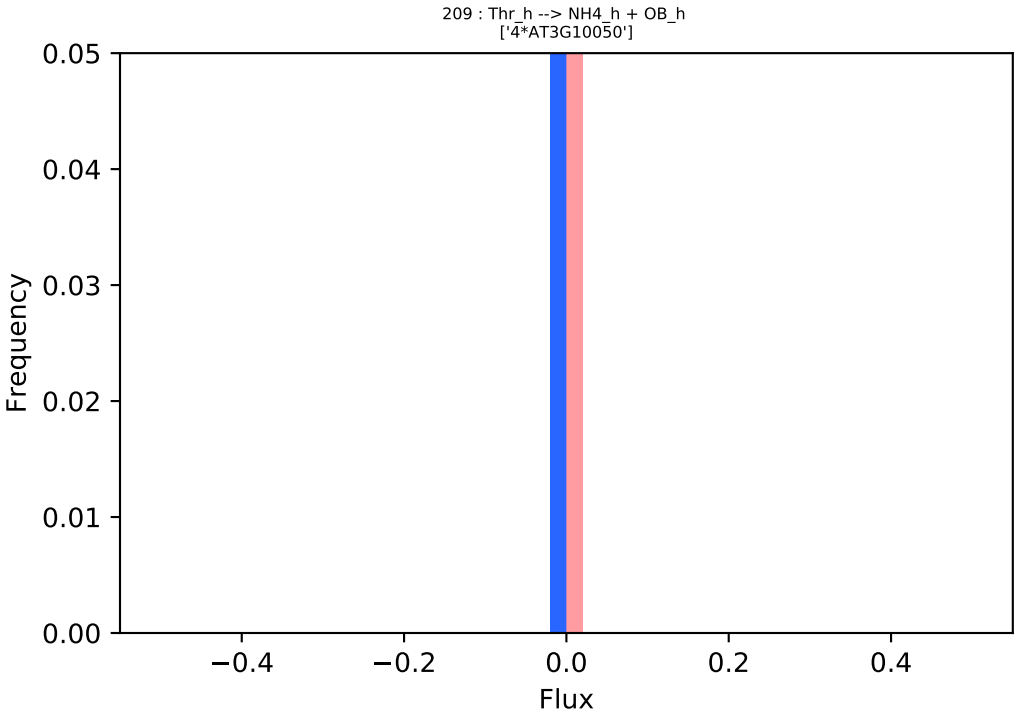

204 : EIGP_h --> H2O_h + IA_DASH_P_h
['AT3G22425', 'AT4G14910']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

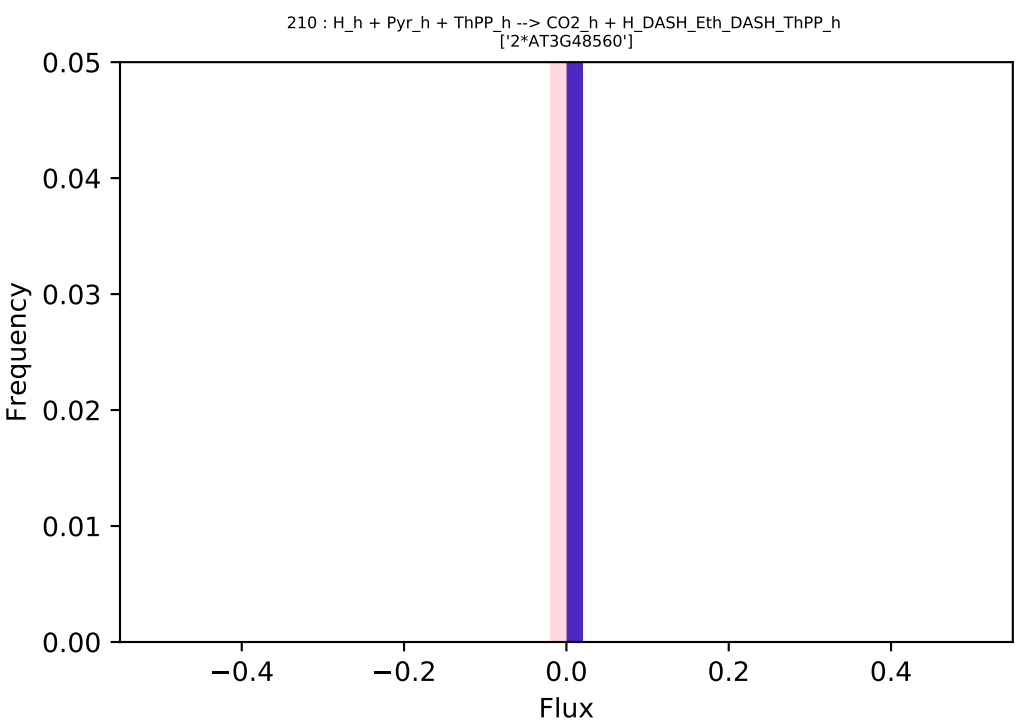

205 : Glu_h + IA_DASH_P_h --> Hisol_DASH_P_h + KG_h
['AT5G10330', 'AT1G71920']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


206 : H2O_h + Hisol_DASH_P_h --> Hisol_h + Pi_h
['AT4G39120']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


207 : Hisol_h + NAD_h --> 2.0 H_h + Hisal_h + NADH_h
['AT5G63890']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


208 : H2O_h + Hisal_h + NAD_h --> H_h + His_h + NADH_h
['AT5G63890']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


209 : Thr_h --> NH4_h + OB_h
['4*AT3G10050']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


210 : H_h + Pyr_h + ThPP_h --> CO2_h + H_DASH_Eth_DASH_ThPP_h
['2*AT3G48560']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
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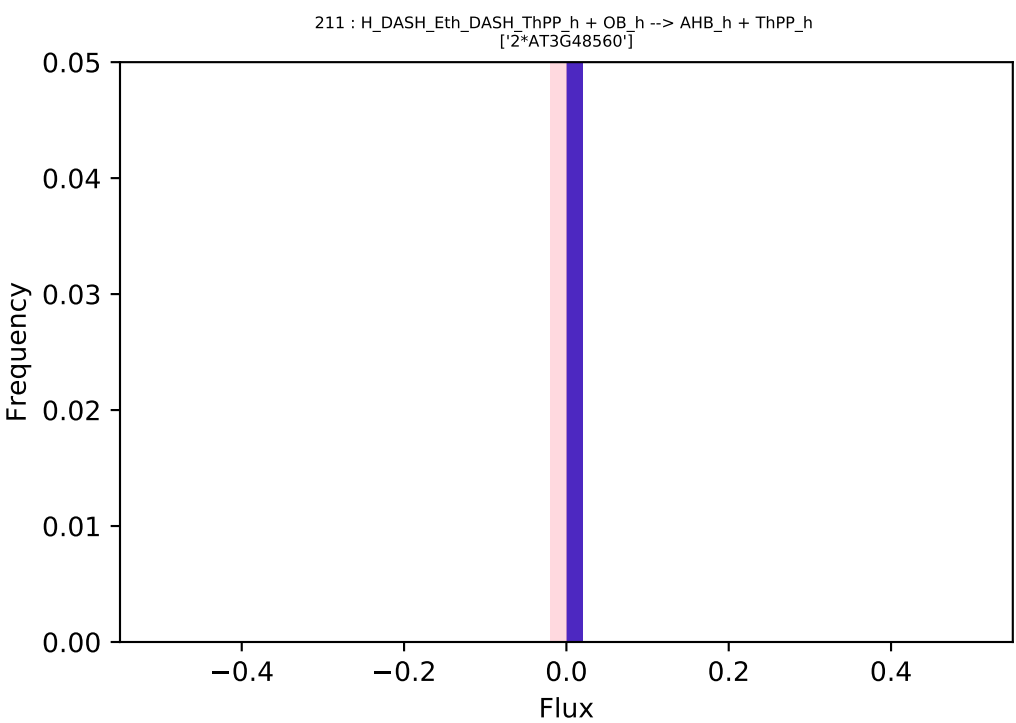
0.2
0.4
Flux


211 : H_DASH_Eth_DASH_ThPP_h + OB_h --> AHB_h + ThPP_h
['2*AT3G48560']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
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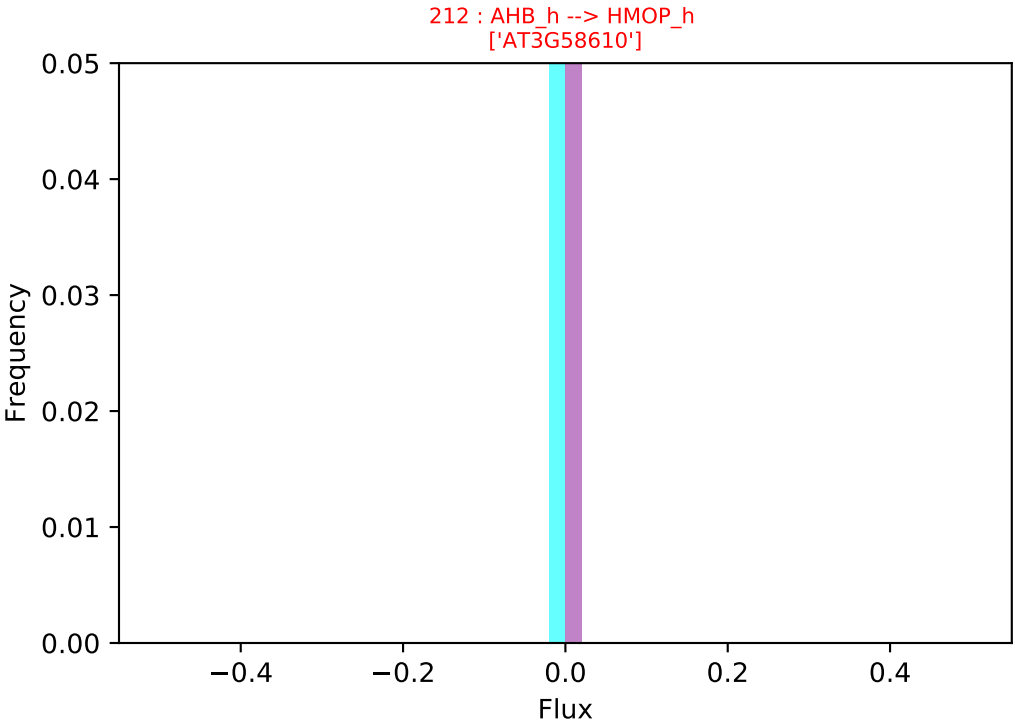
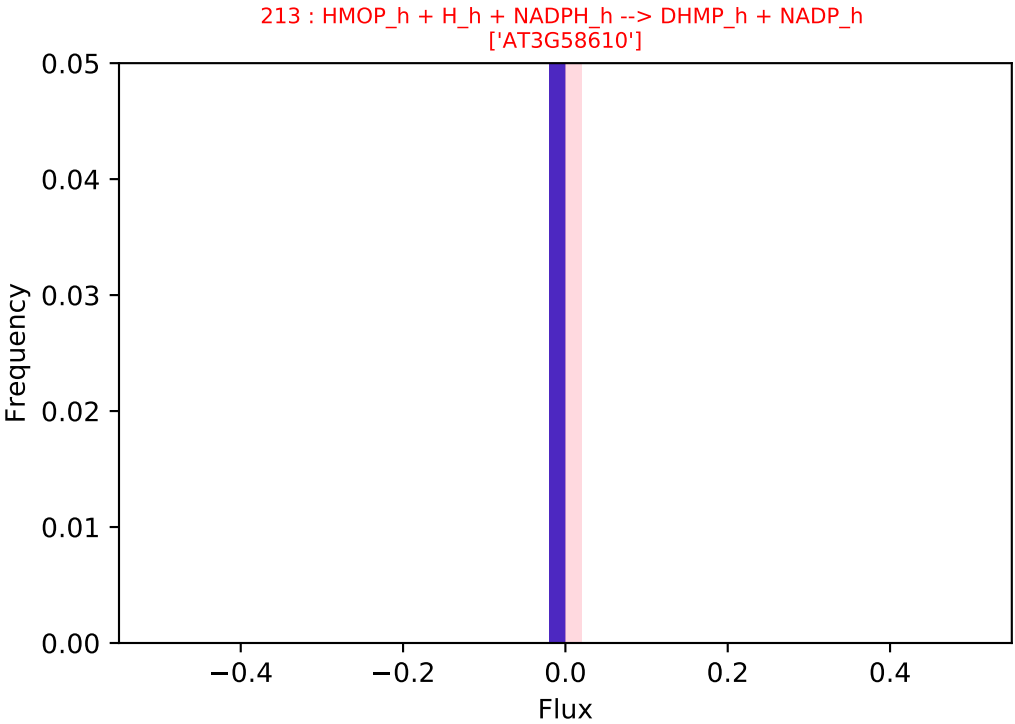
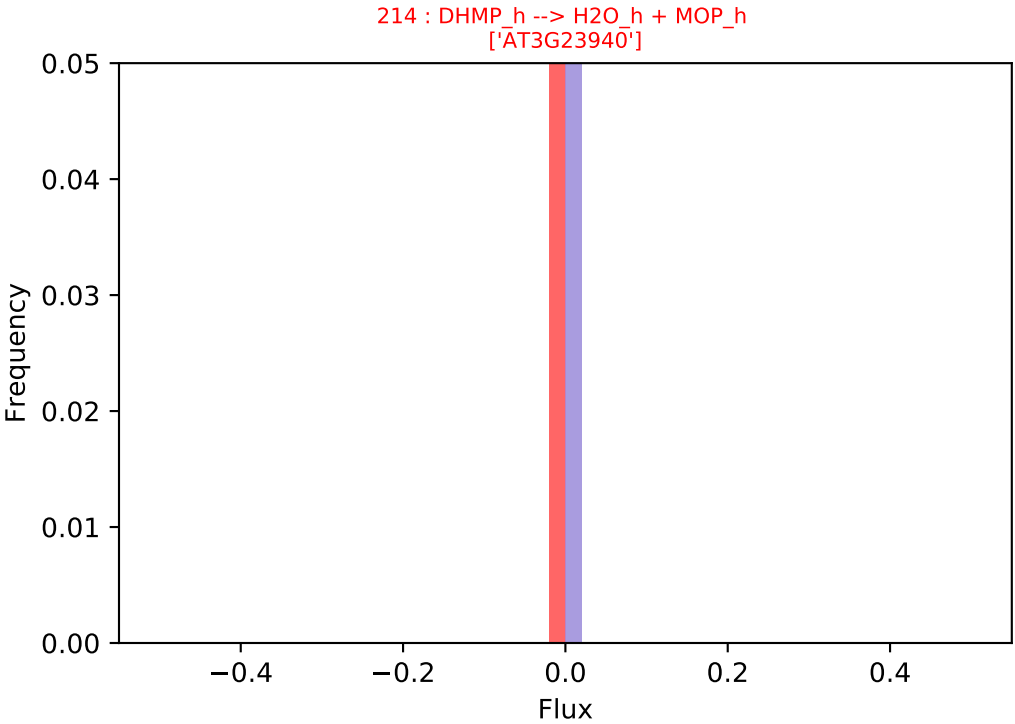
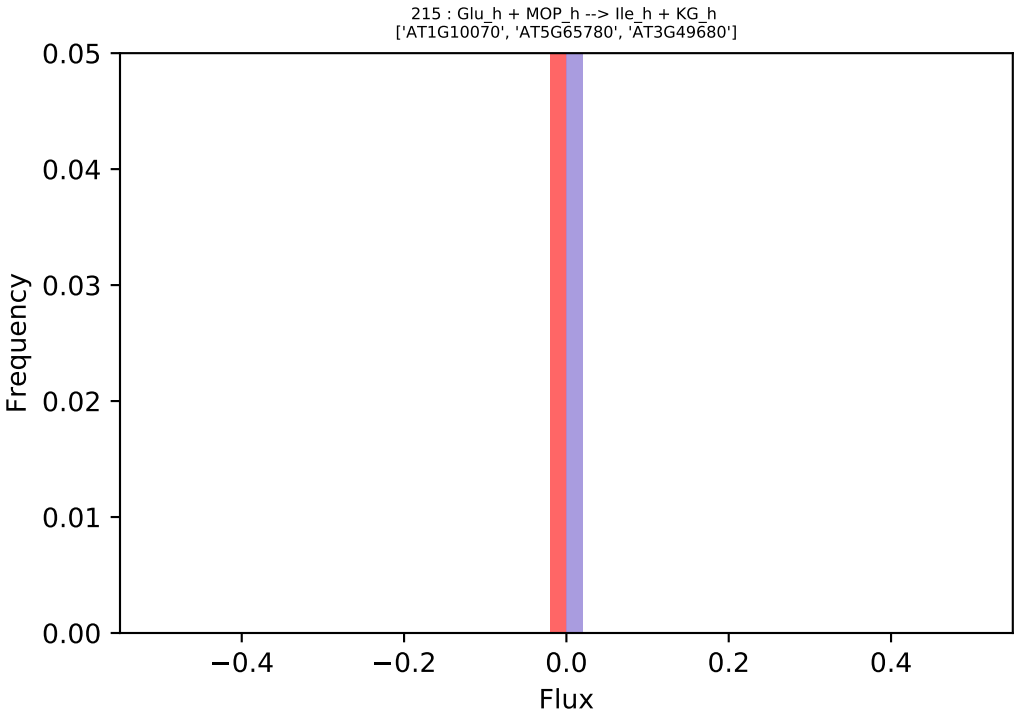
0.2
0.4
Flux


212 : AHB_h --> HMOP_h
['AT3G58610']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


213 : HMOP_h + H_h + NADPH_h --> DHMP_h + NADP_h
['AT3G58610']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


214 : DHMP_h --> H2O_h + MOP_h
['AT3G23940']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


215 : Glu_h + MOP_h --> Ile_h + KG_h
['AT1G10070', 'AT5G65780', 'AT3G49680']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
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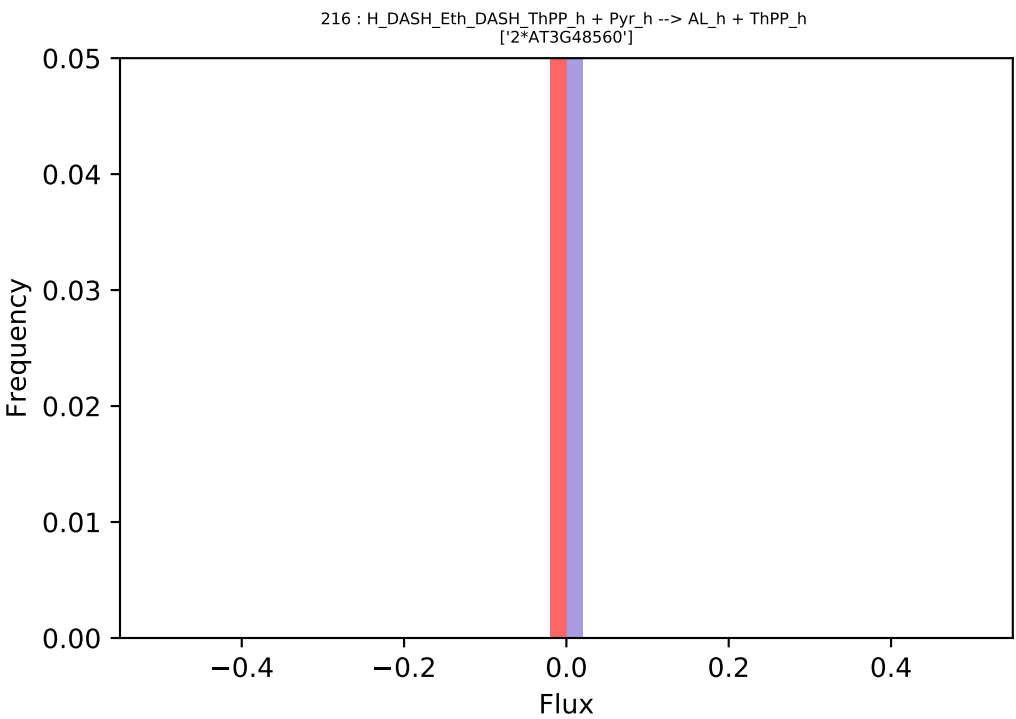
0.4
Flux


216 : H_DASH_Eth_DASH_ThPP_h + Pyr_h --> AL_h + ThPP_h
['2*AT3G48560']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
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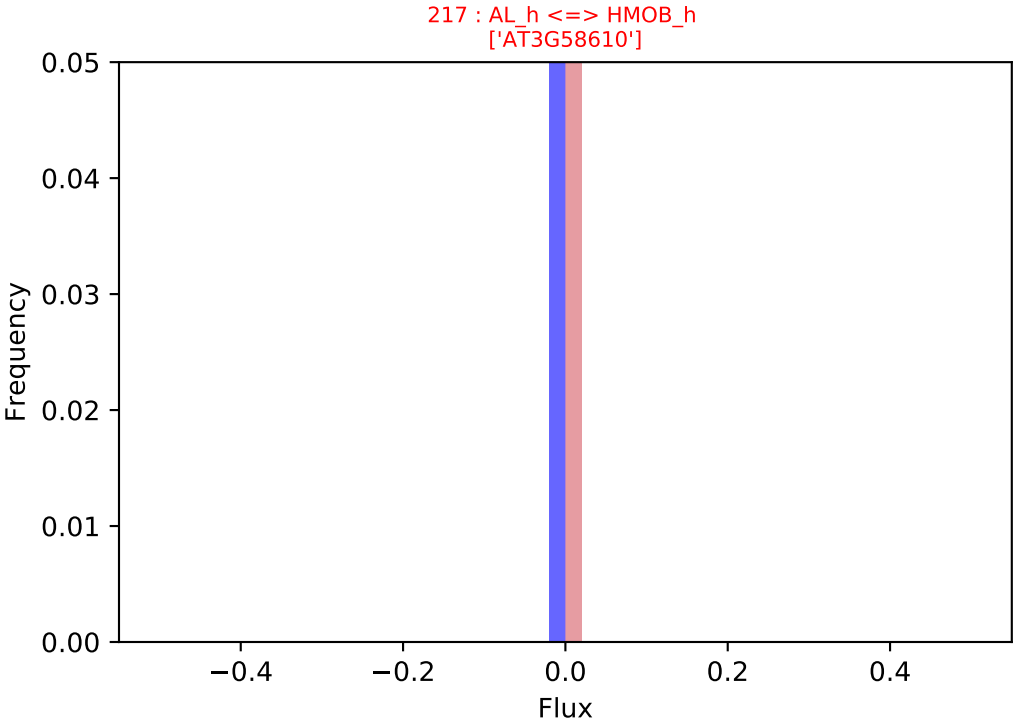
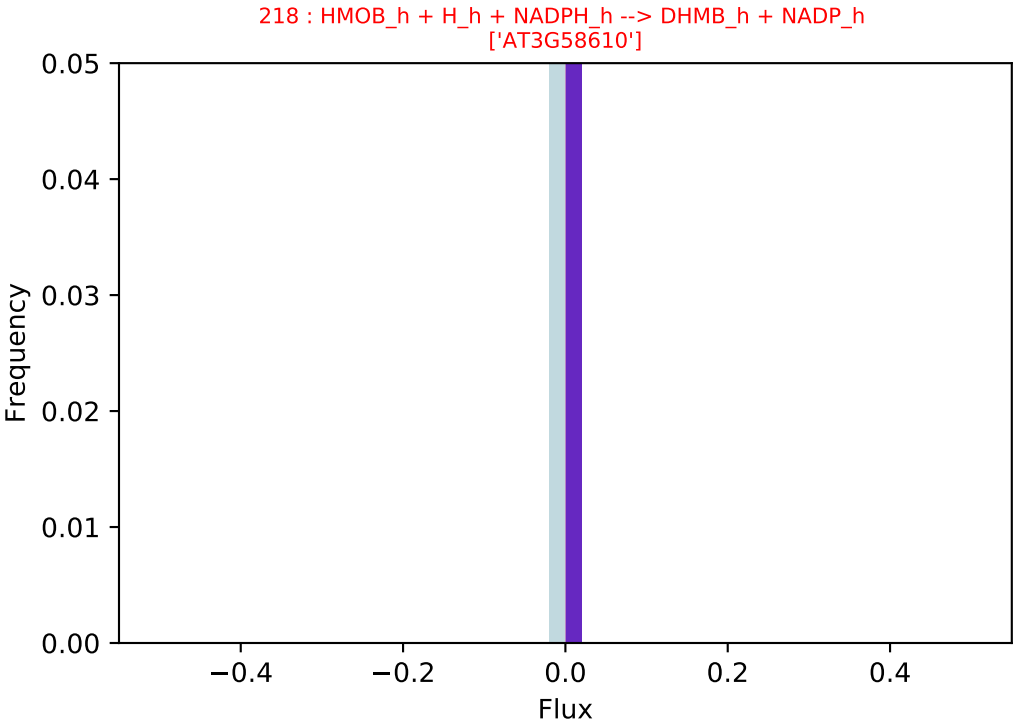
Flux


217 : AL_h <=> HMOB_h
['AT3G58610']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


218 : HMOB_h + H_h + NADPH_h --> DHMB_h + NADP_h
['AT3G58610']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
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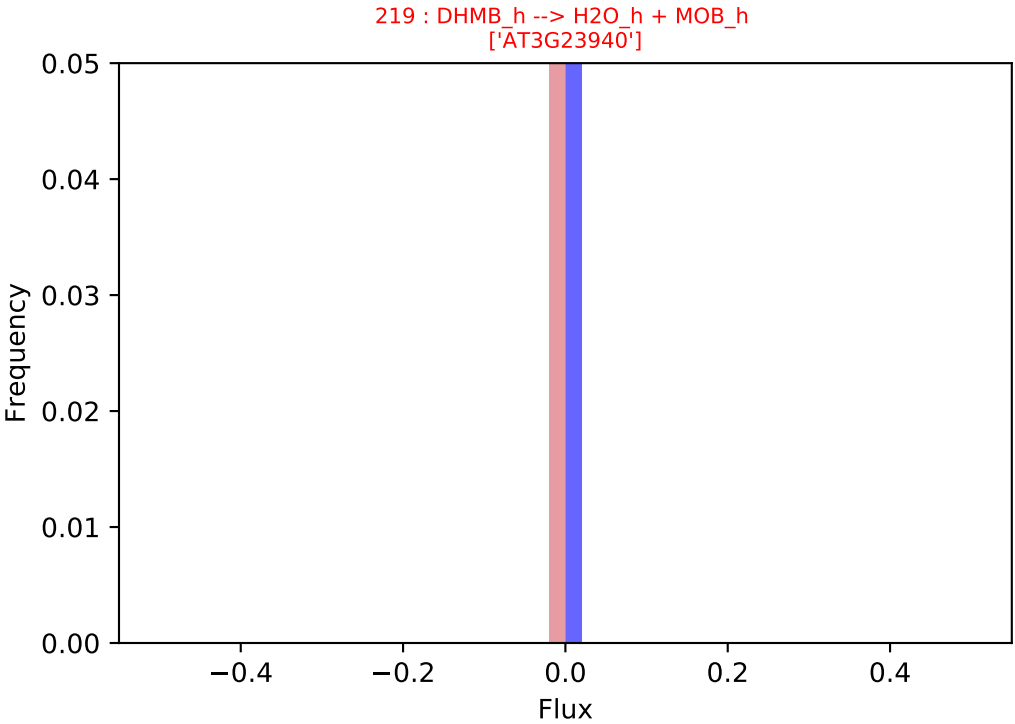
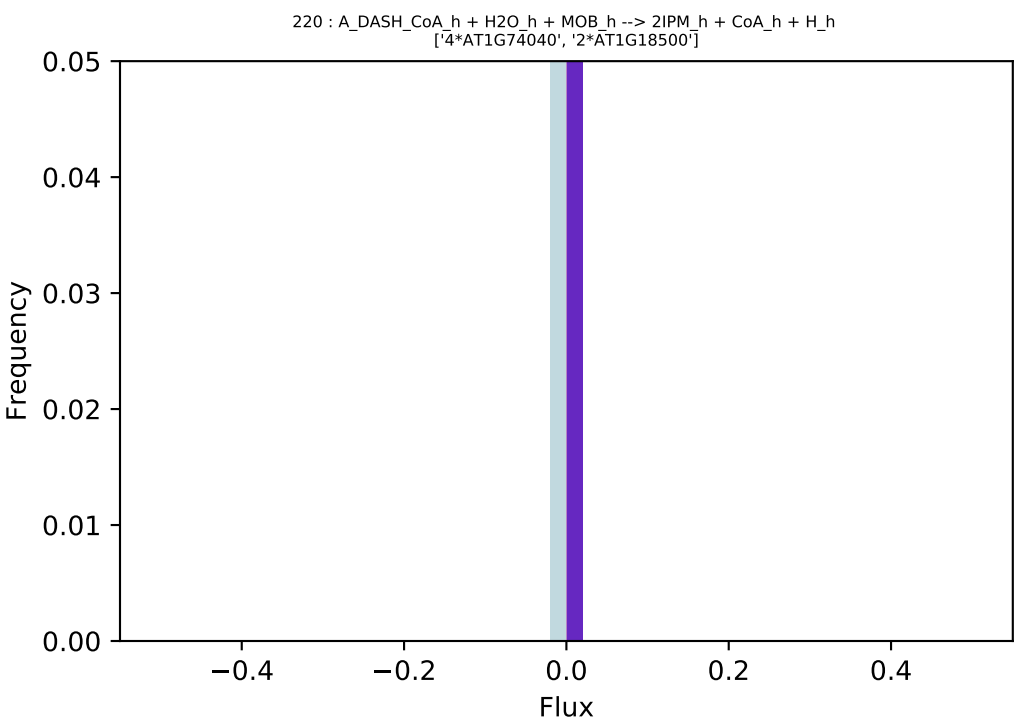
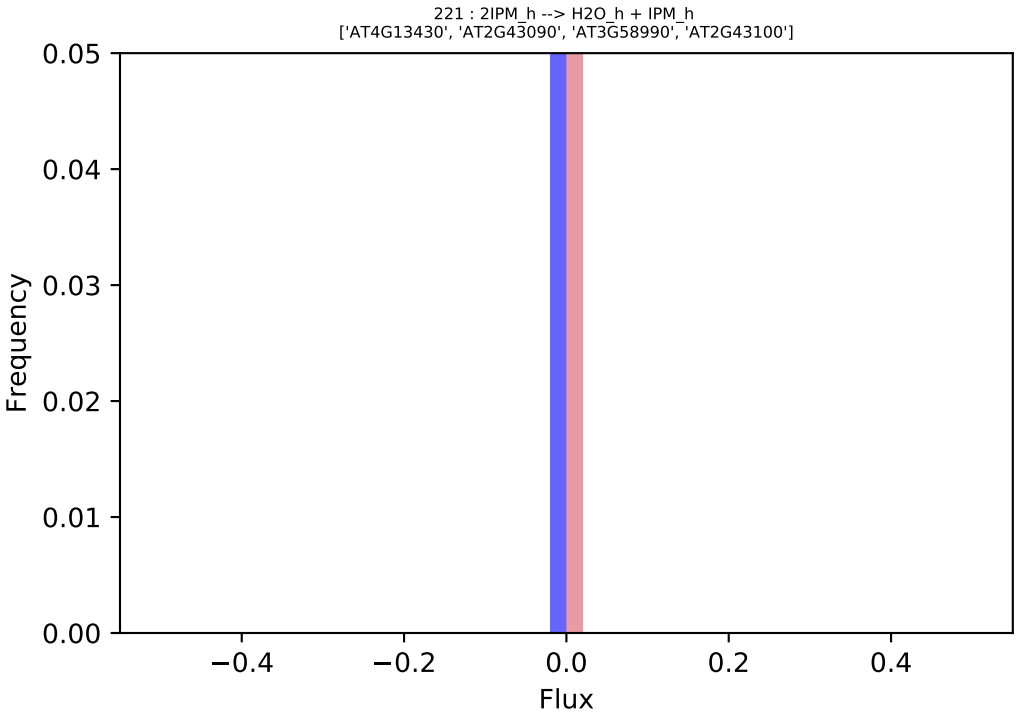
0.2
0.4
Flux


219 : DHMB_h --> H2O_h + MOB_h
['AT3G23940']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


220 : A_DASH_CoA_h + H2O_h + MOB_h --> 2IPM_h + CoA_h + H_h
['4*AT1G74040', '2*AT1G18500']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


221 : 2IPM_h --> H2O_h + IPM_h
['AT4G13430', 'AT2G43090', 'AT3G58990', 'AT2G43100']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
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−0.2
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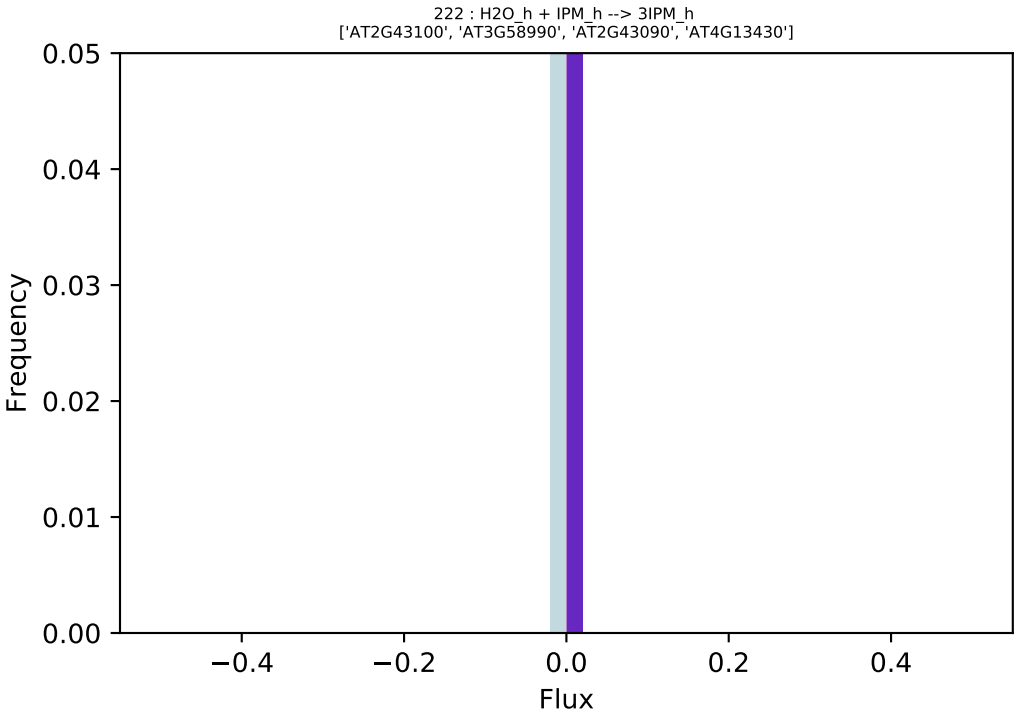
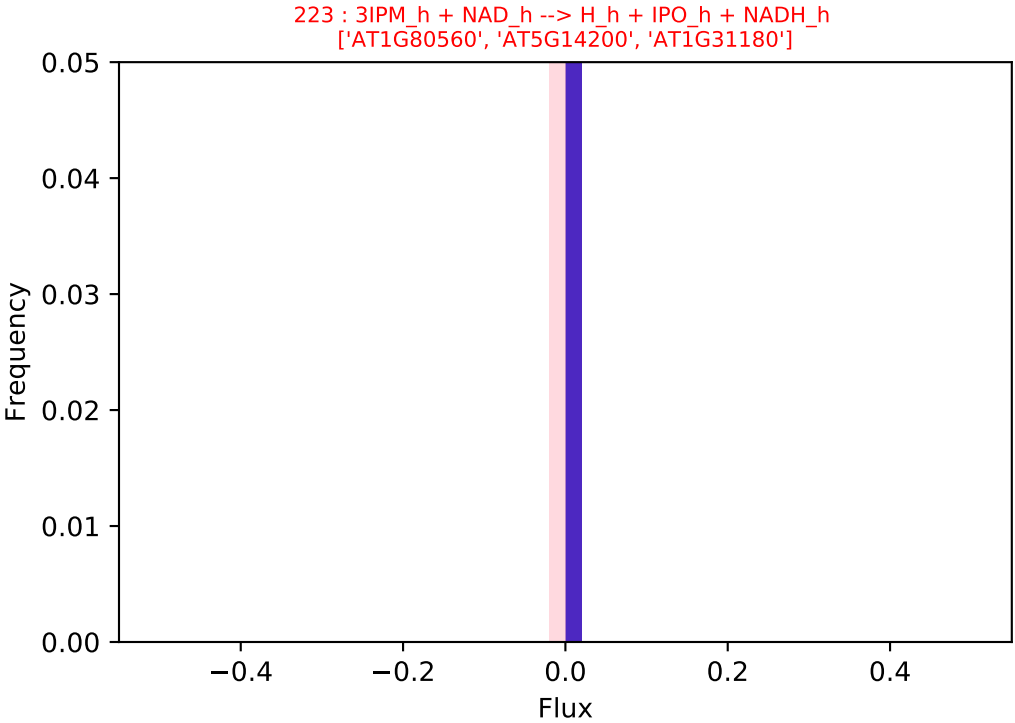
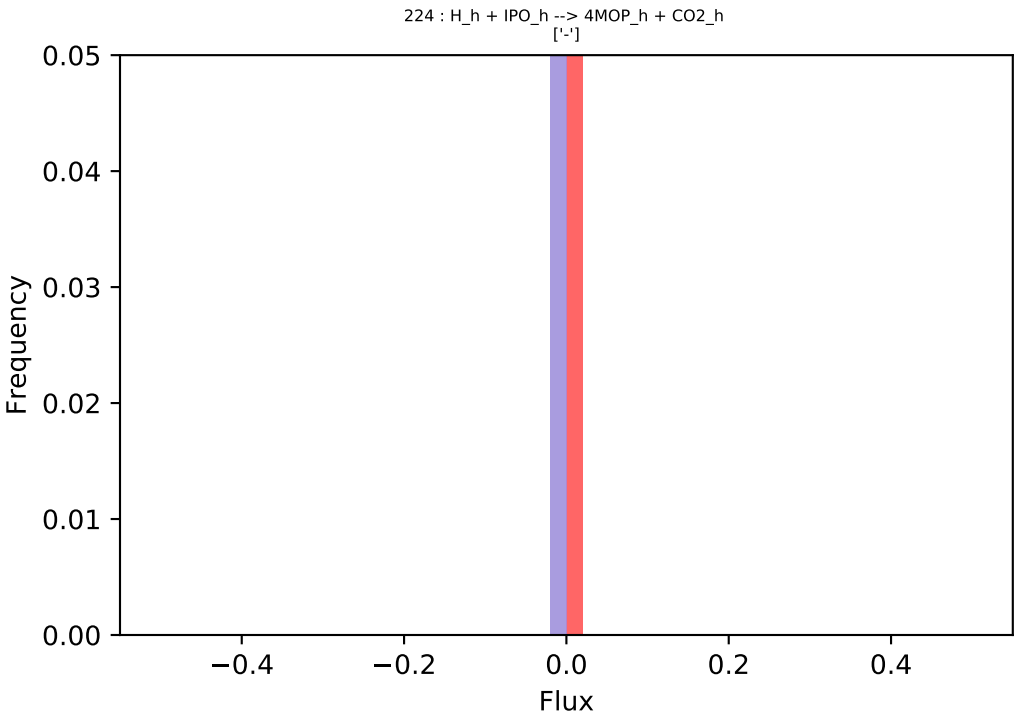
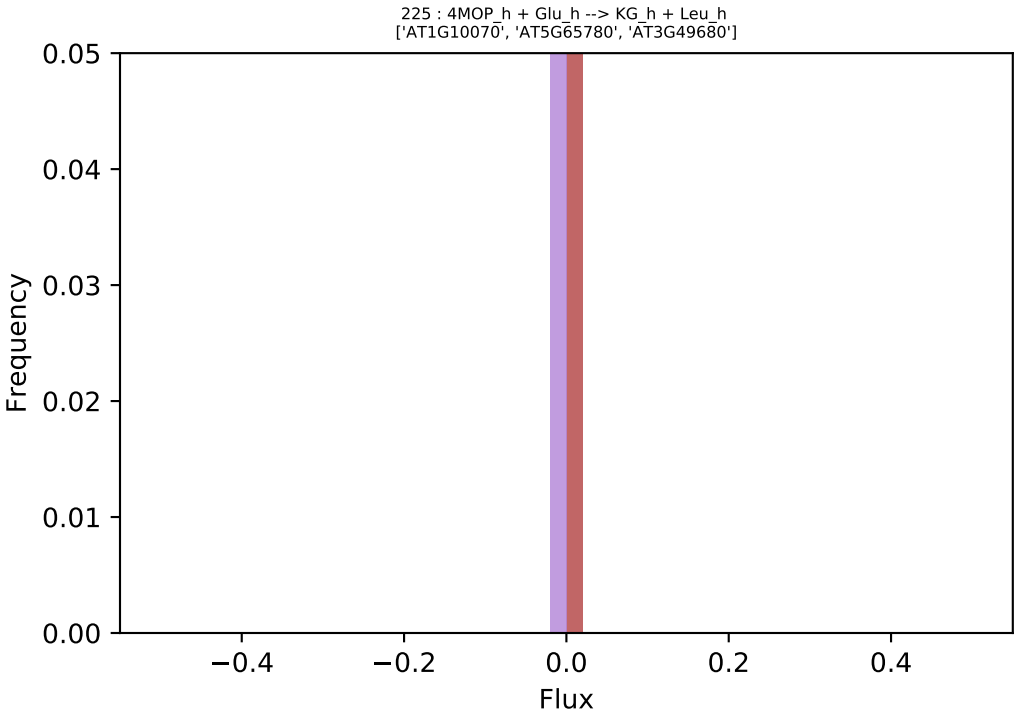
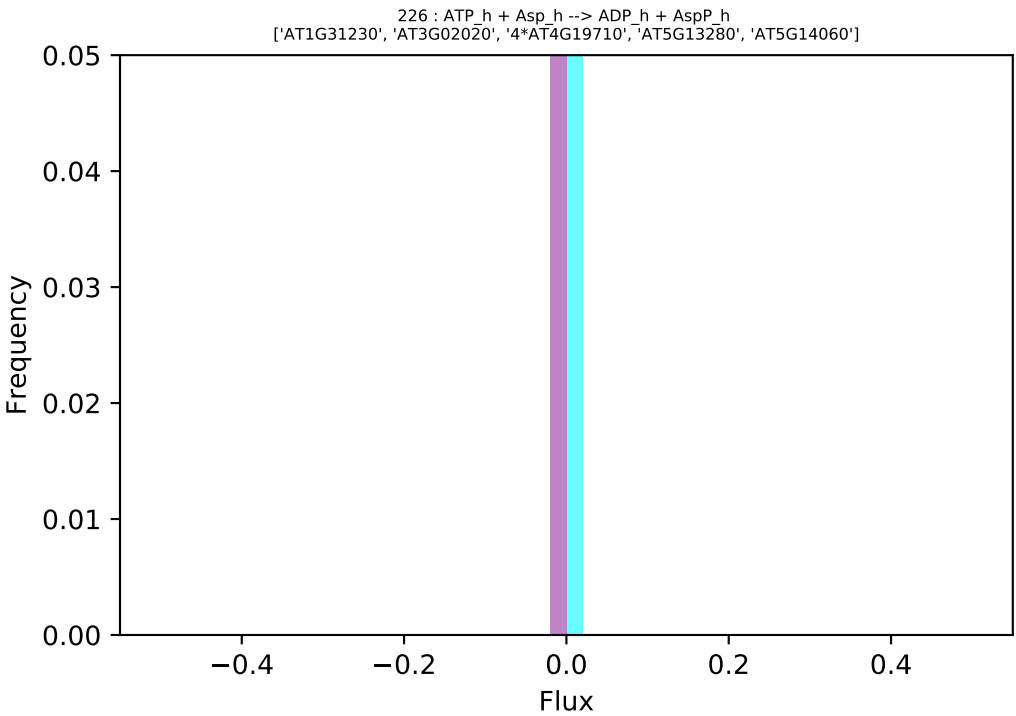
0.2
0.4
Flux

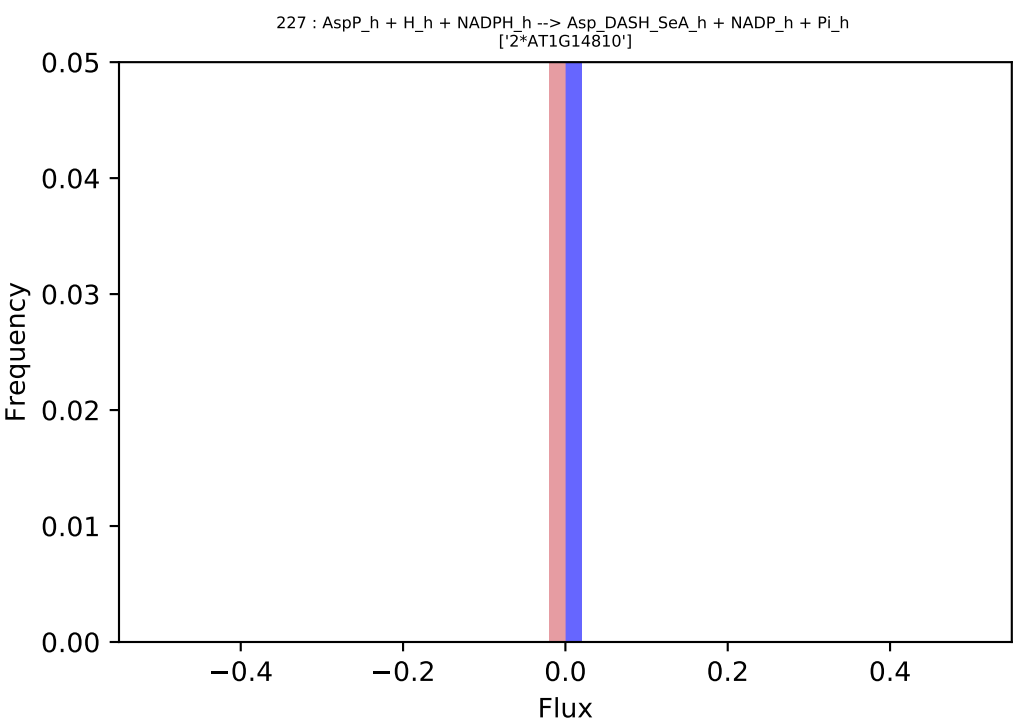

222 : H2O_h + IPM_h --> 3IPM_h
['AT2G43100', 'AT3G58990', 'AT2G43090', 'AT4G13430']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

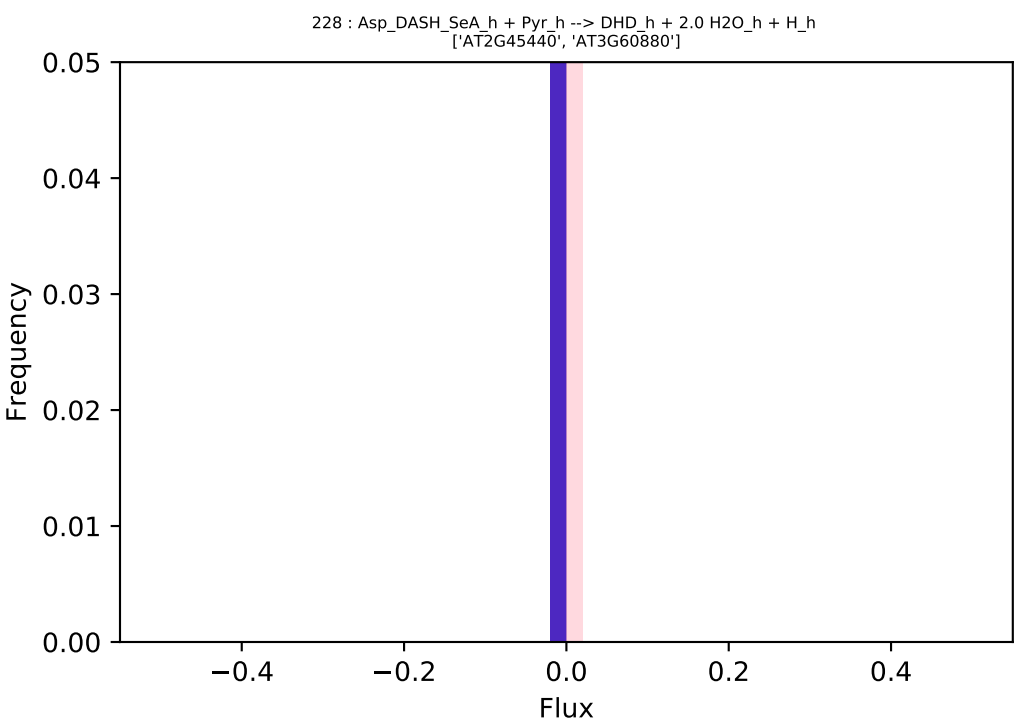

223 : 3IPM_h + NAD_h --> H_h + IPO_h + NADH_h
['AT1G80560', 'AT5G14200', 'AT1G31180']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

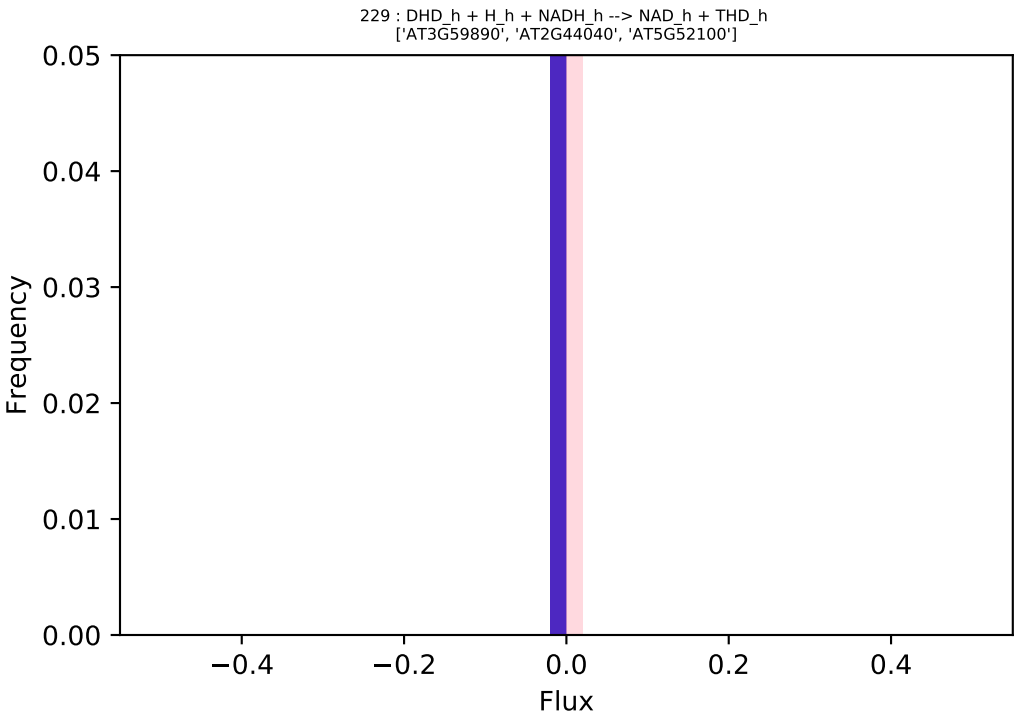

224 : H_h + IPO_h --> 4MOP_h + CO2_h
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

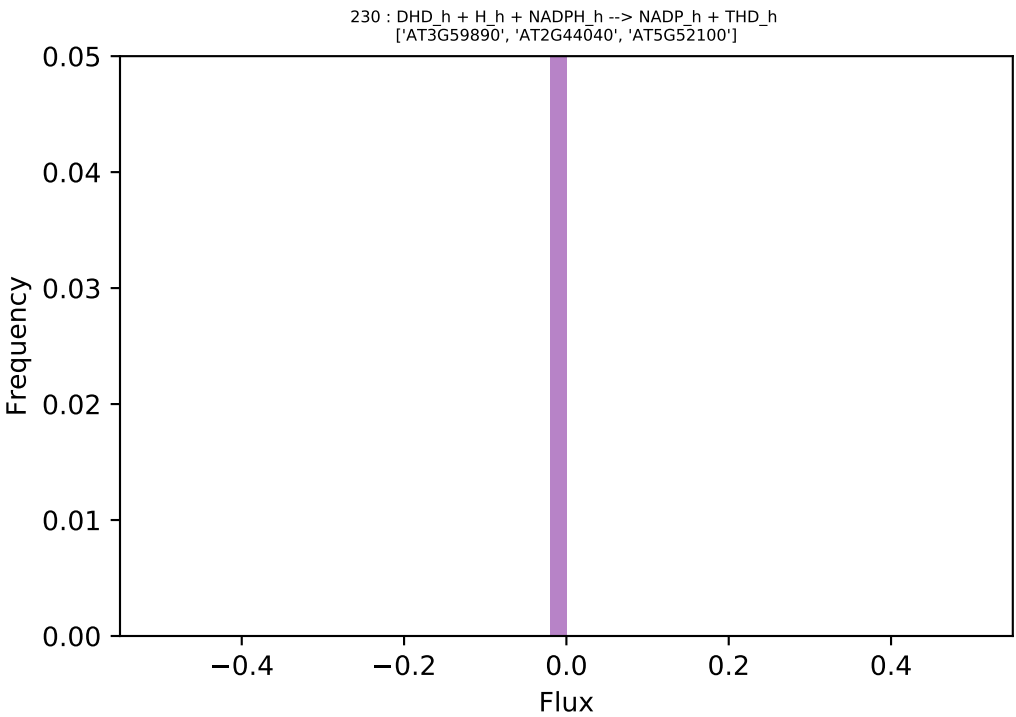

225 : 4MOP_h + Glu_h --> KG_h + Leu_h
['AT1G10070', 'AT5G65780', 'AT3G49680']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

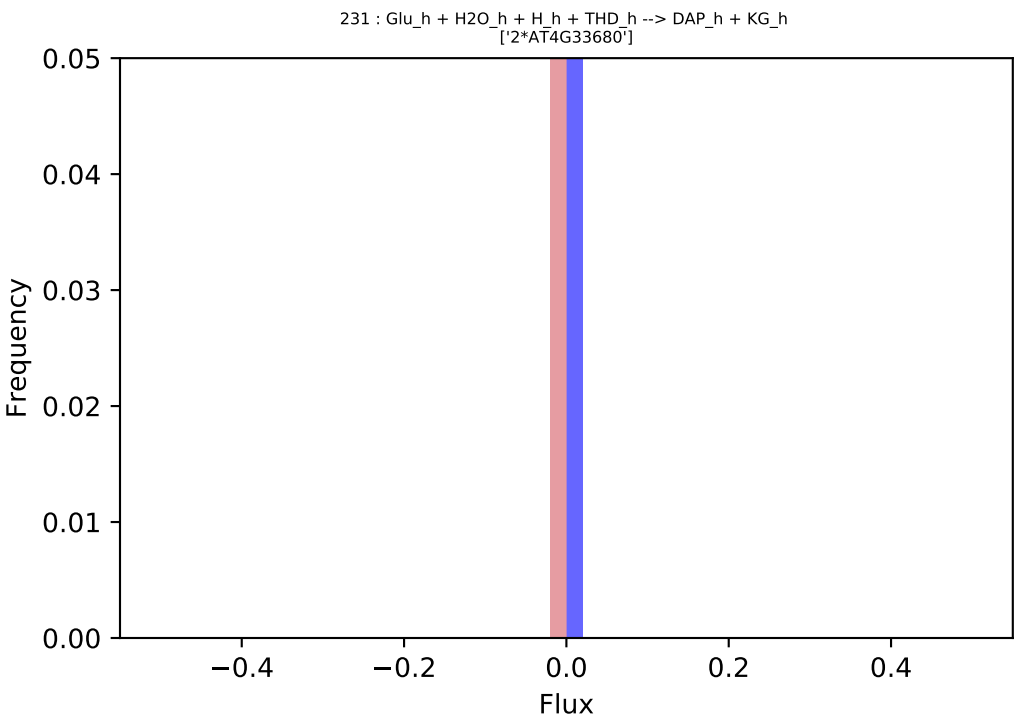

226 : ATP_h + Asp_h --> ADP_h + AspP_h
['AT1G31230', 'AT3G02020', '4*AT4G19710', 'AT5G13280', 'AT5G14060']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

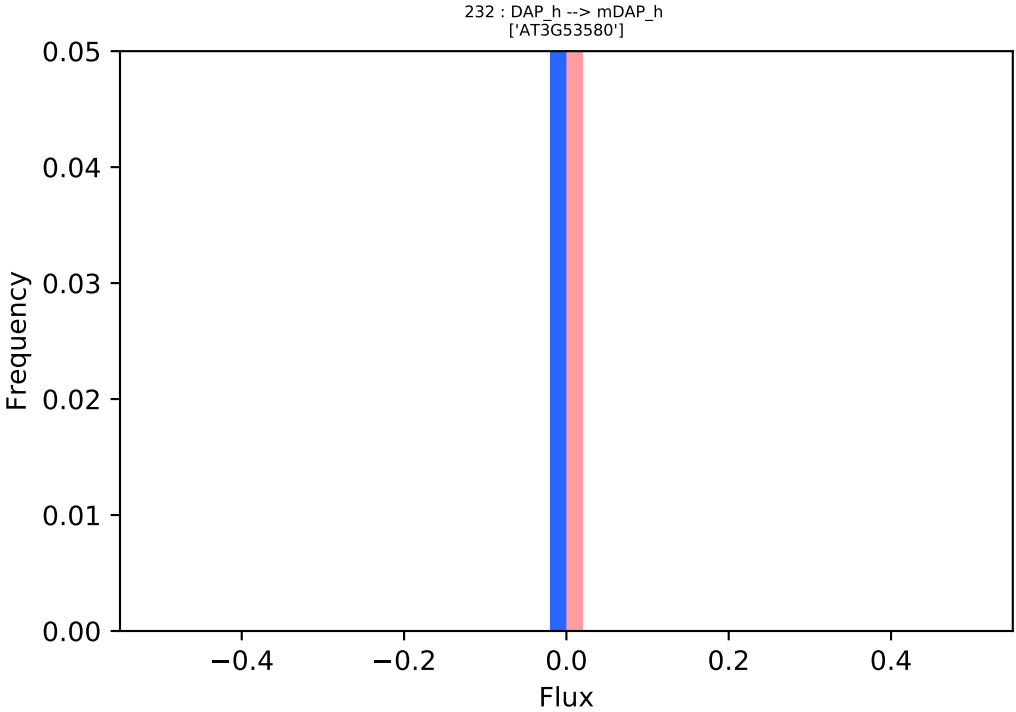

227 : AspP_h + H_h + NADPH_h --> Asp_DASH_SeA_h + NADP_h + Pi_h
['2*AT1G14810']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

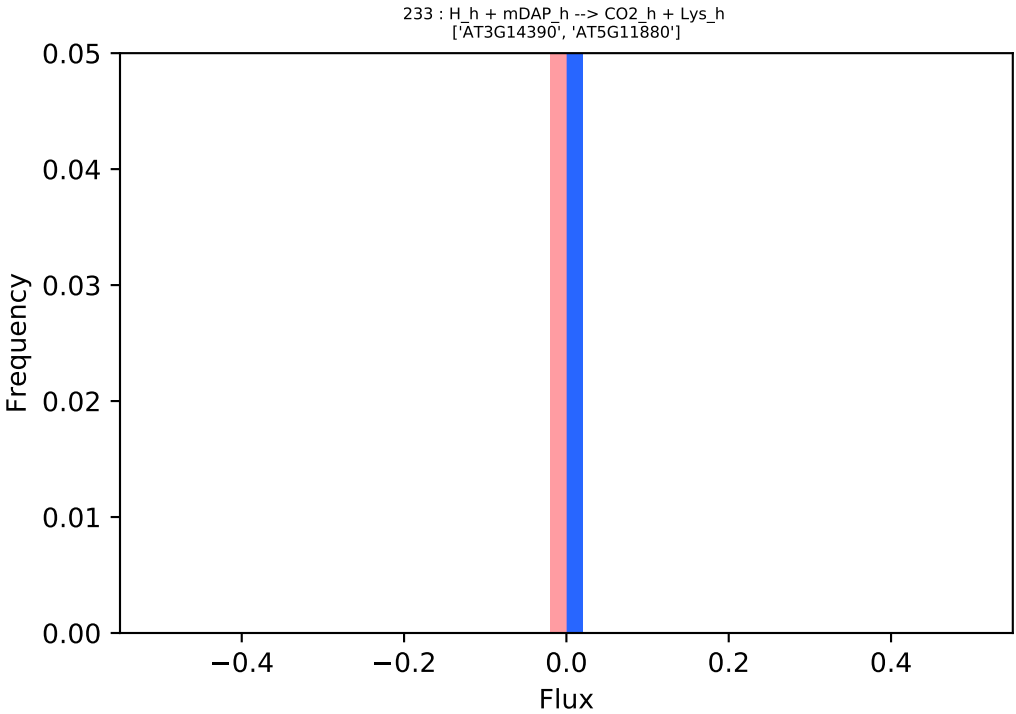

228 : Asp_DASH_SeA_h + Pyr_h --> DHD_h + 2.0 H2O_h + H_h
['AT2G45440', 'AT3G60880']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

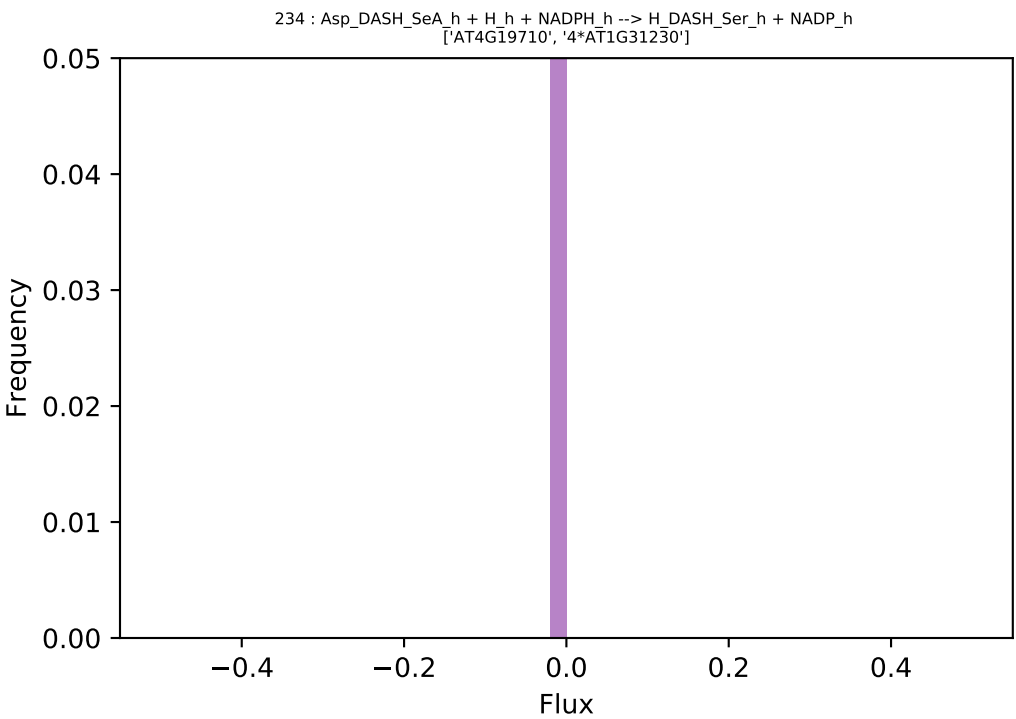

229 : DHD_h + H_h + NADH_h --> NAD_h + THD_h
['AT3G59890', 'AT2G44040', 'AT5G52100']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

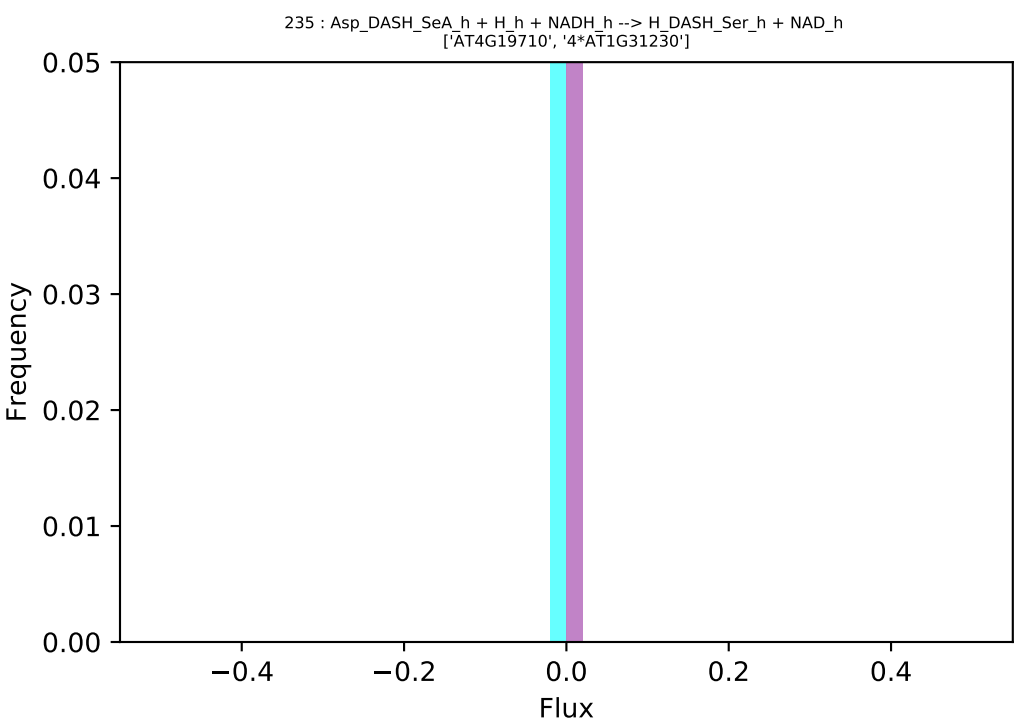

230 : DHD_h + H_h + NADPH_h --> NADP_h + THD_h
['AT3G59890', 'AT2G44040', 'AT5G52100']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

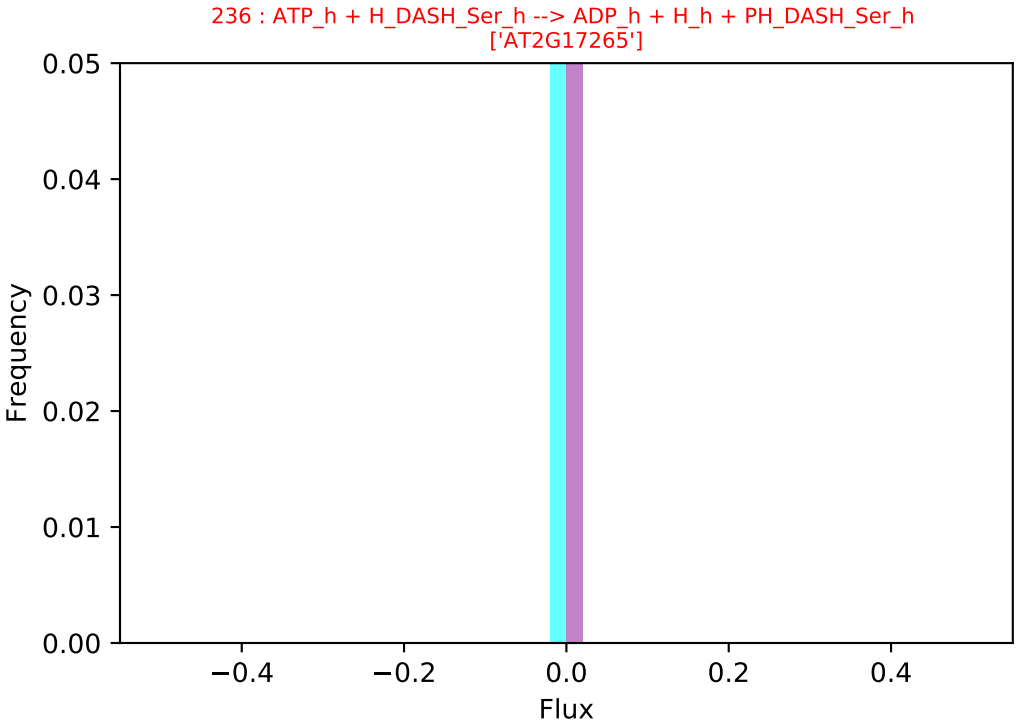

231 : Glu_h + H2O_h + H_h + THD_h --> DAP_h + KG_h
['2*AT4G33680']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

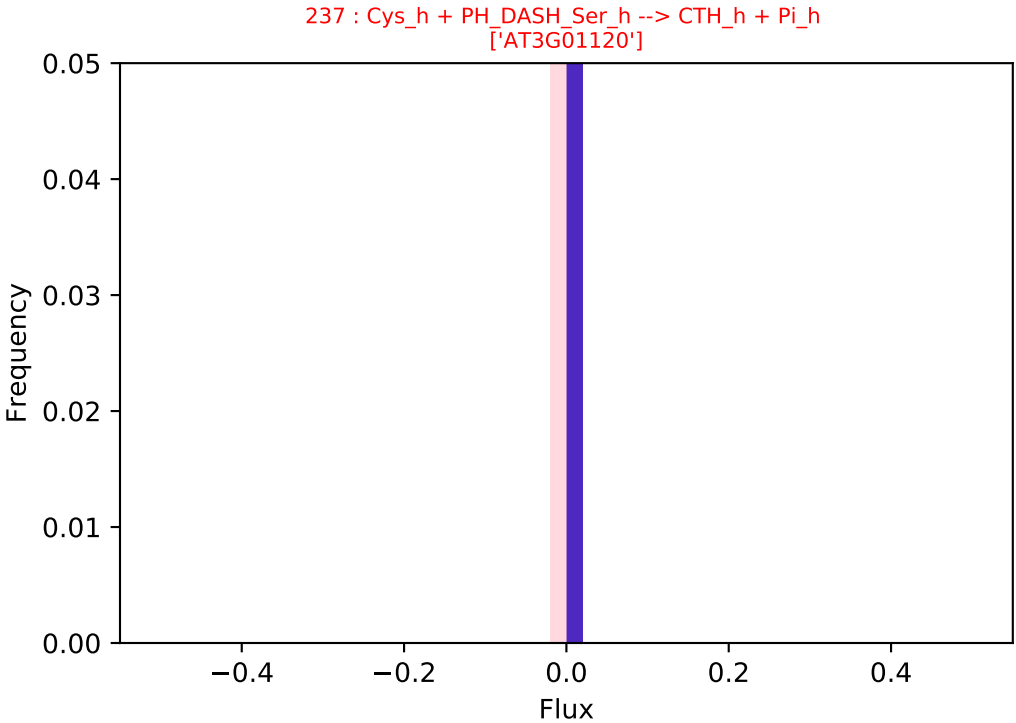

232 : DAP_h --> mDAP_h
['AT3G53580']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

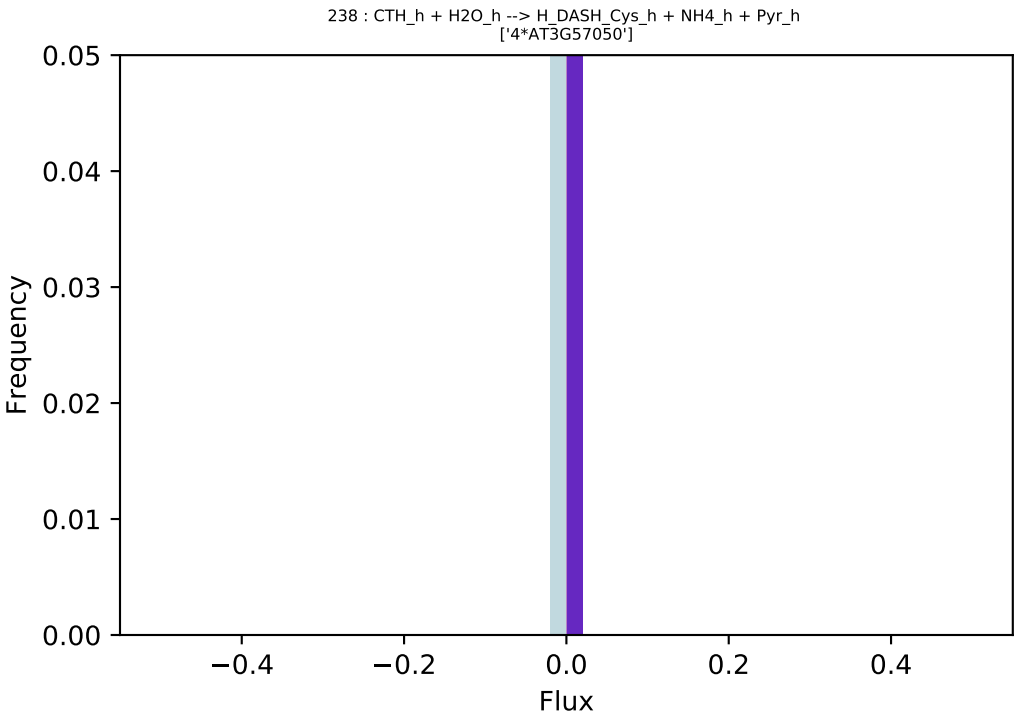

233 : H_h + mDAP_h --> CO2_h + Lys_h
['AT3G14390', 'AT5G11880']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

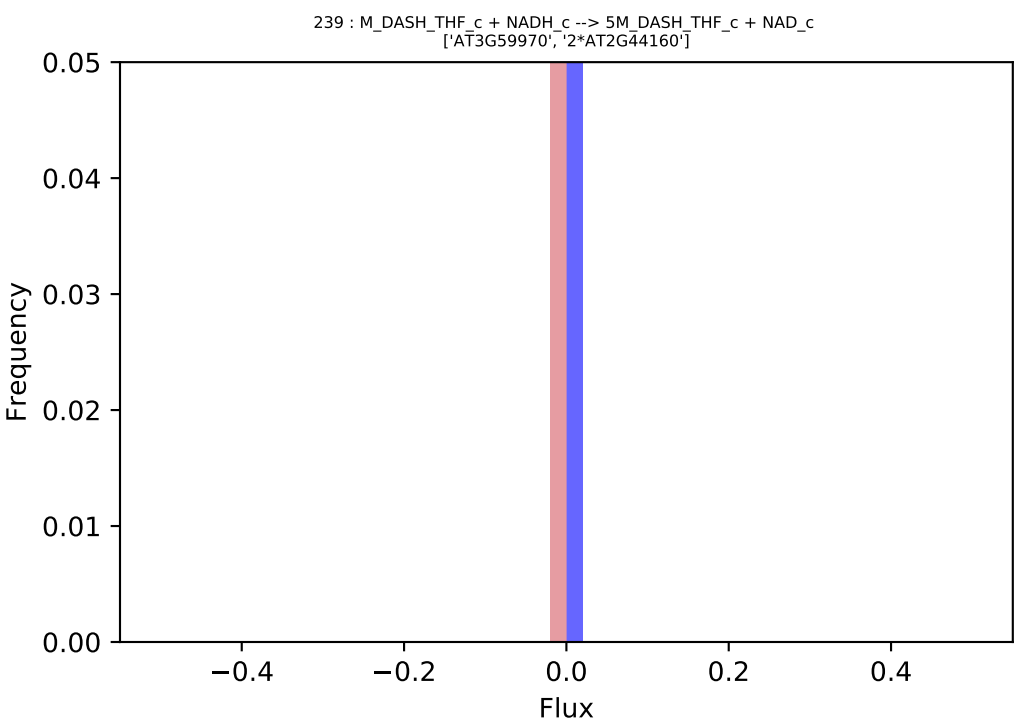

234 : Asp_DASH_SeA_h + H_h + NADPH_h --> H_DASH_Ser_h + NADP_h
['AT4G19710', '4*AT1G31230']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

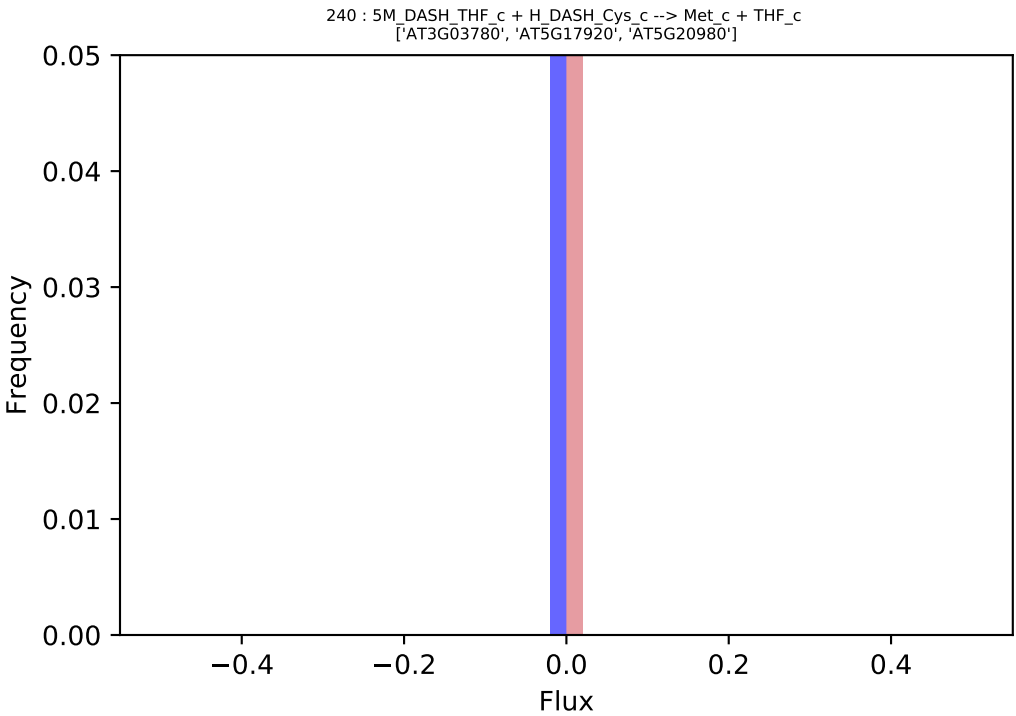

235 : Asp_DASH_SeA_h + H_h + NADH_h --> H_DASH_Ser_h + NAD_h
['AT4G19710', '4*AT1G31230']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

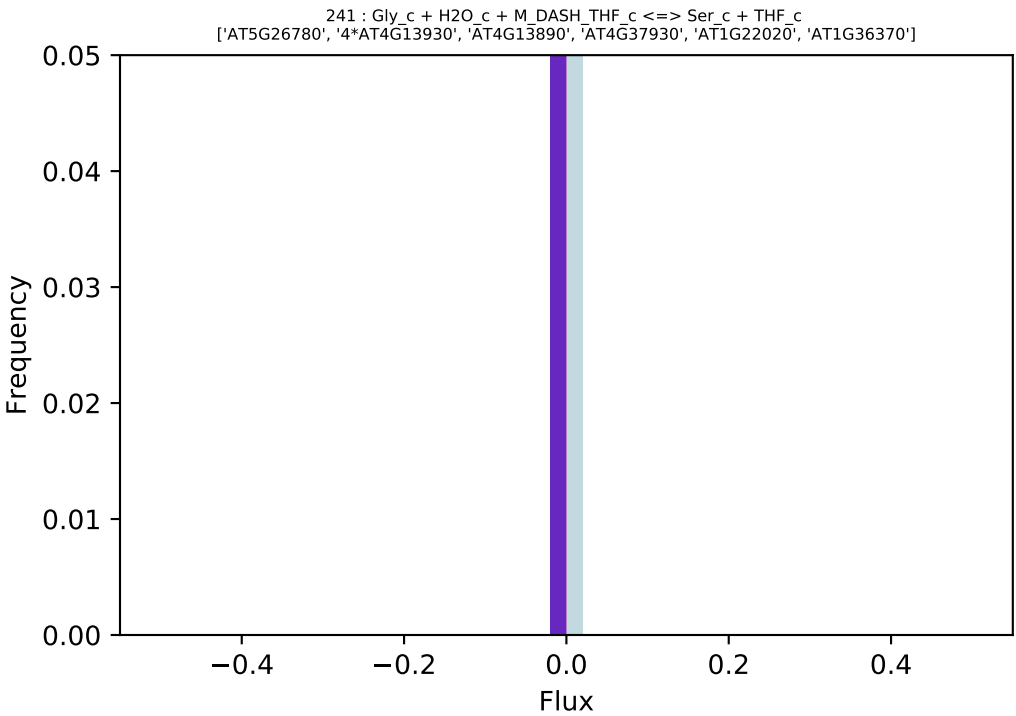

236 : ATP_h + H_DASH_Ser_h --> ADP_h + H_h + PH_DASH_Ser_h
['AT2G17265']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

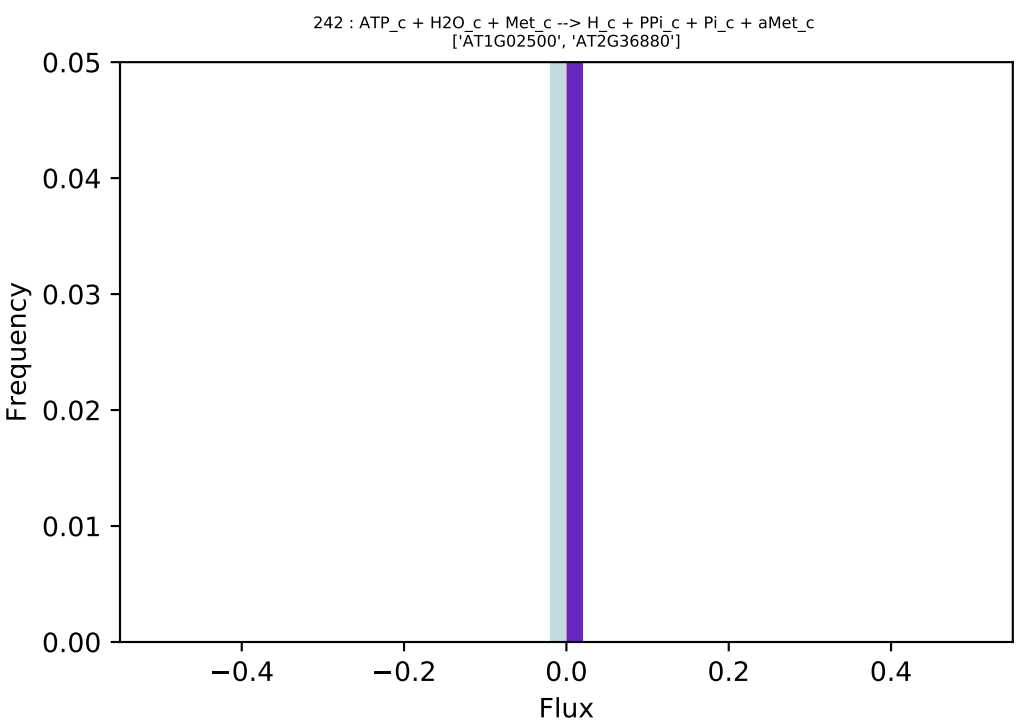

237 : Cys_h + PH_DASH_Ser_h --> CTH_h + Pi_h
['AT3G01120']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

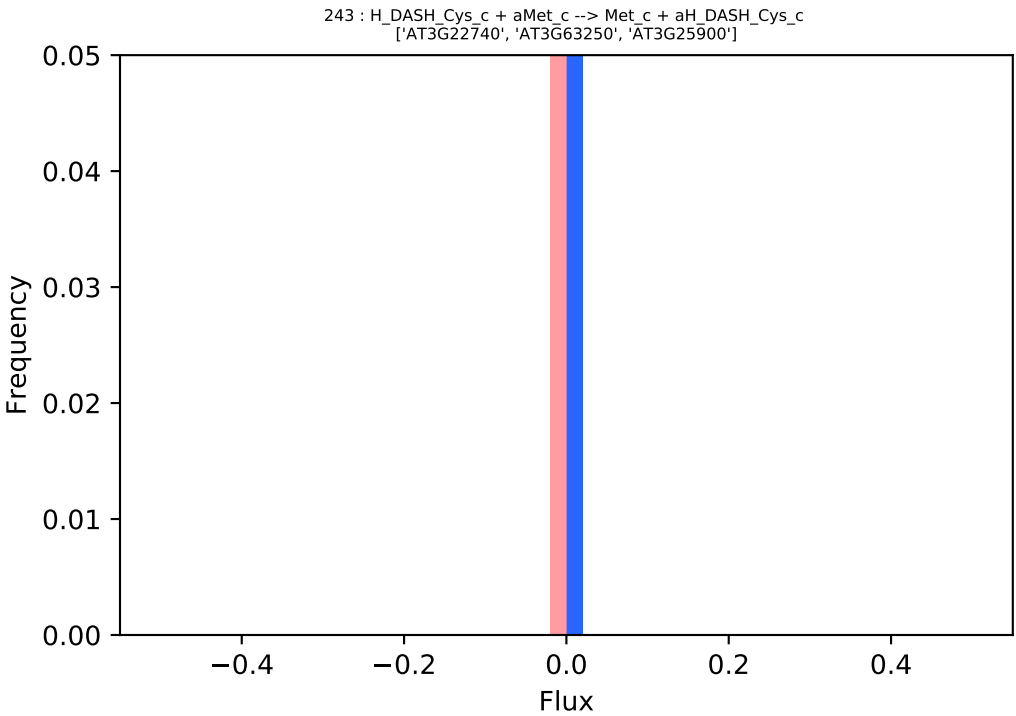

238 : CTH_h + H2O_h --> H_DASH_Cys_h + NH4_h + Pyr_h
['4*AT3G57050']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

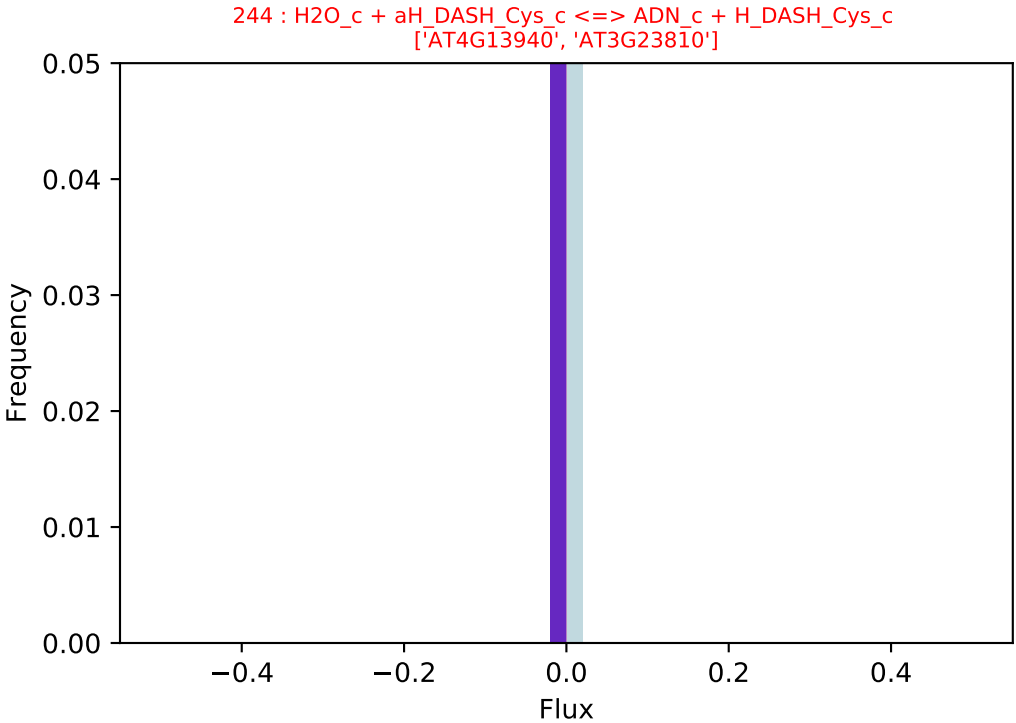

239 : M_DASH_THF_c + NADH_c --> 5M_DASH_THF_c + NAD_c
['AT3G59970', '2*AT2G44160']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


240 : 5M_DASH_THF_c + H_DASH_Cys_c --> Met_c + THF_c
['AT3G03780', 'AT5G17920', 'AT5G20980']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


241 : Gly_c + H2O_c + M_DASH_THF_c <=> Ser_c + THF_c
['AT5G26780', '4*AT4G13930', 'AT4G13890', 'AT4G37930', 'AT1G22020', 'AT1G36370']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


242 : ATP_c + H2O_c + Met_c --> H_c + PPi_c + Pi_c + aMet_c
['AT1G02500', 'AT2G36880']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


243 : H_DASH_Cys_c + aMet_c --> Met_c + aH_DASH_Cys_c
['AT3G22740', 'AT3G63250', 'AT3G25900']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


244 : H2O_c + aH_DASH_Cys_c <=> ADN_c + H_DASH_Cys_c
['AT4G13940', 'AT3G23810']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
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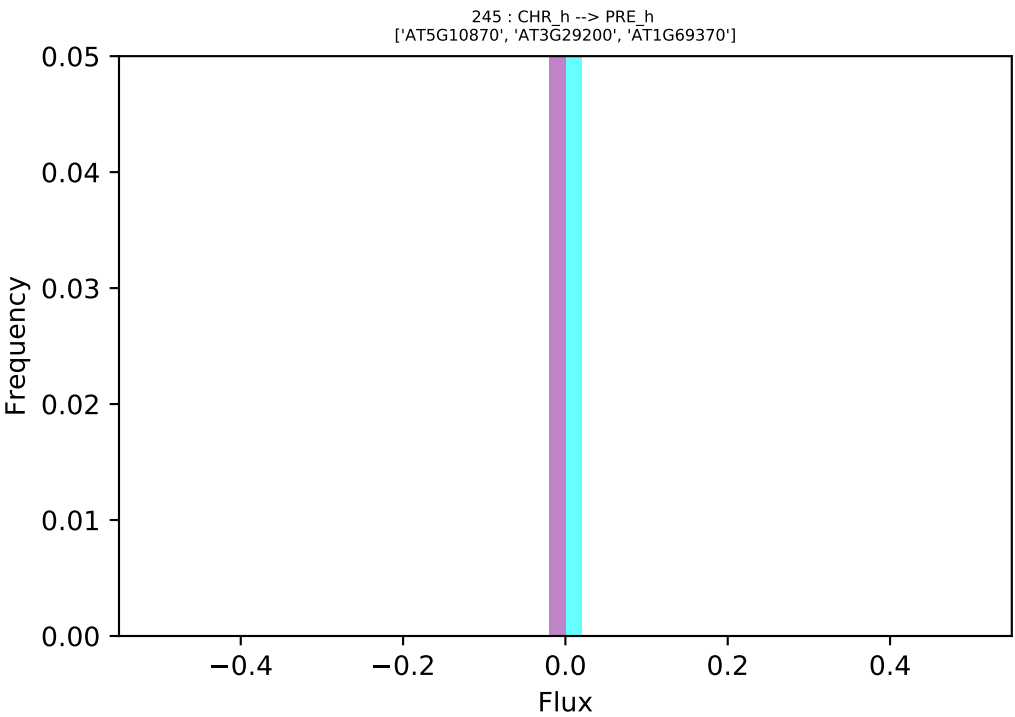
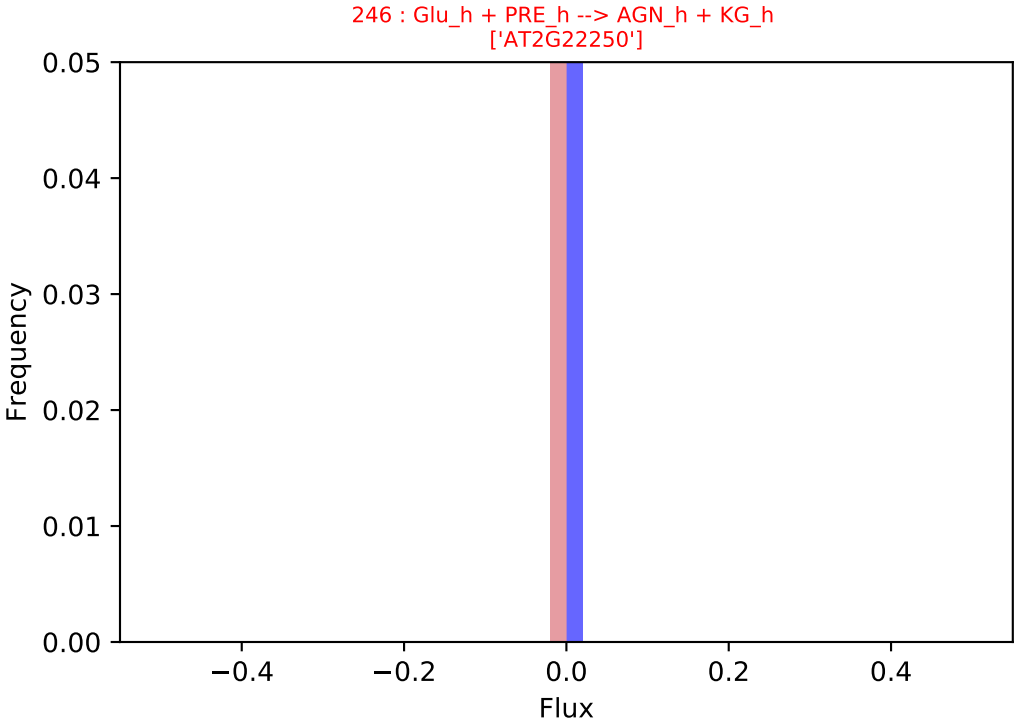
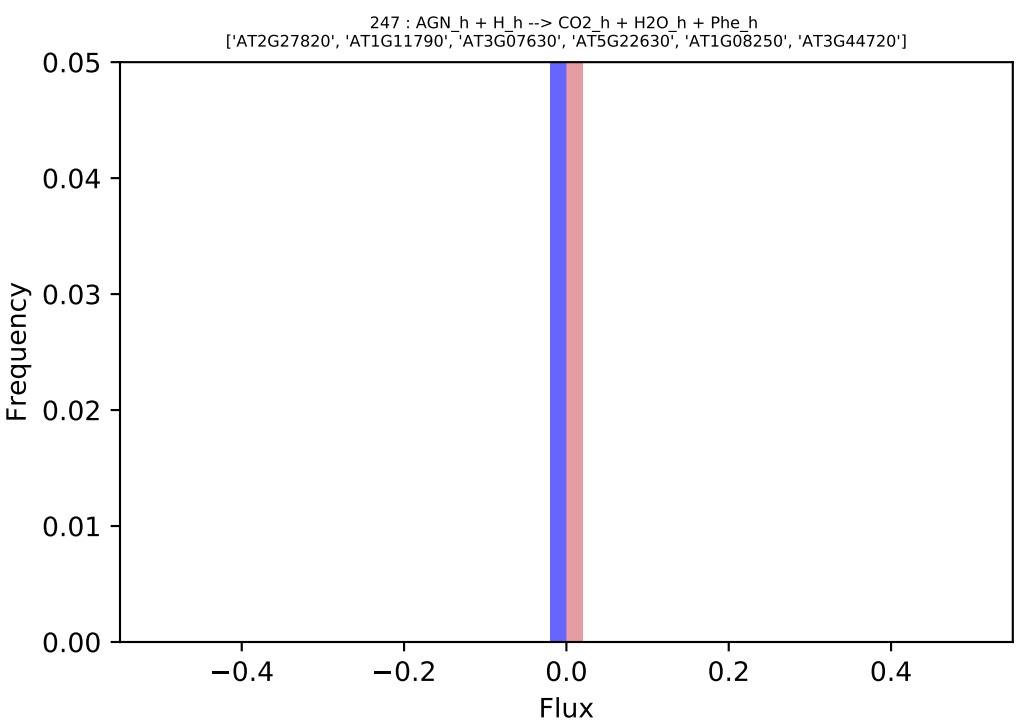
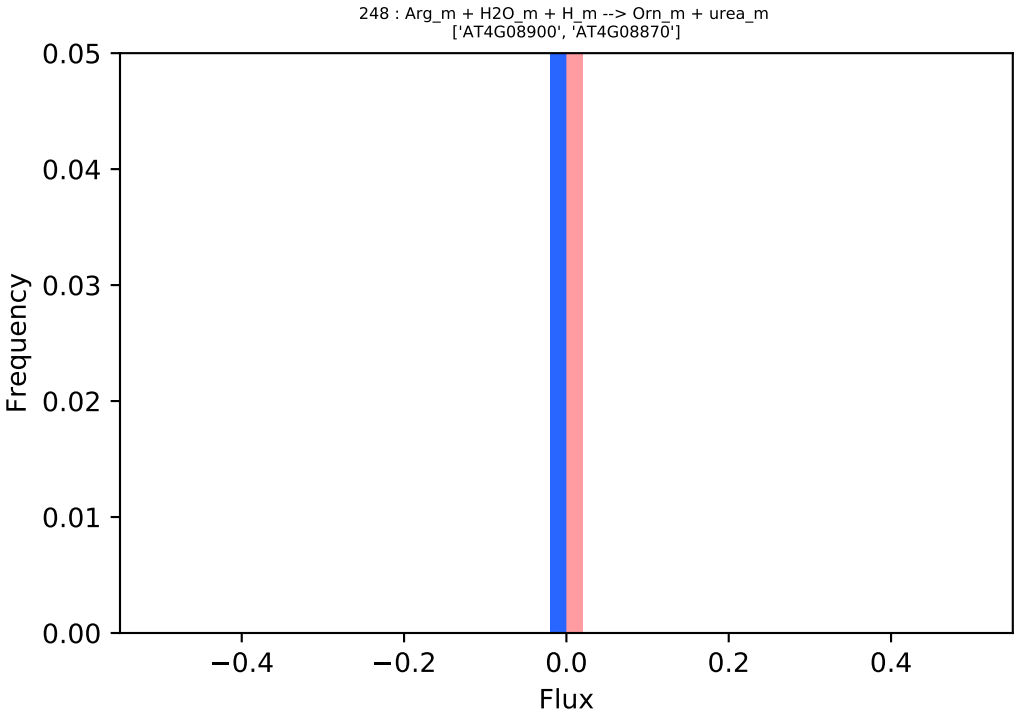
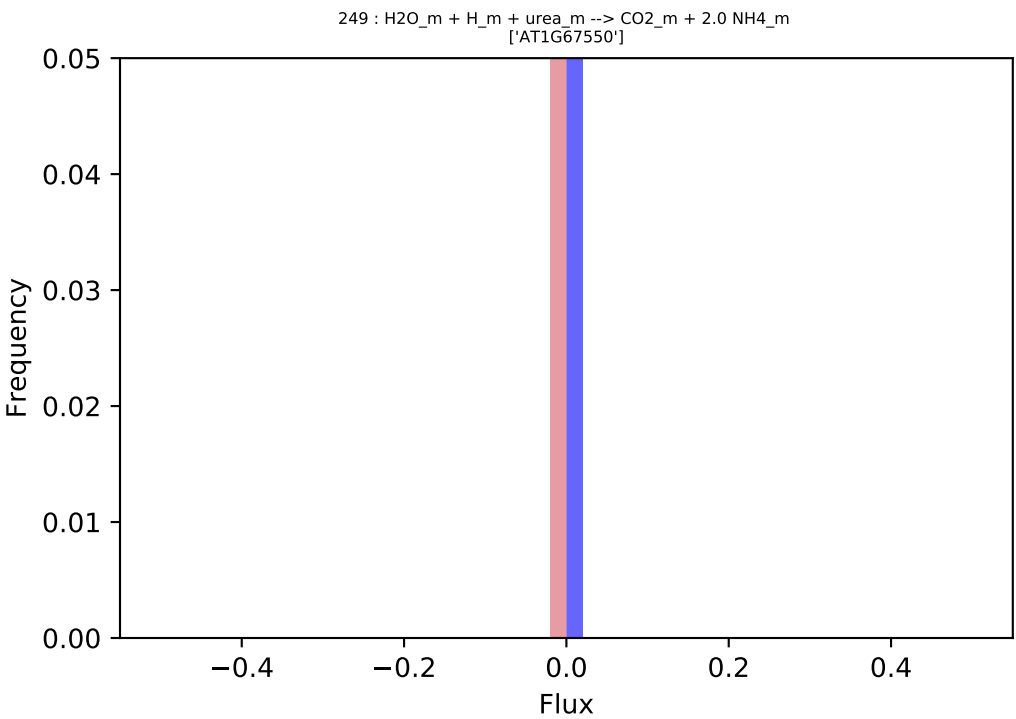
0.2
0.4
Flux

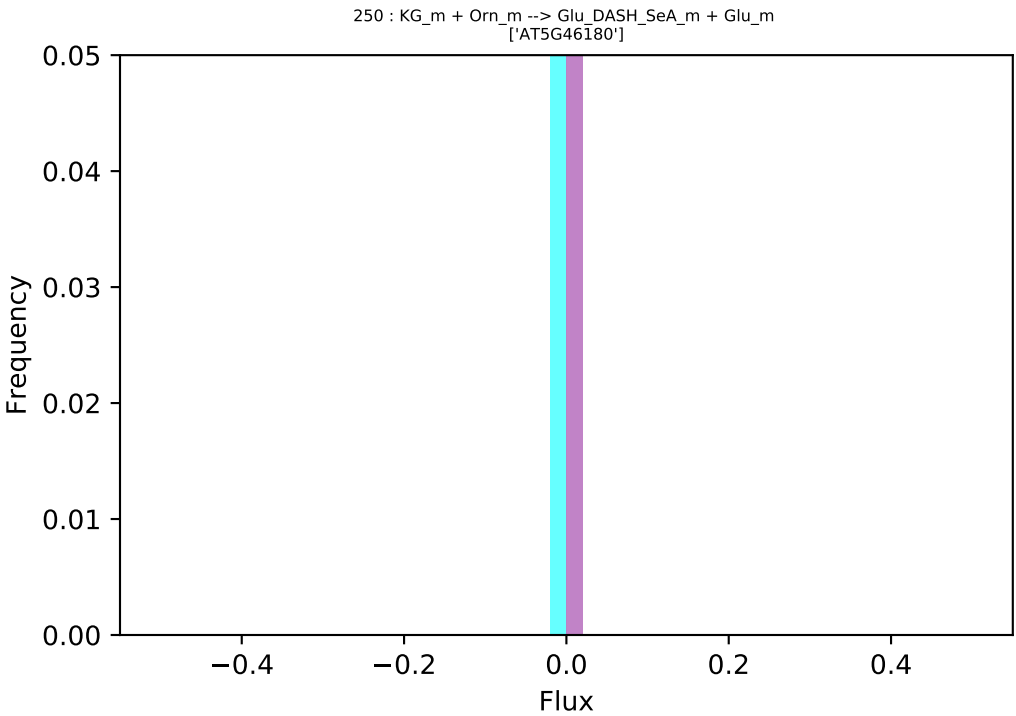

245 : CHR_h --> PRE_h
['AT5G10870', 'AT3G29200', 'AT1G69370']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

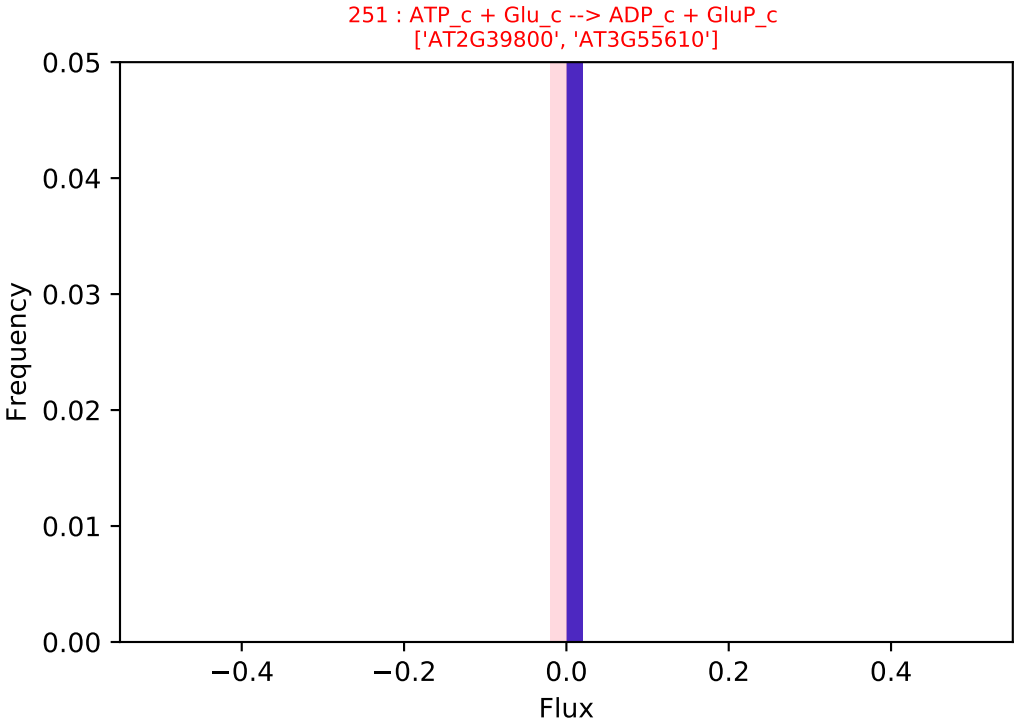

246 : Glu_h + PRE_h --> AGN_h + KG_h
['AT2G22250']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

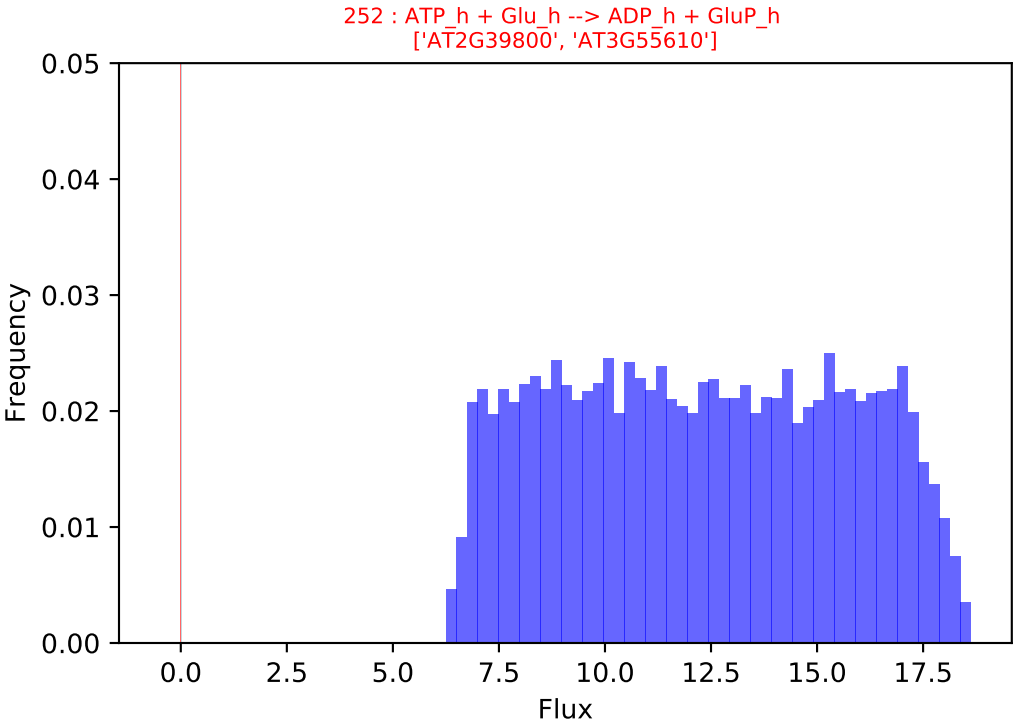

247 : AGN_h + H_h --> CO2_h + H2O_h + Phe_h
['AT2G27820', 'AT1G11790', 'AT3G07630', 'AT5G22630', 'AT1G08250', 'AT3G44720']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


248 : Arg_m + H2O_m + H_m --> Orn_m + urea_m
['AT4G08900', 'AT4G08870']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


249 : H2O_m + H_m + urea_m --> CO2_m + 2.0 NH4_m
['AT1G67550']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


250 : KG_m + Orn_m --> Glu_DASH_SeA_m + Glu_m
['AT5G46180']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


251 : ATP_c + Glu_c --> ADP_c + GluP_c
['AT2G39800', 'AT3G55610']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


252 : ATP_h + Glu_h --> ADP_h + GluP_h
['AT2G39800', 'AT3G55610']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
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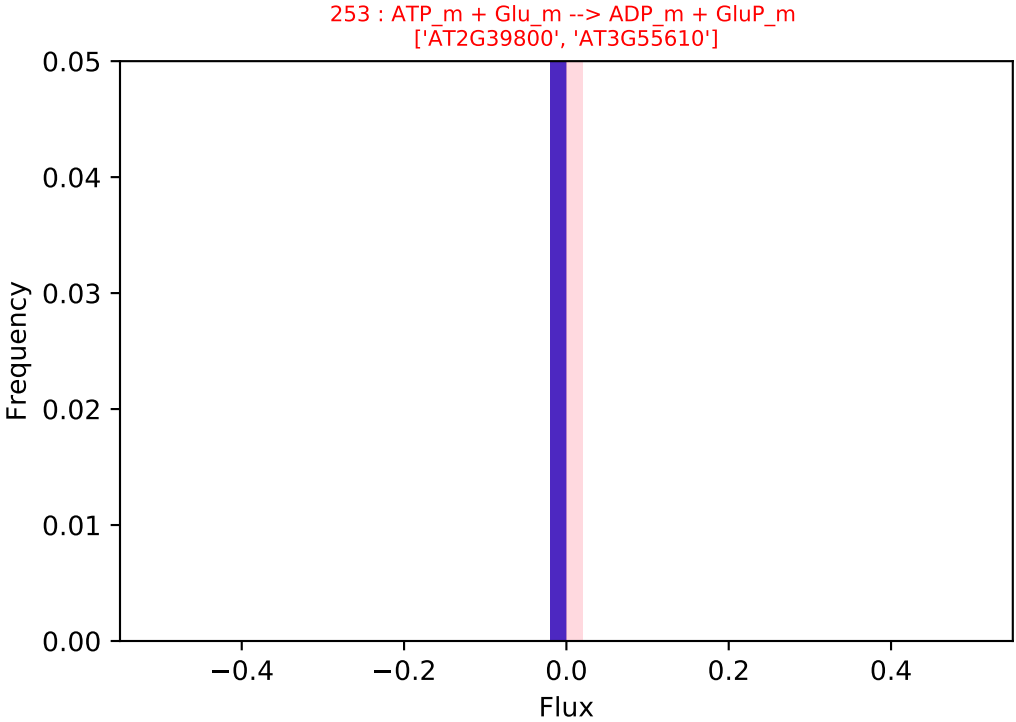
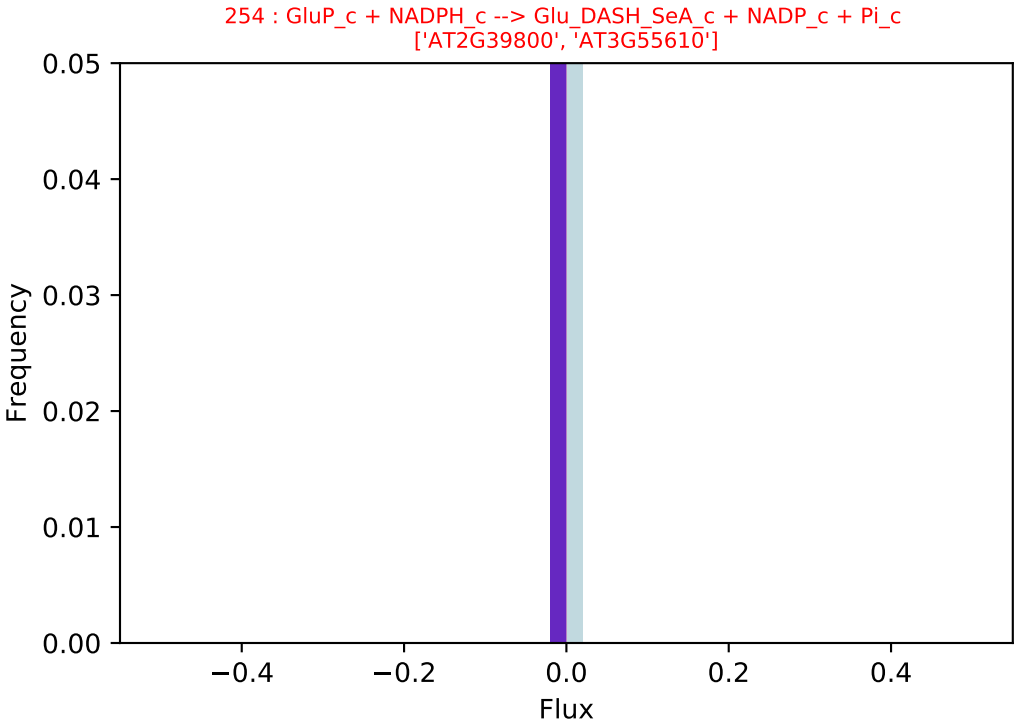
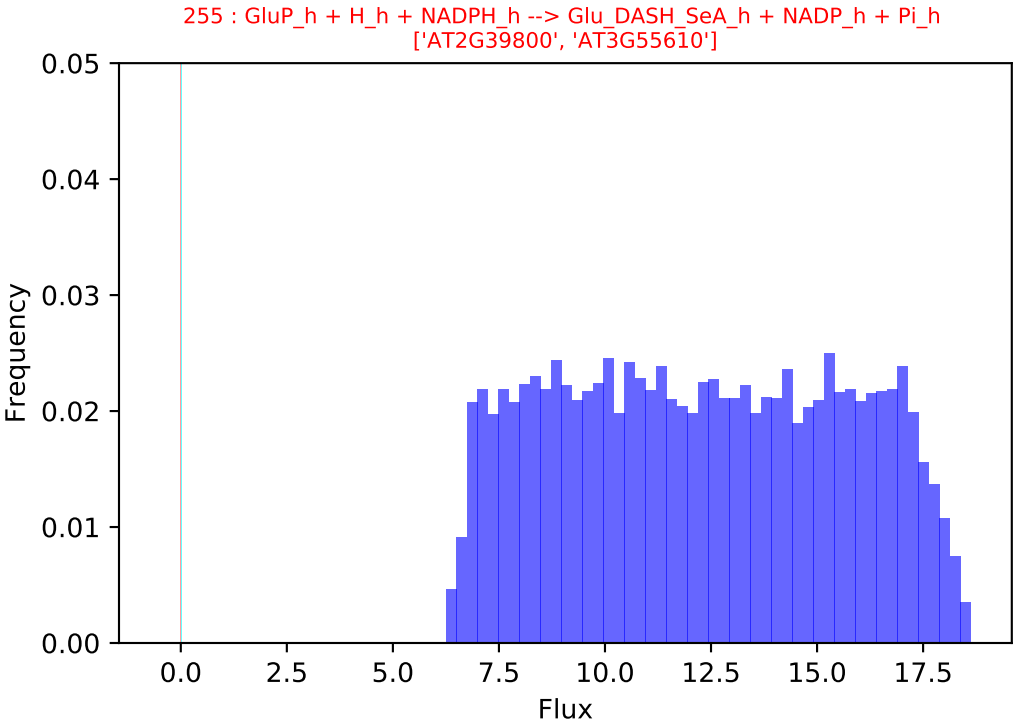
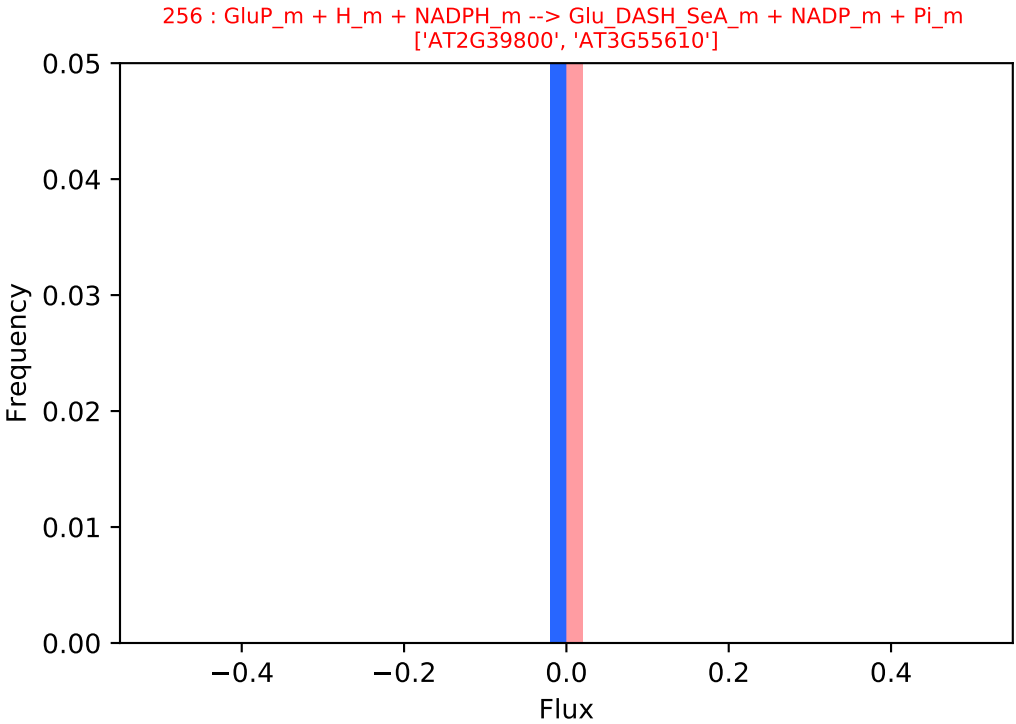
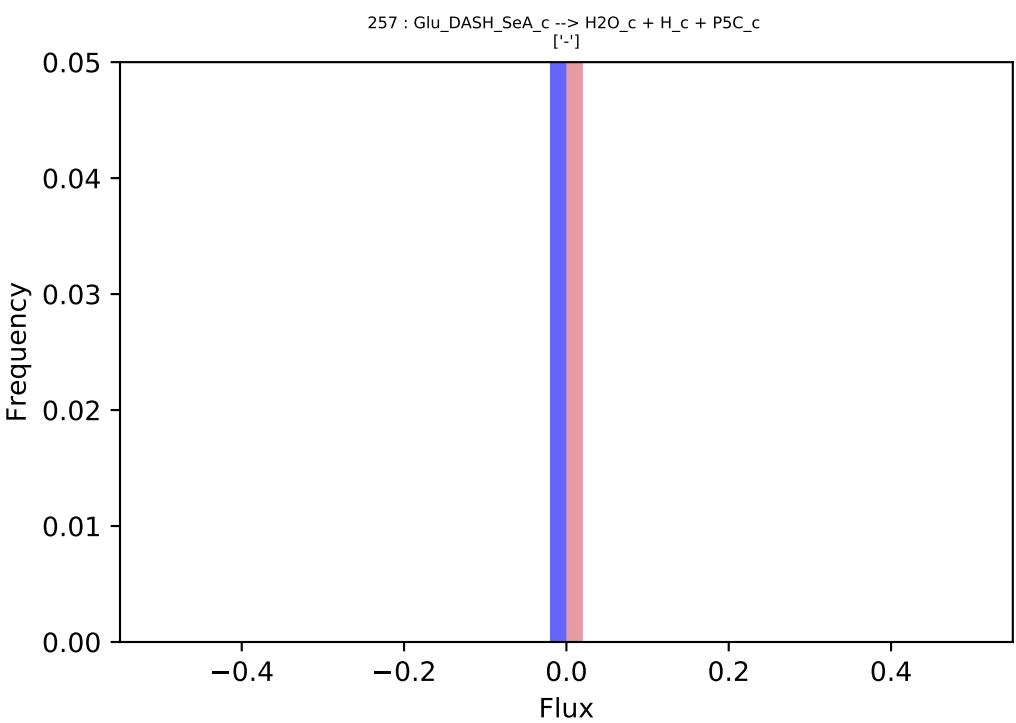
5.0
7.5
10.0
12.5
15.0
17.5
Flux

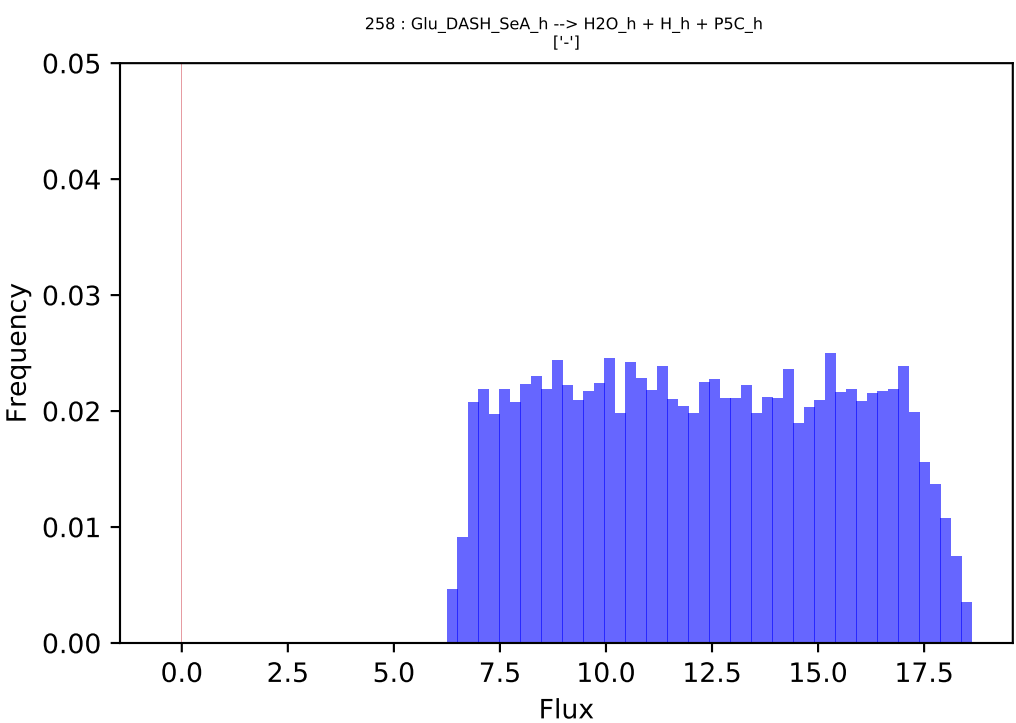

253 : ATP_m + Glu_m --> ADP_m + GluP_m
['AT2G39800', 'AT3G55610']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

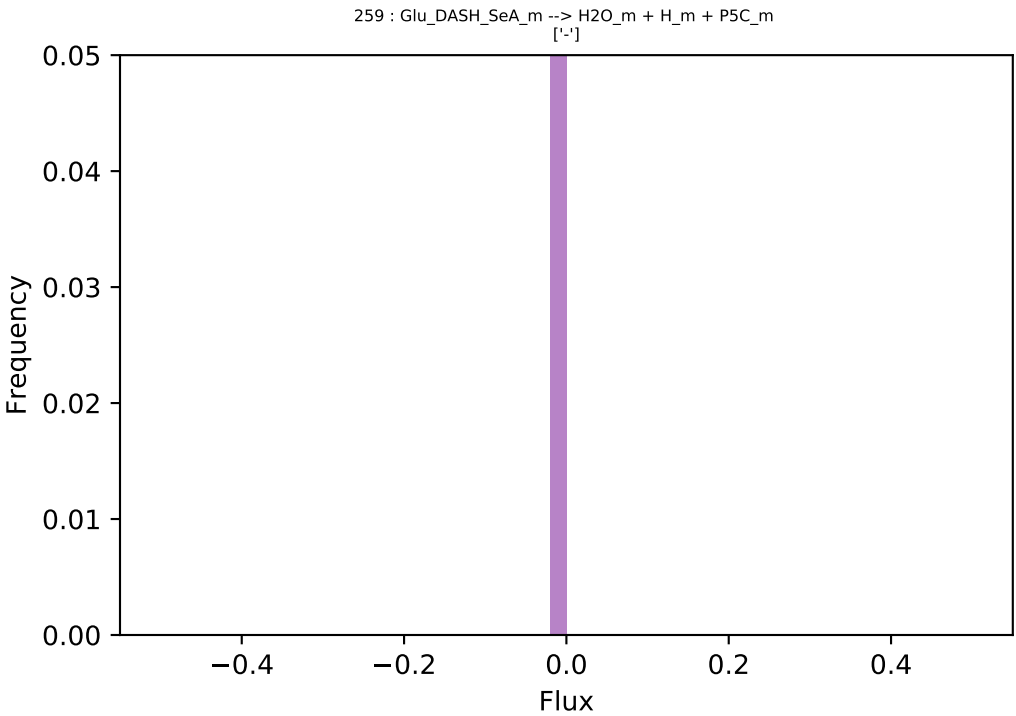

254 : GluP_c + NADPH_c --> Glu_DASH_SeA_c + NADP_c + Pi_c
['AT2G39800', 'AT3G55610']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

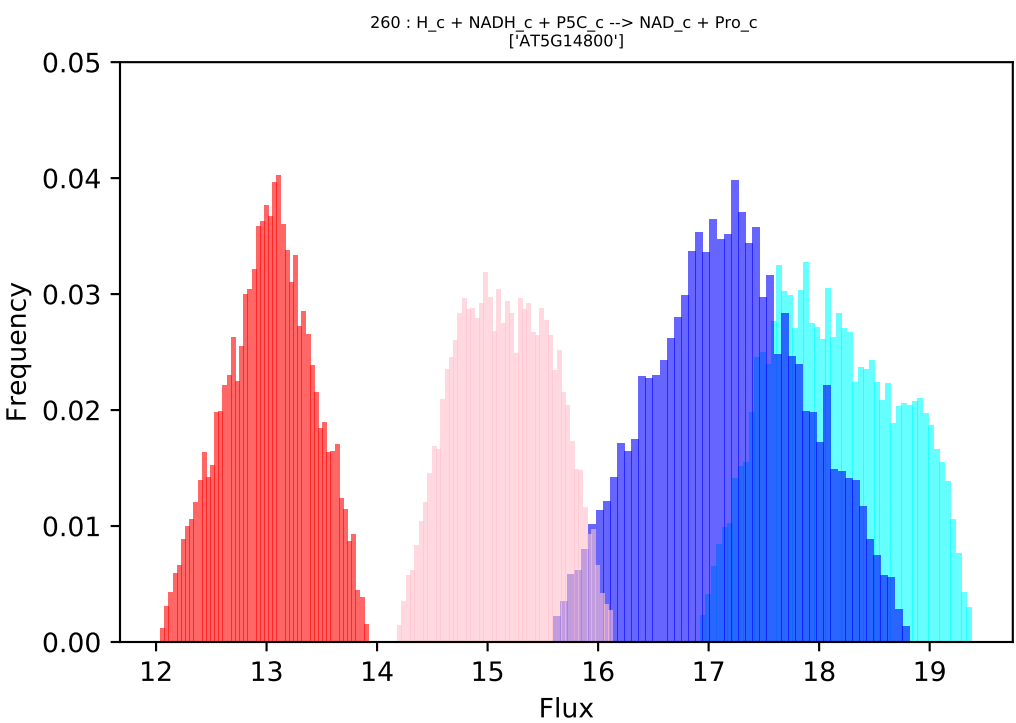

255 : GluP_h + H_h + NADPH_h --> Glu_DASH_SeA_h + NADP_h + Pi_h
['AT2G39800', 'AT3G55610']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
Flux


256 : GluP_m + H_m + NADPH_m --> Glu_DASH_SeA_m + NADP_m + Pi_m
['AT2G39800', 'AT3G55610']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


257 : Glu_DASH_SeA_c --> H2O_c + H_c + P5C_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


258 : Glu_DASH_SeA_h --> H2O_h + H_h + P5C_h
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
Flux


259 : Glu_DASH_SeA_m --> H2O_m + H_m + P5C_m
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


260 : H_c + NADH_c + P5C_c --> NAD_c + Pro_c
['AT5G14800']
Frequency
Flux
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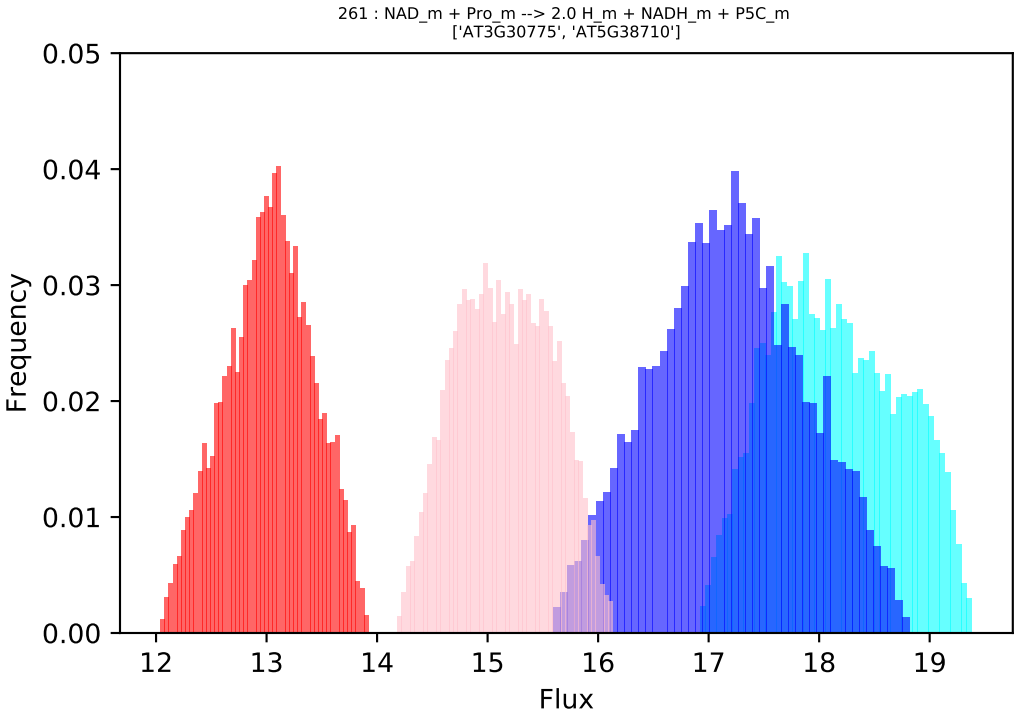
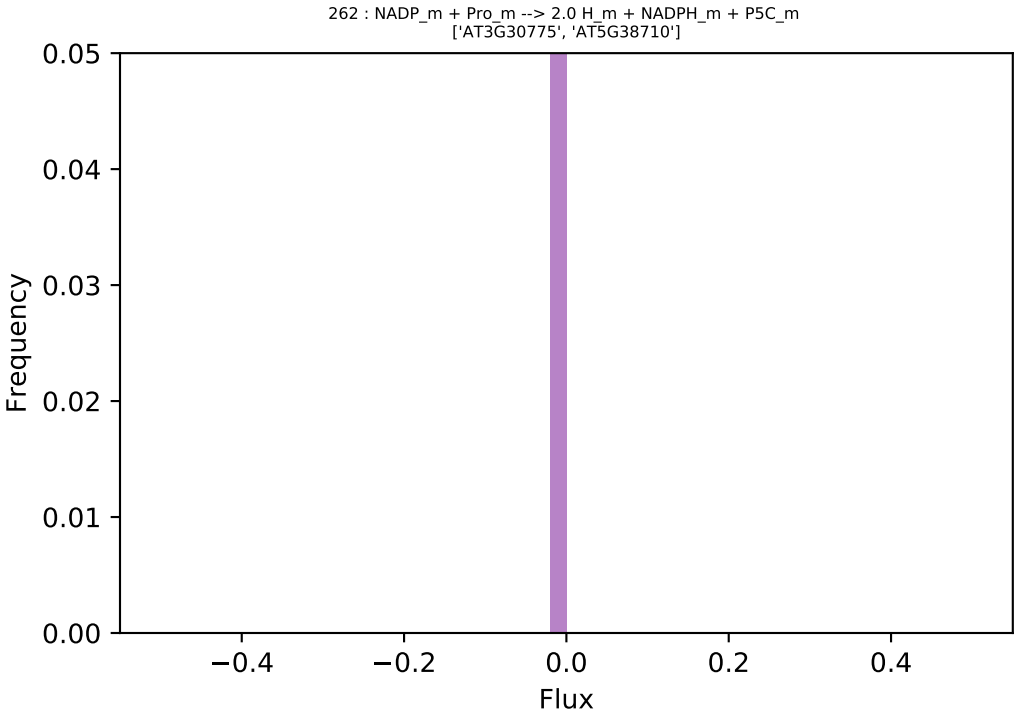
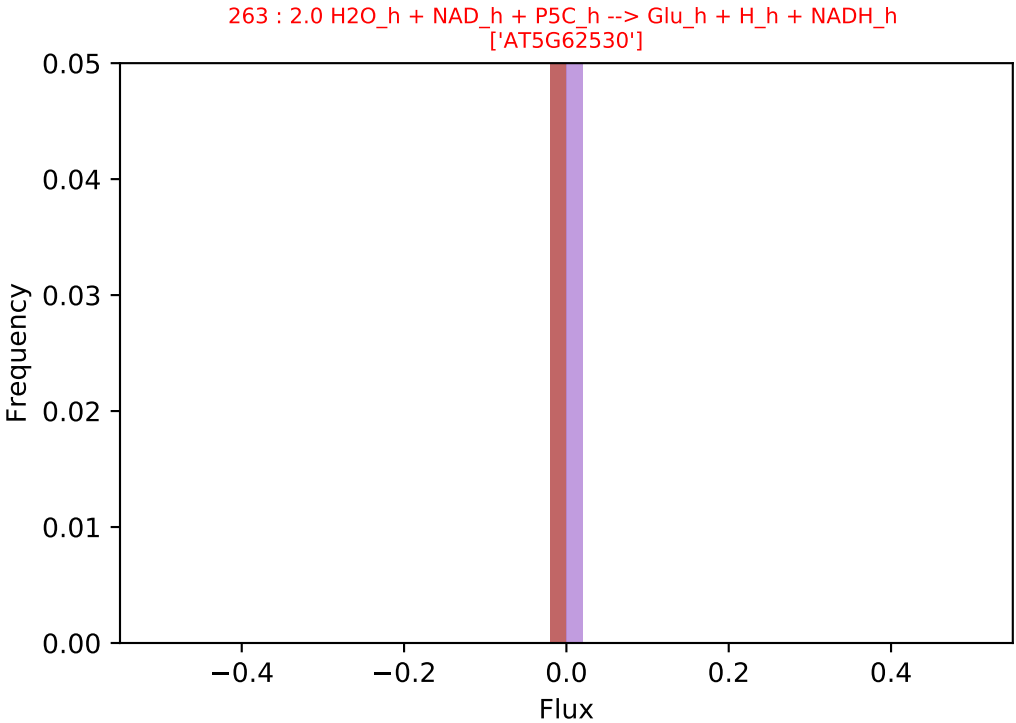
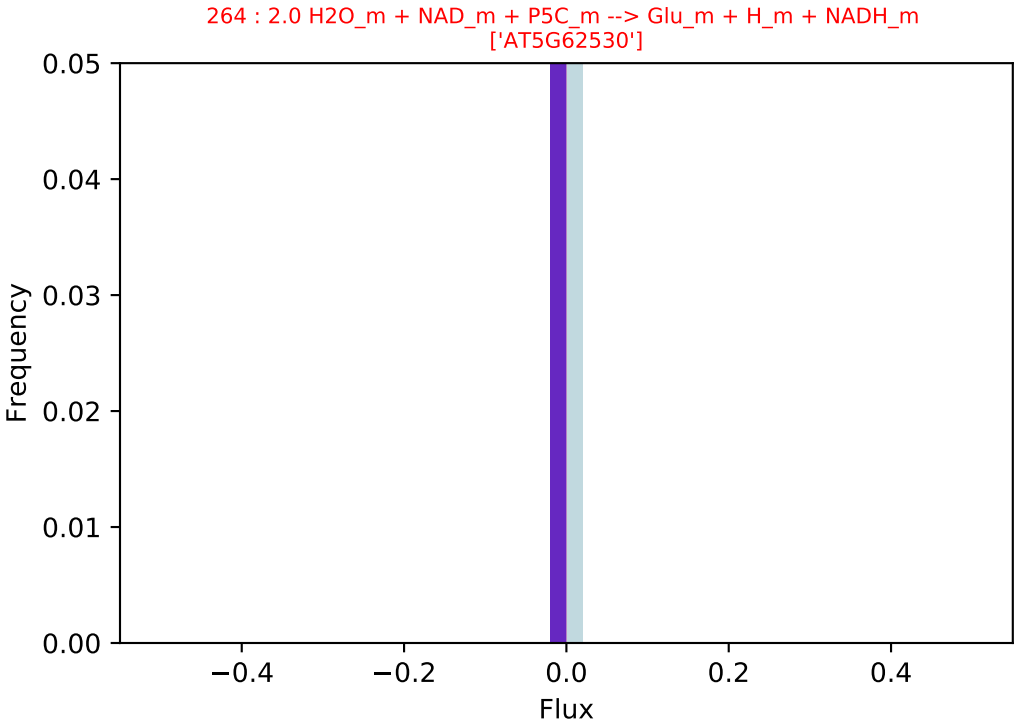
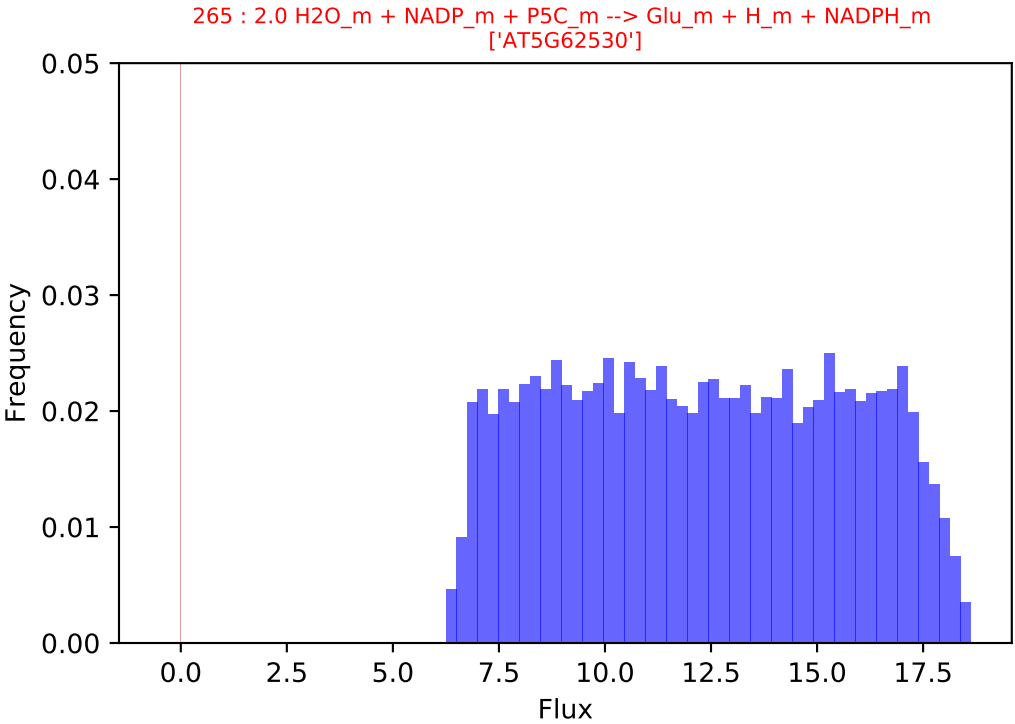
0.01
0.02
0.03
0.04
0.05
12
13
14
15
16
17
18
19

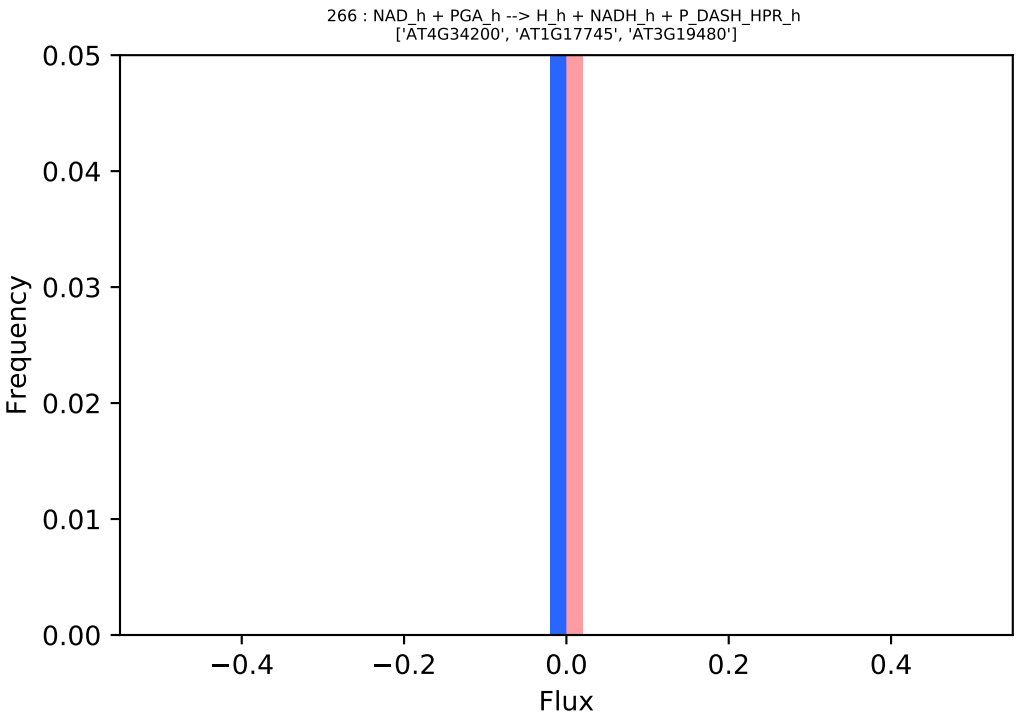

261 : NAD_m + Pro_m --> 2.0 H_m + NADH_m + P5C_m
['AT3G30775', 'AT5G38710']
Frequency
Flux
0.00
0.01
0.02
0.03
0.04
0.05
12
13
14
15
16
17
18
19

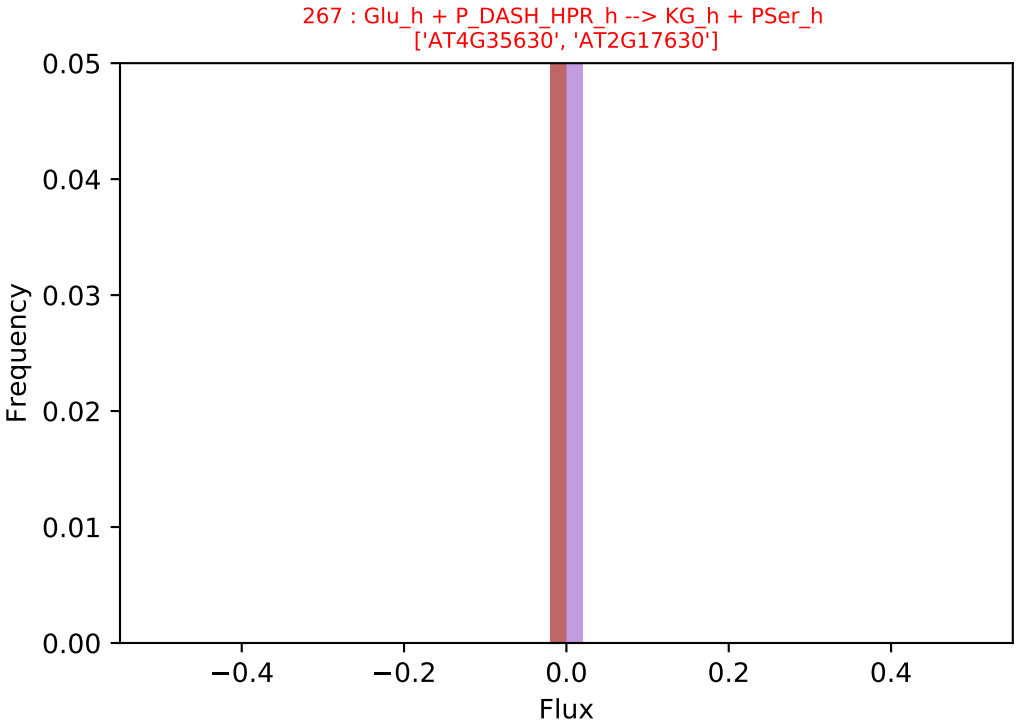

262 : NADP_m + Pro_m --> 2.0 H_m + NADPH_m + P5C_m
['AT3G30775', 'AT5G38710']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

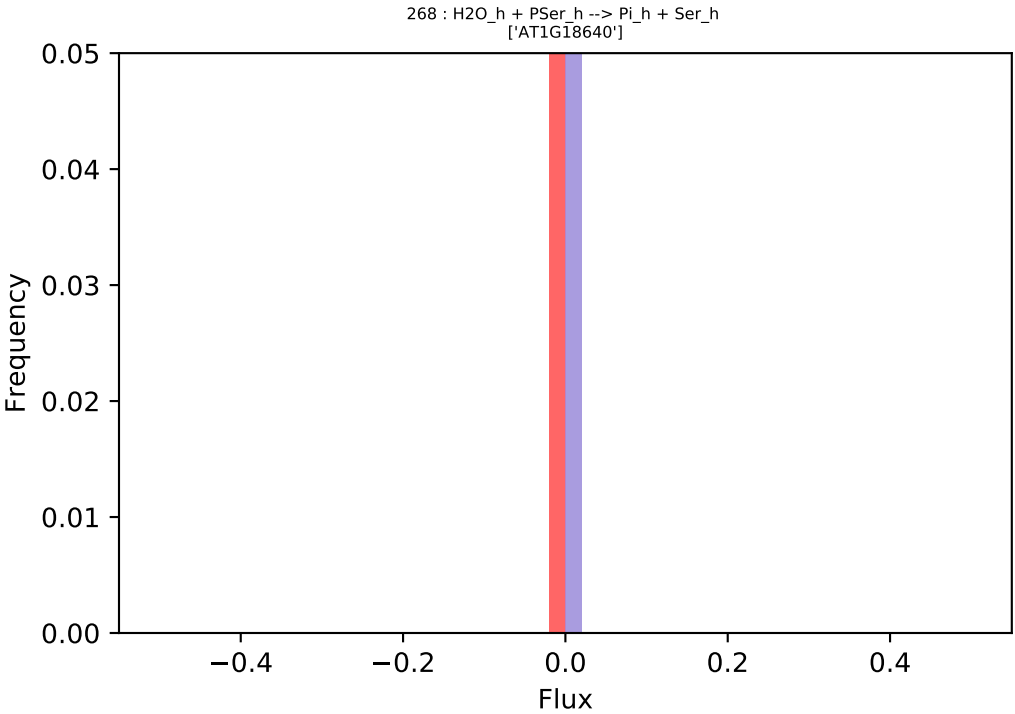

263 : 2.0 H2O_h + NAD_h + P5C_h --> Glu_h + H_h + NADH_h
['AT5G62530']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

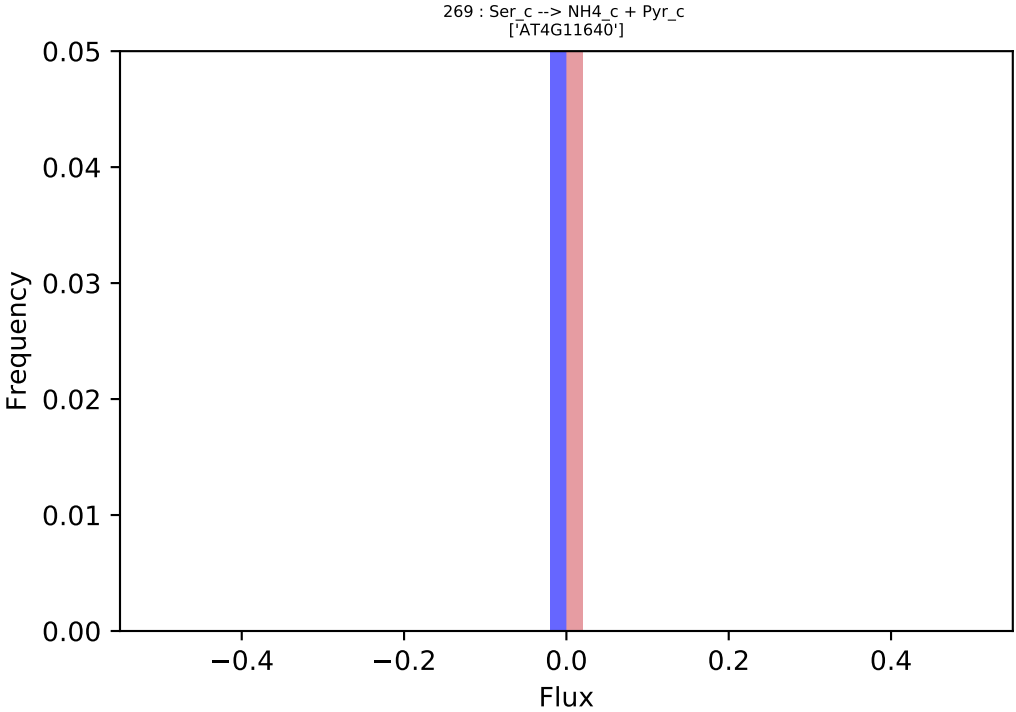

264 : 2.0 H2O_m + NAD_m + P5C_m --> Glu_m + H_m + NADH_m
['AT5G62530']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

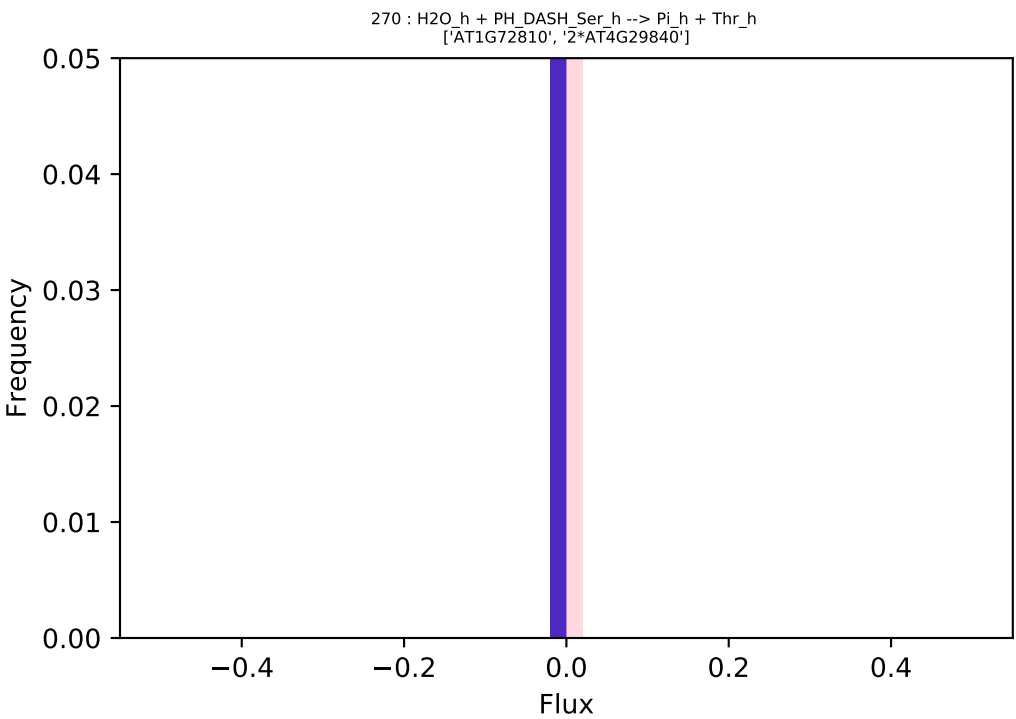

265 : 2.0 H2O_m + NADP_m + P5C_m --> Glu_m + H_m + NADPH_m
['AT5G62530']
Frequency
0.05
0.04
0.03
0.02
0.01
0.00
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
Flux

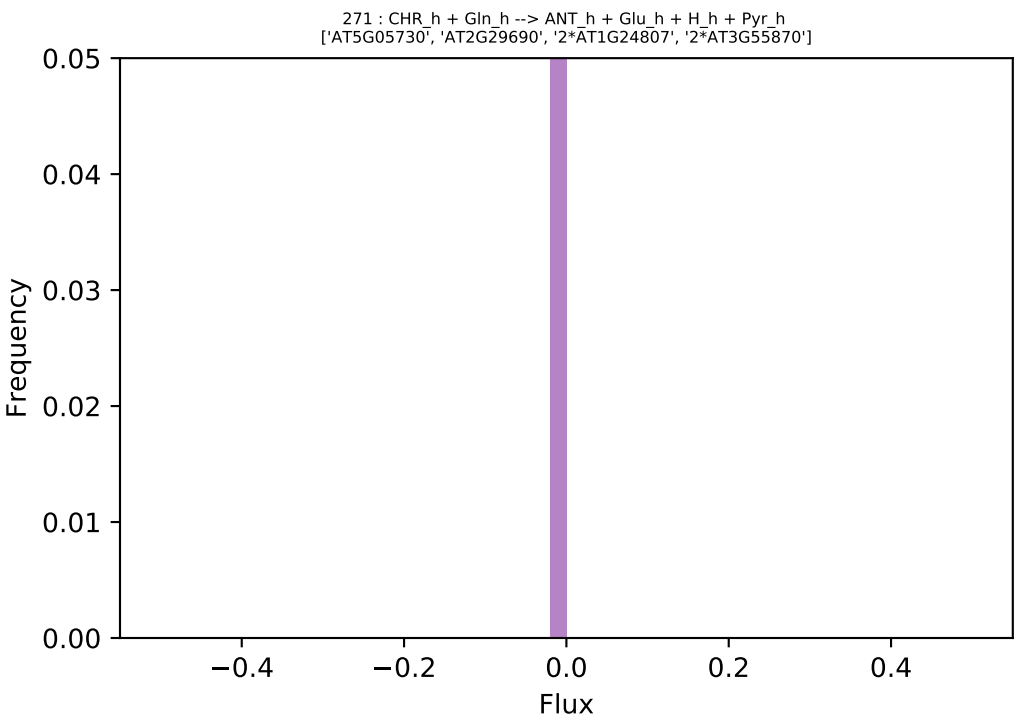

266 : NAD_h + PGA_h --> H_h + NADH_h + P_DASH_HPR_h
['AT4G34200', 'AT1G17745', 'AT3G19480']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

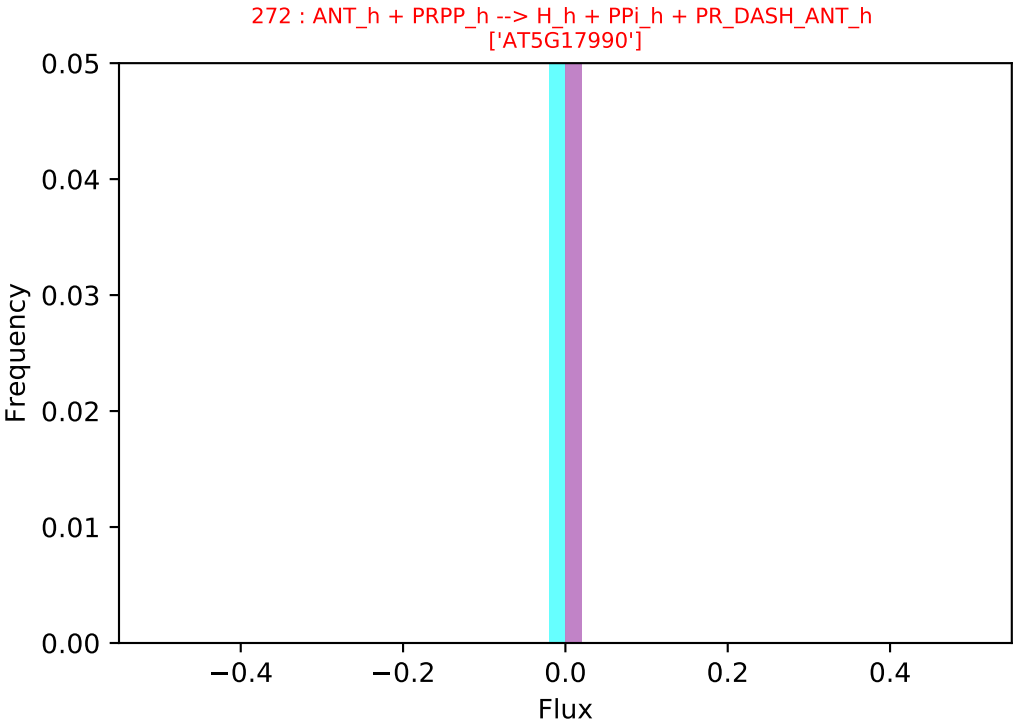

267 : Glu_h + P_DASH_HPR_h --> KG_h + PSer_h
['AT4G35630', 'AT2G17630']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

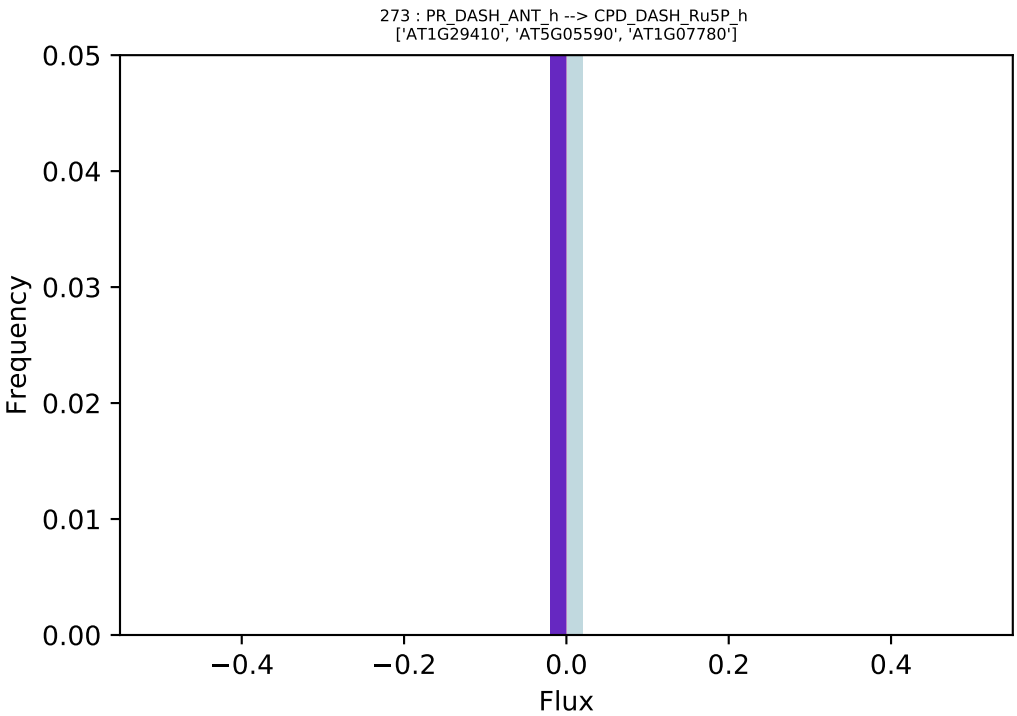

268 : H2O_h + PSer_h --> Pi_h + Ser_h
['AT1G18640']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

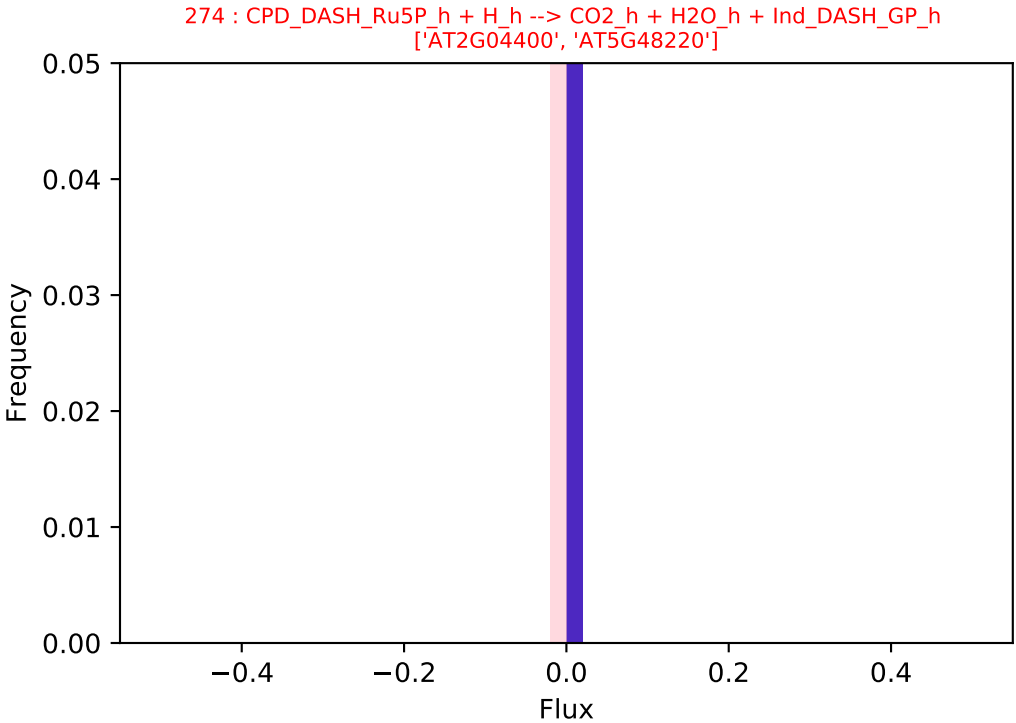

269 : Ser_c --> NH4_c + Pyr_c
['AT4G11640']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

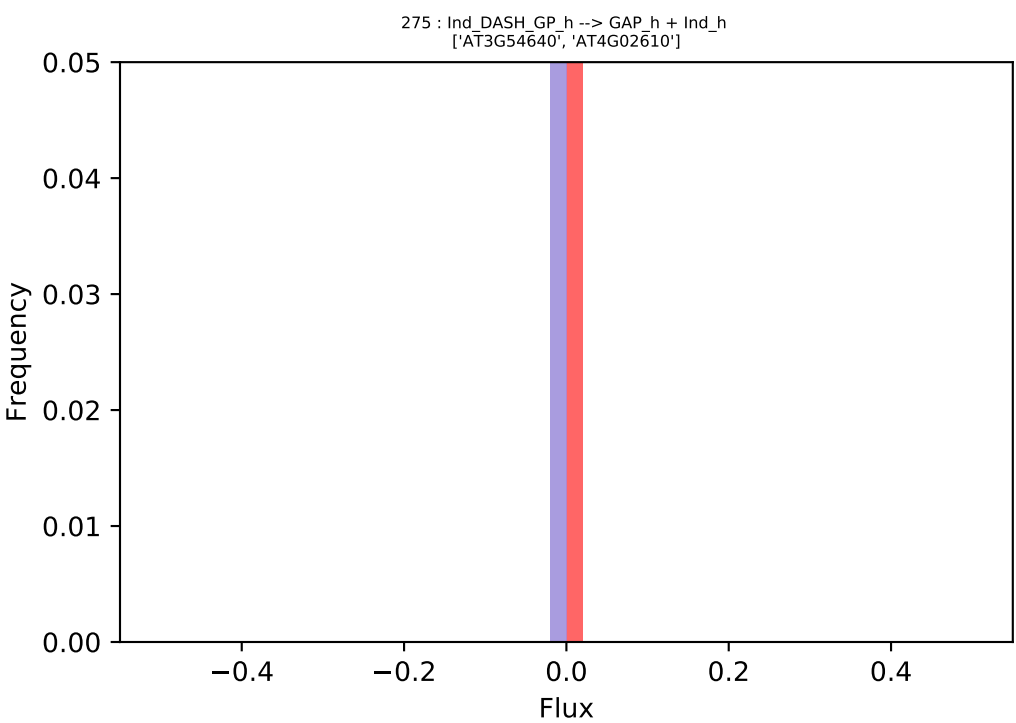

270 : H2O_h + PH_DASH_Ser_h --> Pi_h + Thr_h
['AT1G72810', '2*AT4G29840']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


271 : CHR_h + Gln_h --> ANT_h + Glu_h + H_h + Pyr_h
['AT5G05730', 'AT2G29690', '2*AT1G24807', '2*AT3G55870']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


272 : ANT_h + PRPP_h --> H_h + PPi_h + PR_DASH_ANT_h
['AT5G17990']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


273 : PR_DASH_ANT_h --> CPD_DASH_Ru5P_h
['AT1G29410', 'AT5G05590', 'AT1G07780']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


274 : CPD_DASH_Ru5P_h + H_h --> CO2_h + H2O_h + Ind_DASH_GP_h
['AT2G04400', 'AT5G48220']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


275 : Ind_DASH_GP_h --> GAP_h + Ind_h
['AT3G54640', 'AT4G02610']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
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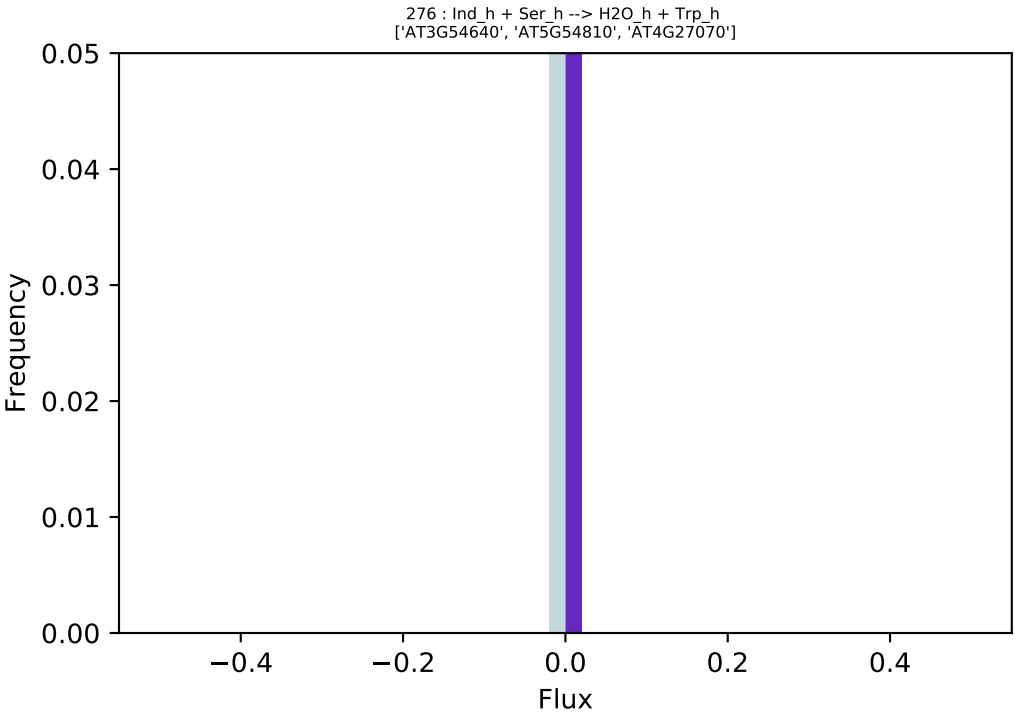
0.2
0.4
Flux


276 : Ind_h + Ser_h --> H2O_h + Trp_h
['AT3G54640', 'AT5G54810', 'AT4G27070']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
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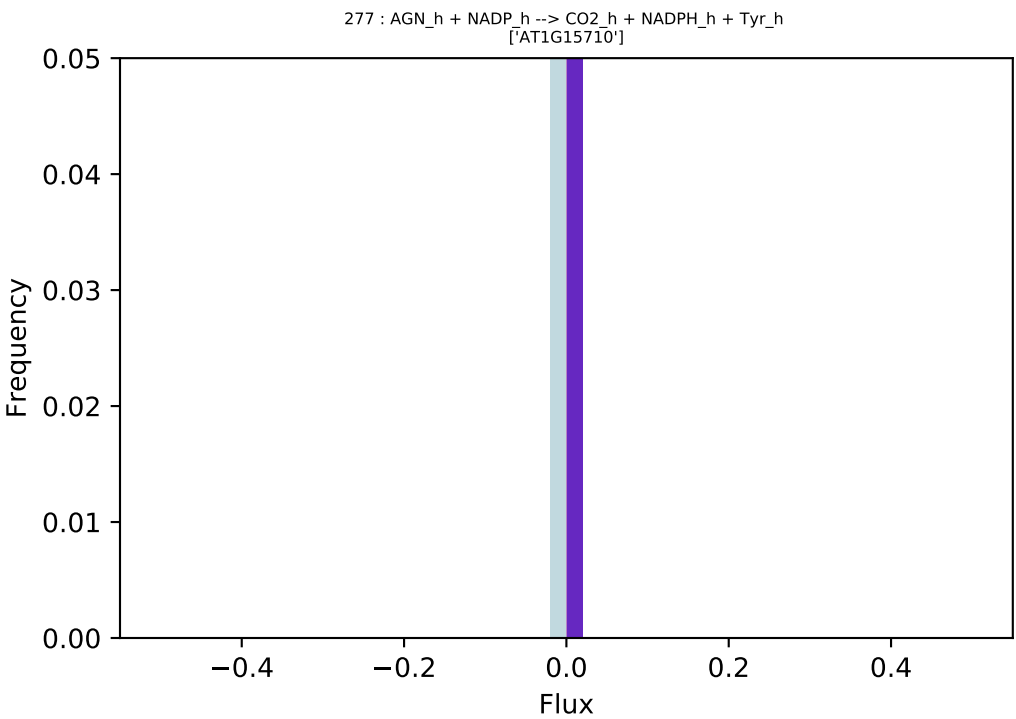
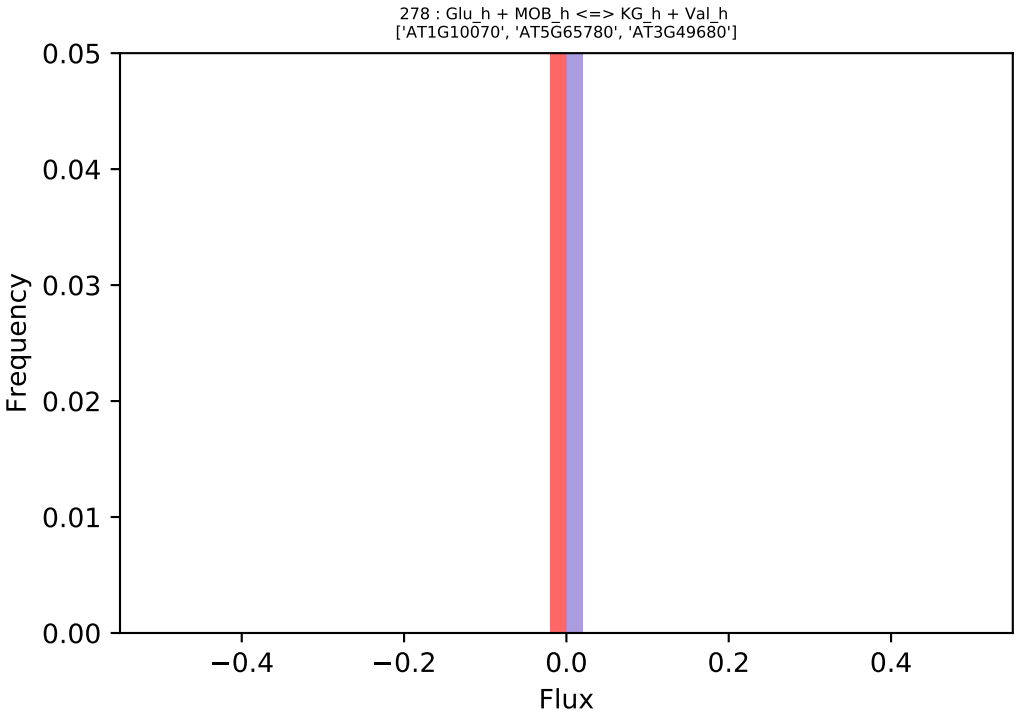
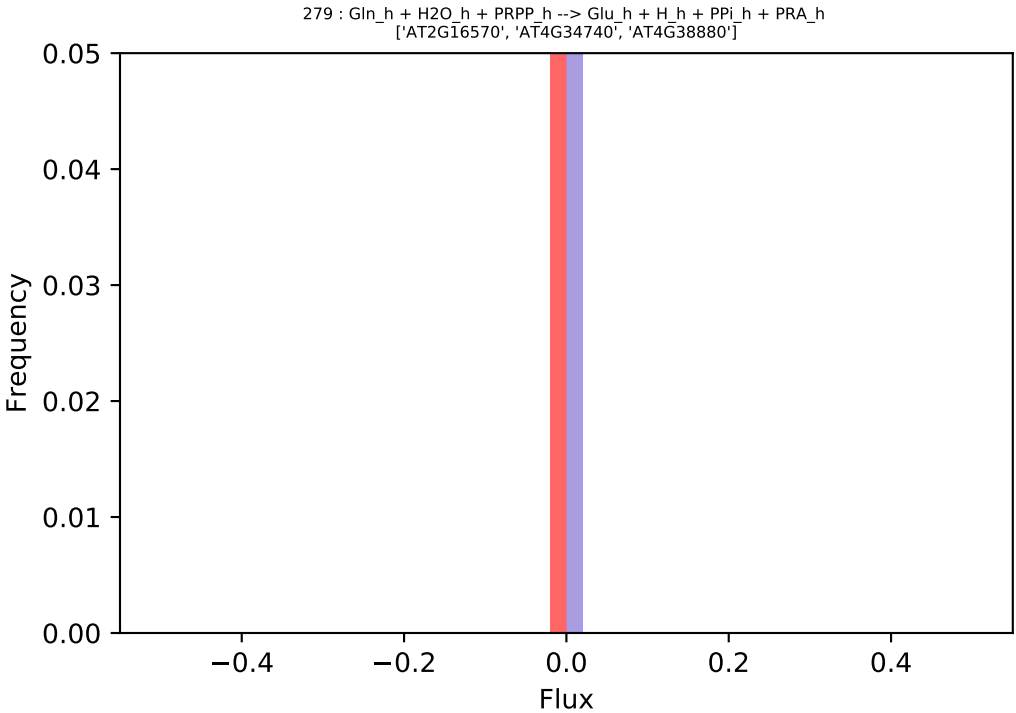
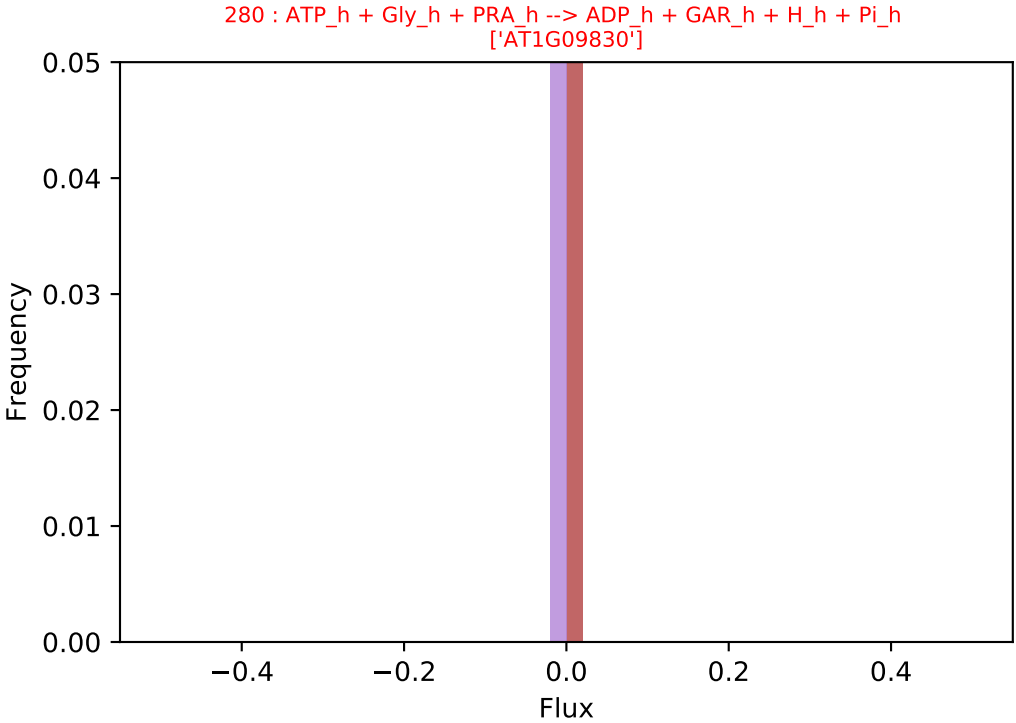
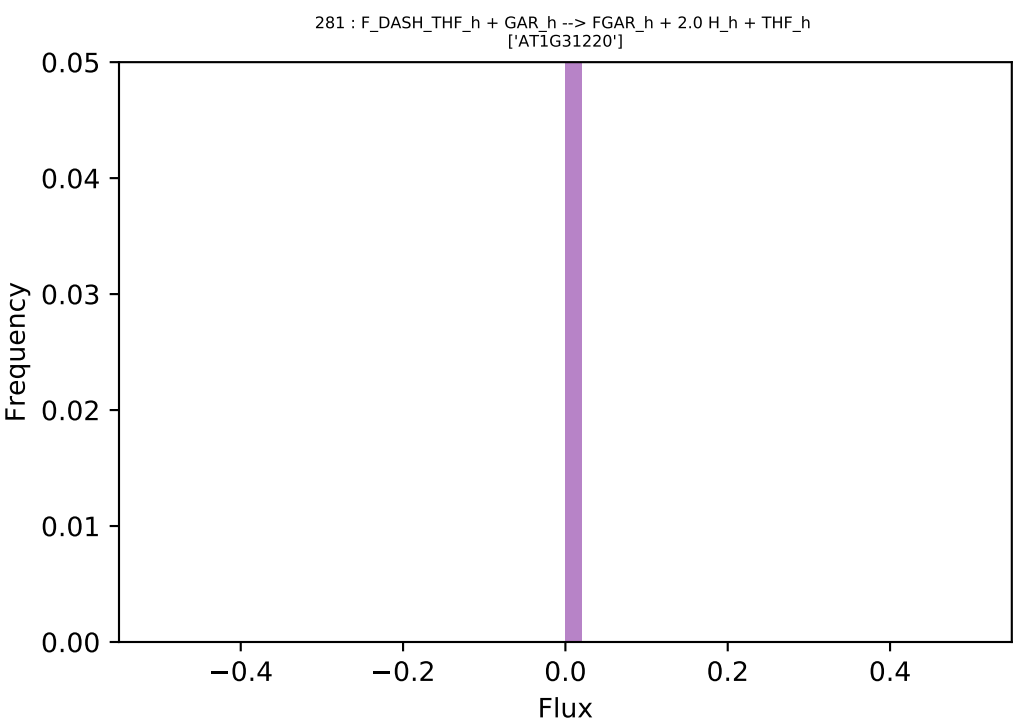
0.2
0.4
Flux

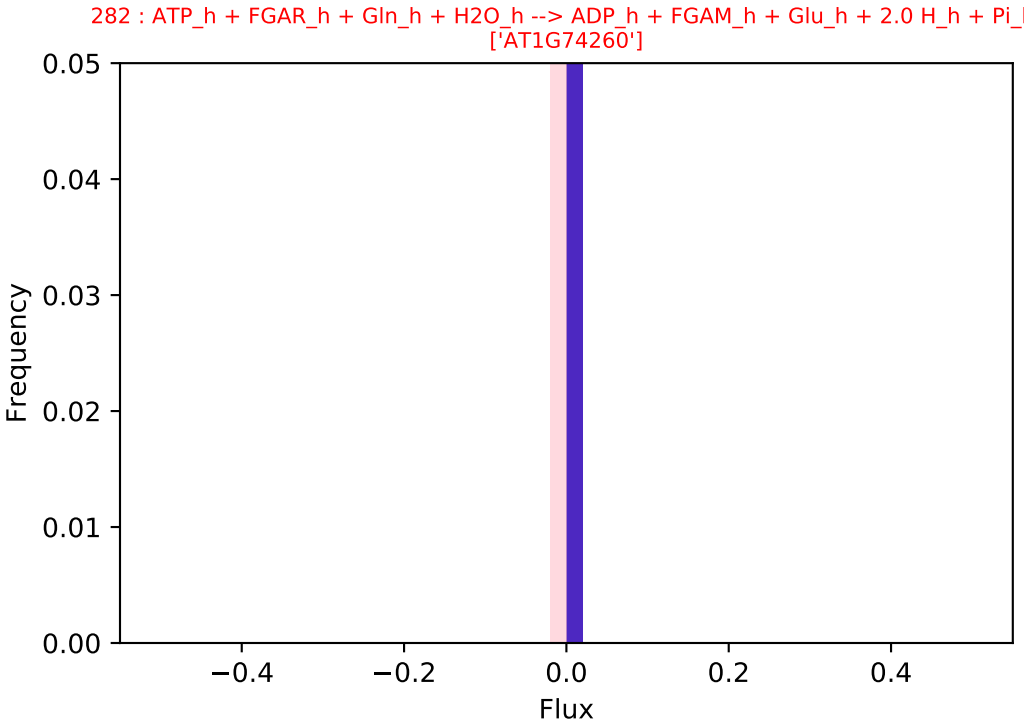

277 : AGN_h + NADP_h --> CO2_h + NADPH_h + Tyr_h
['AT1G15710']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

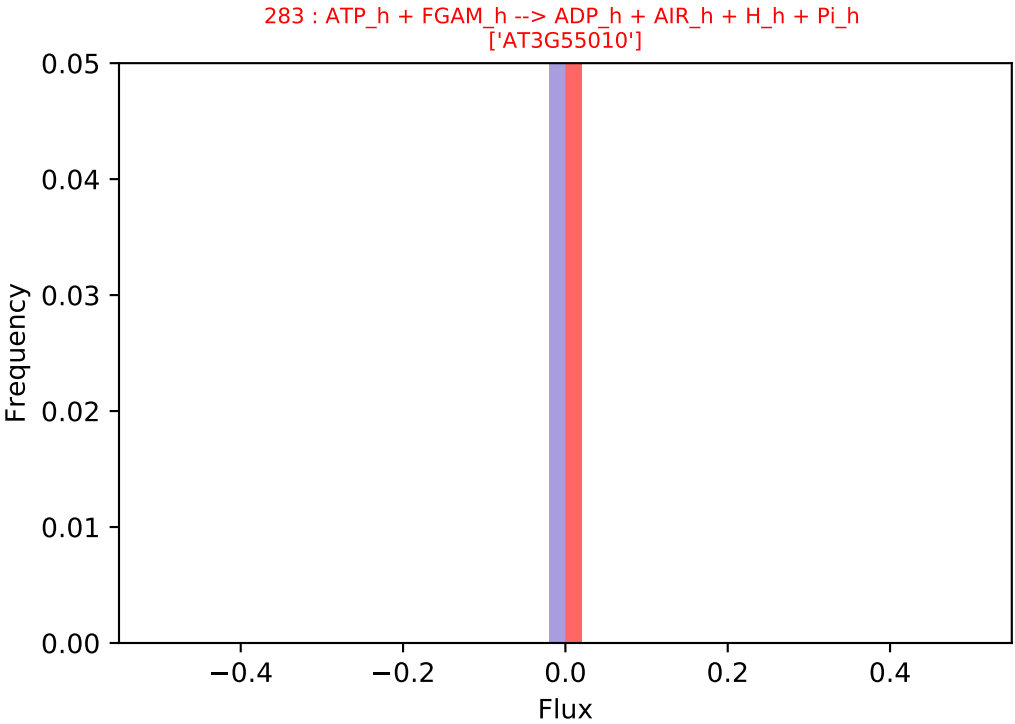

278 : Glu_h + MOB_h <=> KG_h + Val_h
['AT1G10070', 'AT5G65780', 'AT3G49680']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

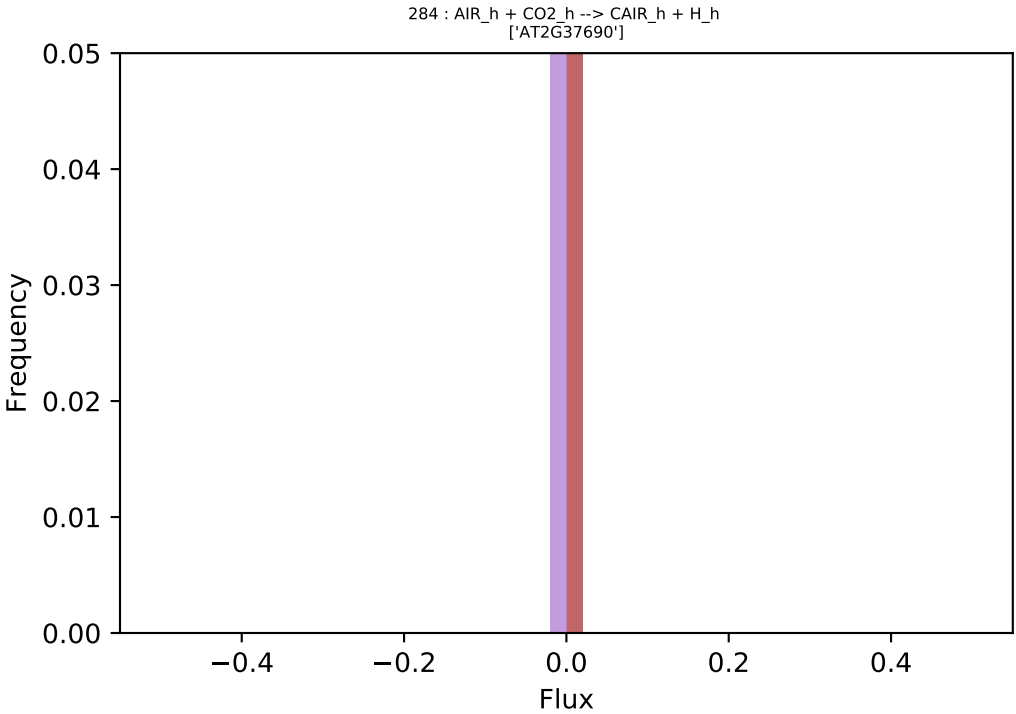

279 : Gln_h + H2O_h + PRPP_h --> Glu_h + H_h + PPi_h + PRA_h
['AT2G16570', 'AT4G34740', 'AT4G38880']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

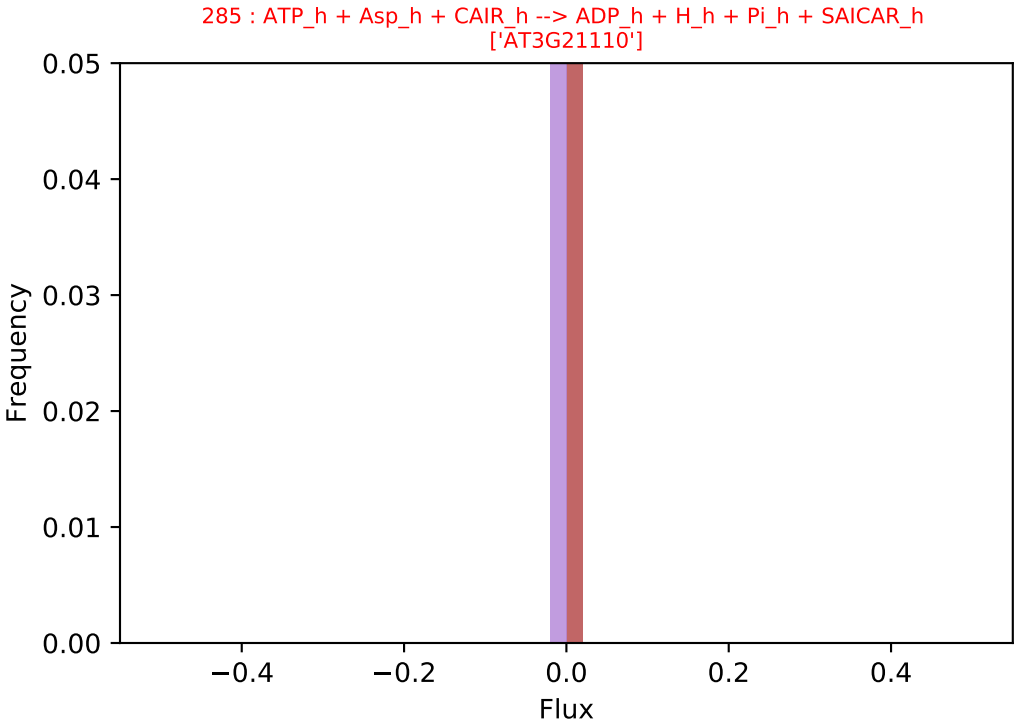

280 : ATP_h + Gly_h + PRA_h --> ADP_h + GAR_h + H_h + Pi_h
['AT1G09830']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

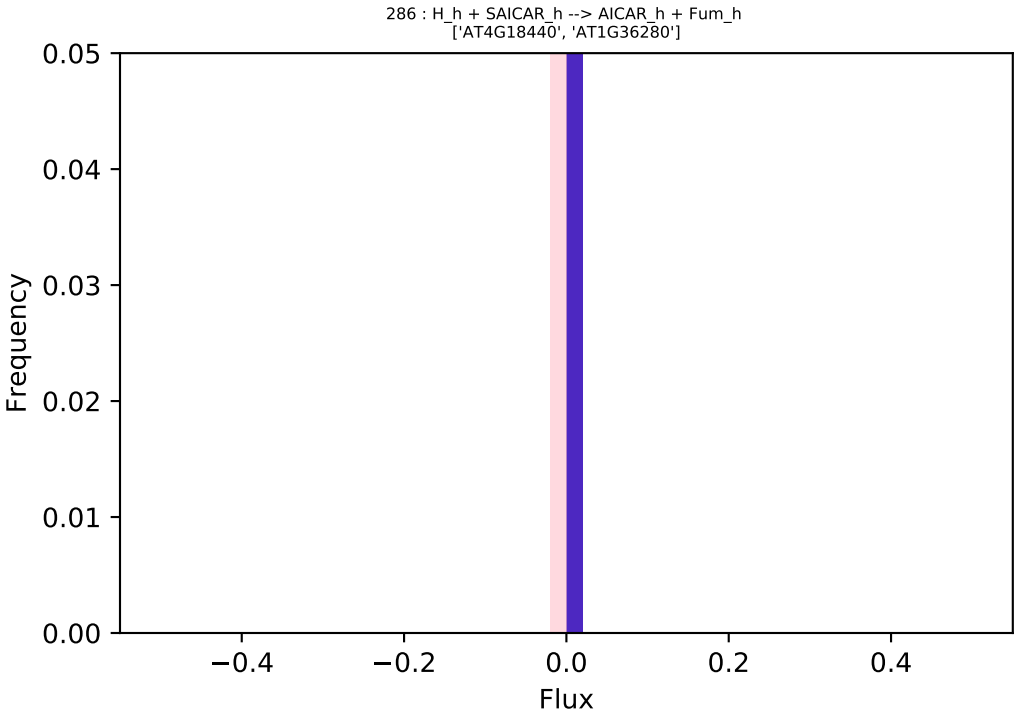

281 : F_DASH_THF_h + GAR_h --> FGAR_h + 2.0 H_h + THF_h
['AT1G31220']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

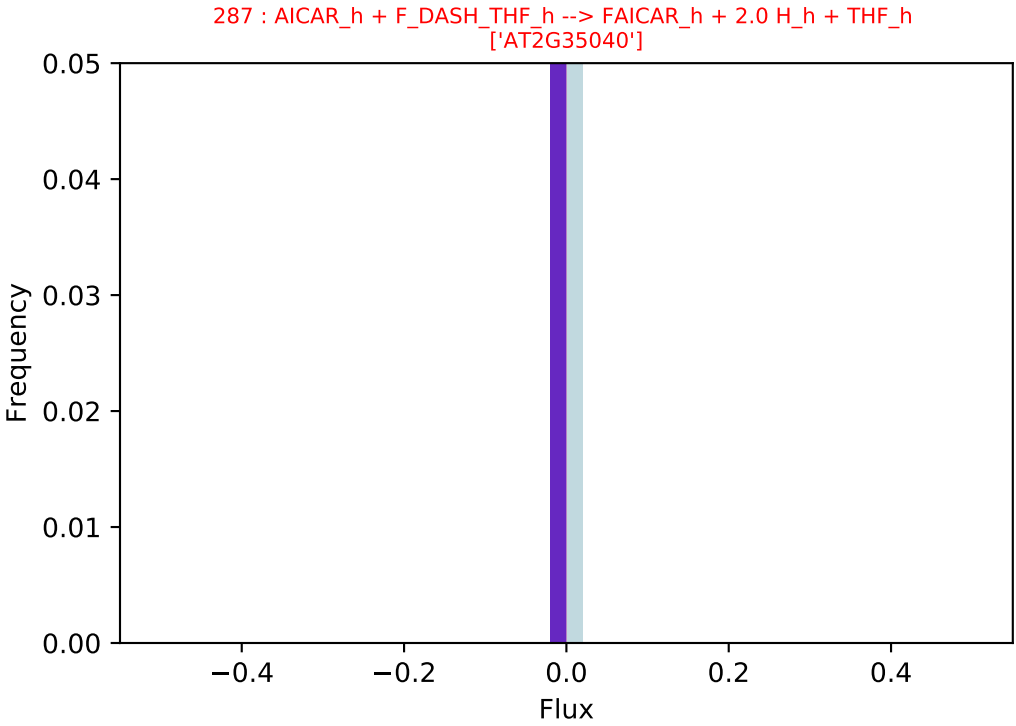

282 : ATP_h + FGAR_h + Gln_h + H2O_h --> ADP_h + FGAM_h + Glu_h + 2.0 H_h + Pi_h
['AT1G74260']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

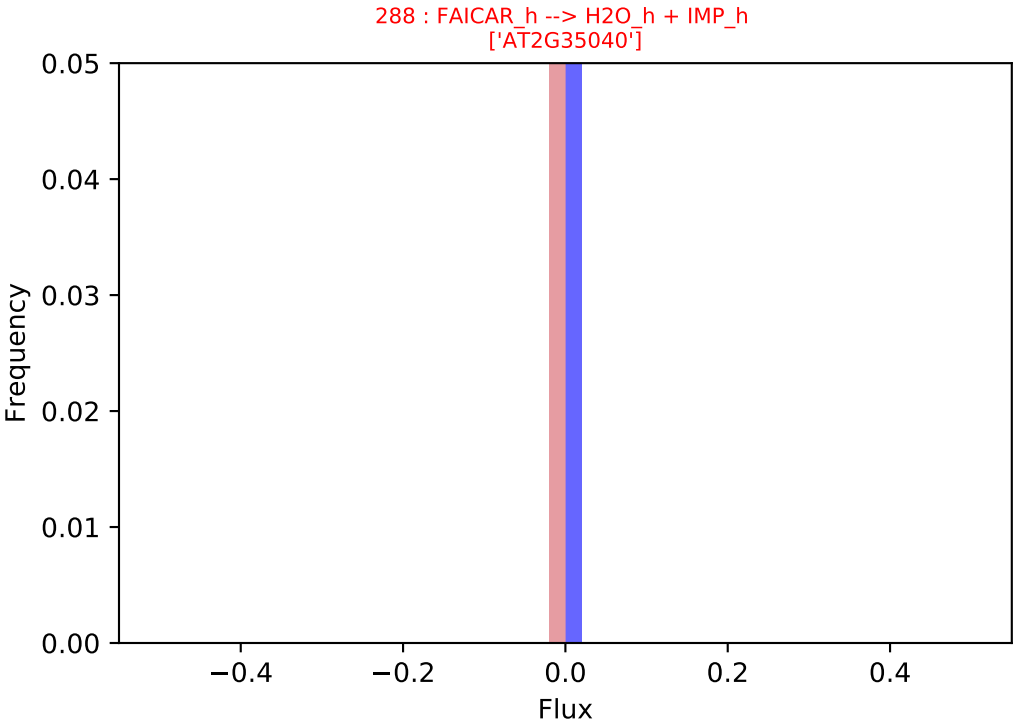

283 : ATP_h + FGAM_h --> ADP_h + AIR_h + H_h + Pi_h
['AT3G55010']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

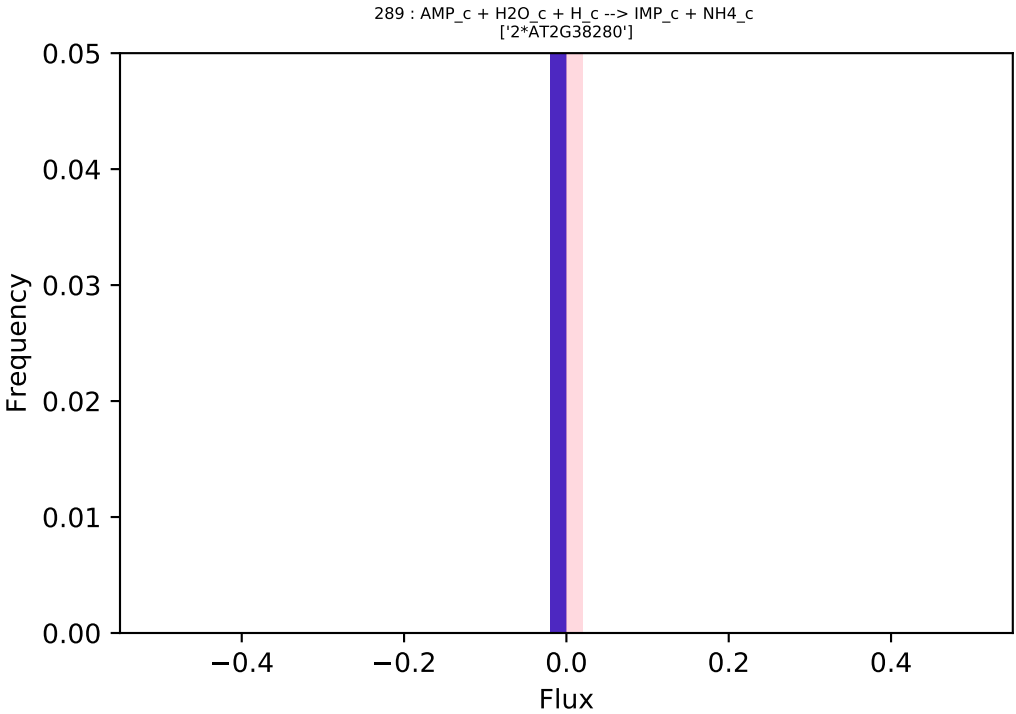

284 : AIR_h + CO2_h --> CAIR_h + H_h
['AT2G37690']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

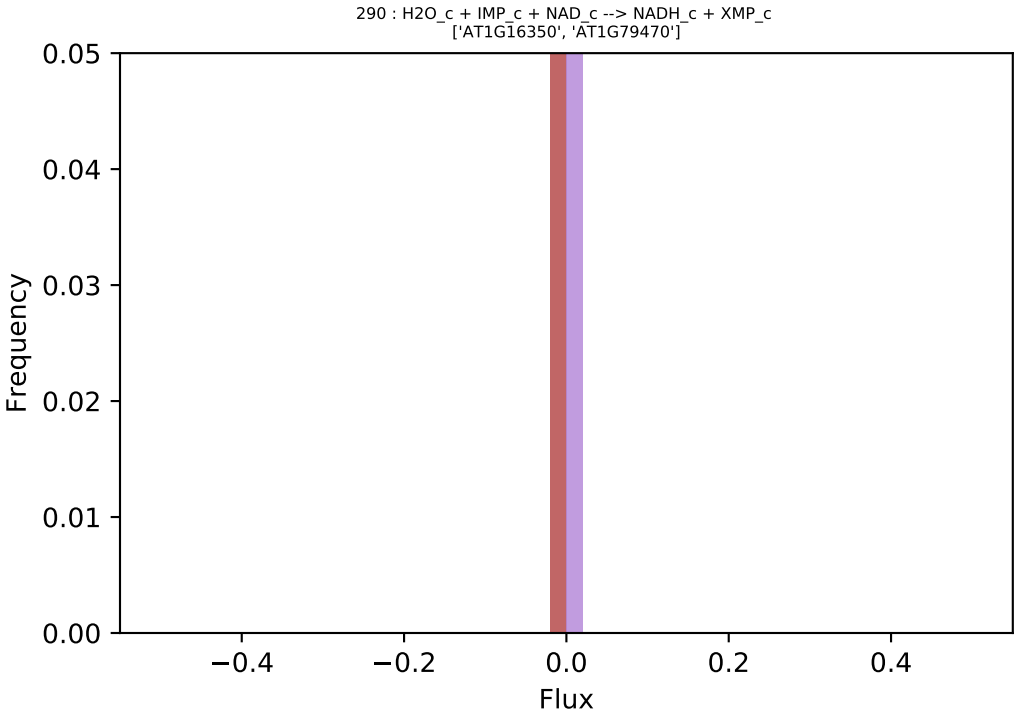

285 : ATP_h + Asp_h + CAIR_h --> ADP_h + H_h + Pi_h + SAICAR_h
['AT3G21110']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

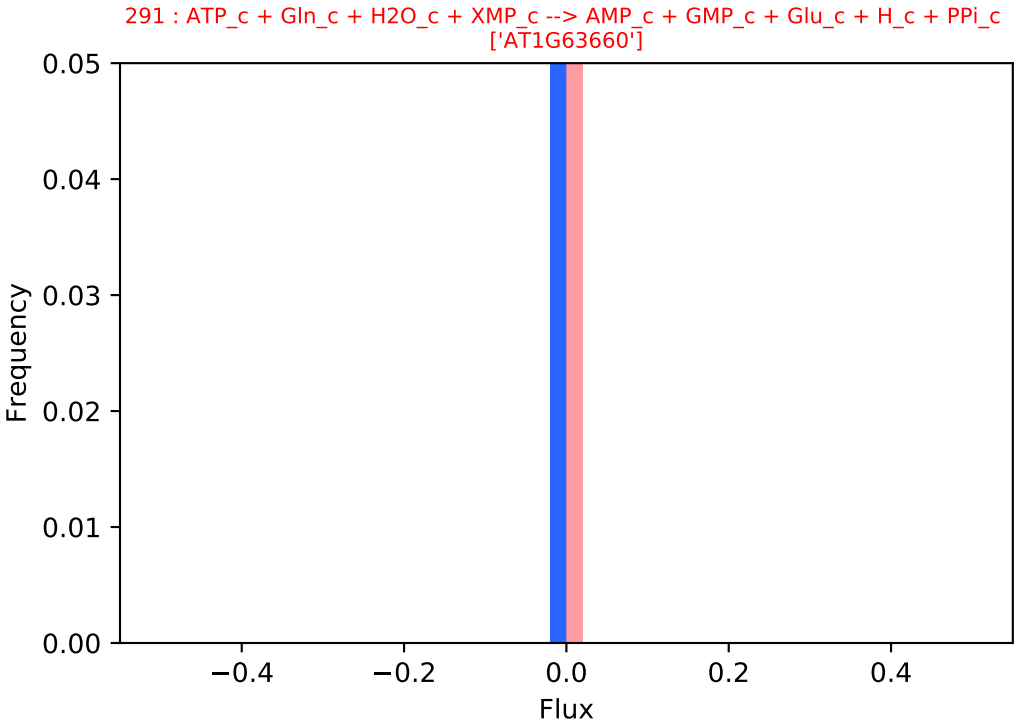

286 : H_h + SAICAR_h --> AICAR_h + Fum_h
['AT4G18440', 'AT1G36280']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

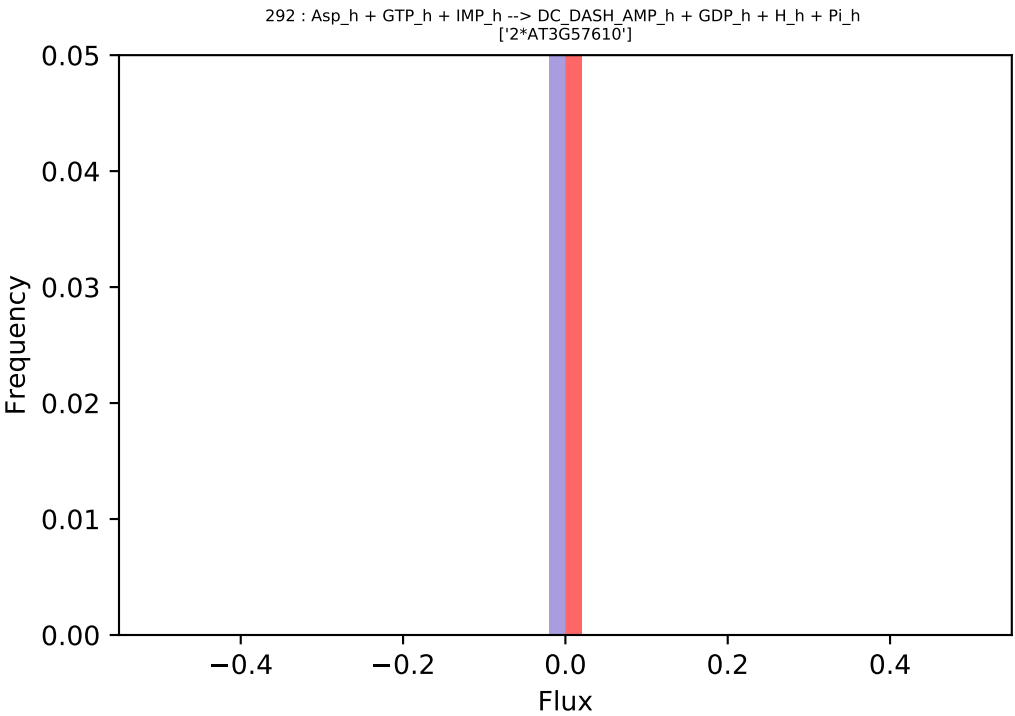

287 : AICAR_h + F_DASH_THF_h --> FAICAR_h + 2.0 H_h + THF_h
['AT2G35040']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

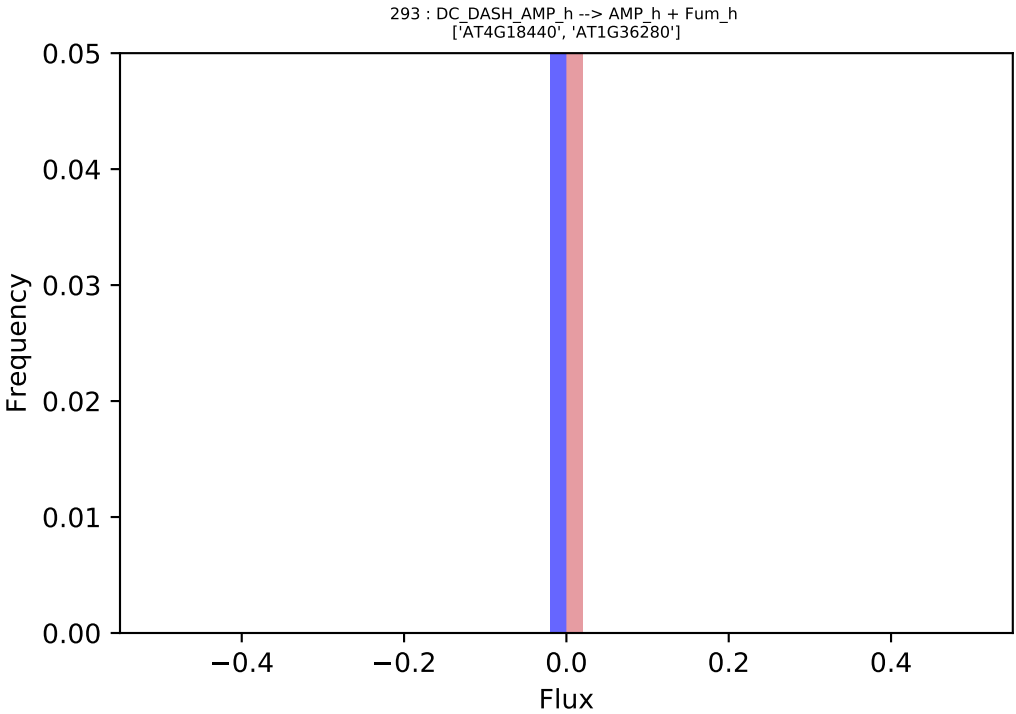

288 : FAICAR_h --> H2O_h + IMP_h
['AT2G35040']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

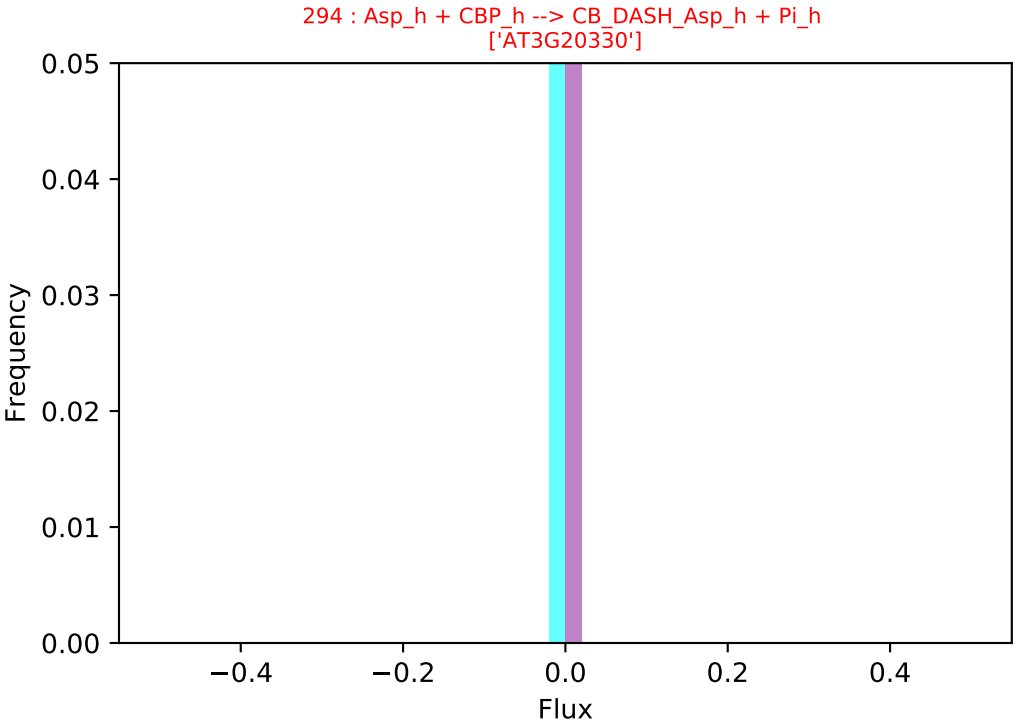

289 : AMP_c + H2O_c + H_c --> IMP_c + NH4_c
['2*AT2G38280']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

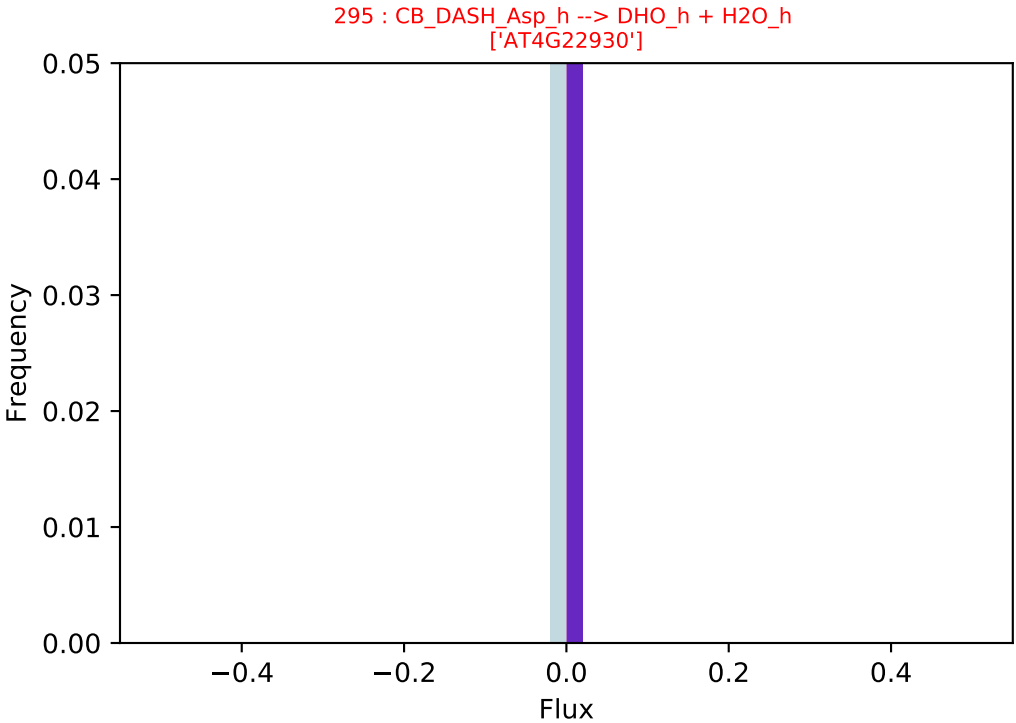

290 : H2O_c + IMP_c + NAD_c --> NADH_c + XMP_c
['AT1G16350', 'AT1G79470']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

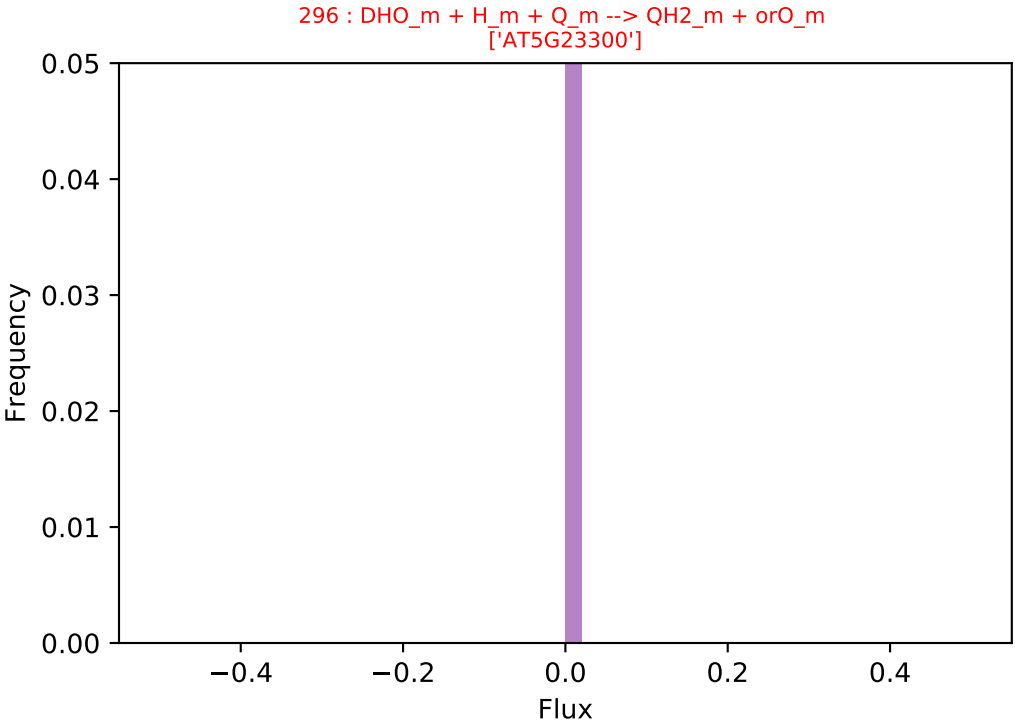

291 : ATP_c + Gln_c + H2O_c + XMP_c --> AMP_c + GMP_c + Glu_c + H_c + PPi_c
['AT1G63660']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

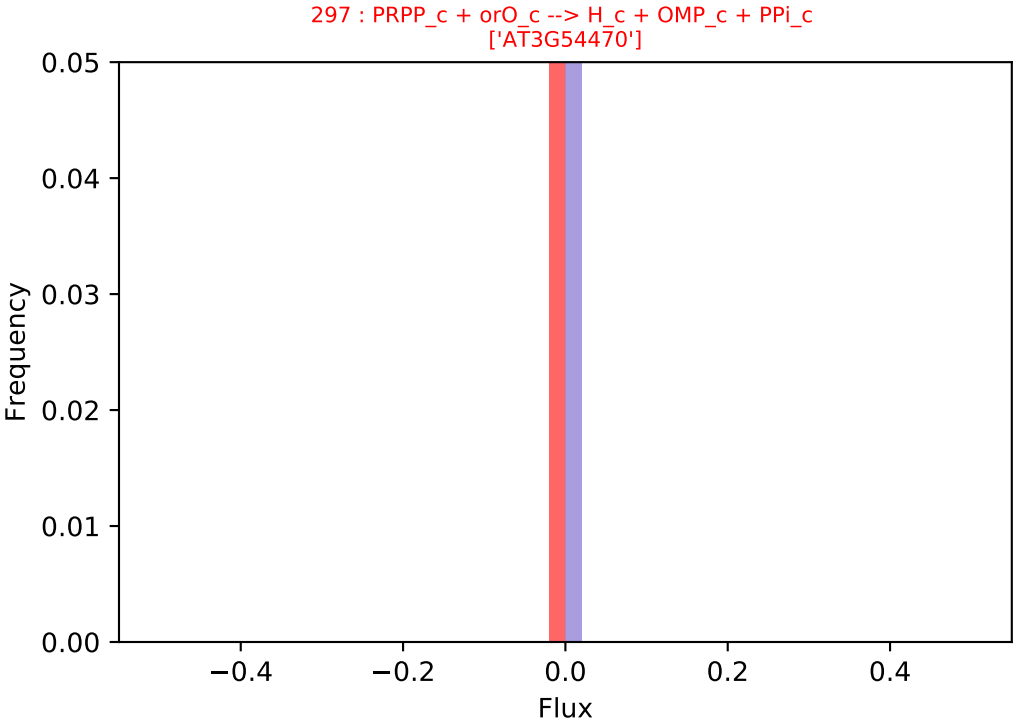

292 : Asp_h + GTP_h + IMP_h --> DC_DASH_AMP_h + GDP_h + H_h + Pi_h
['2*AT3G57610']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

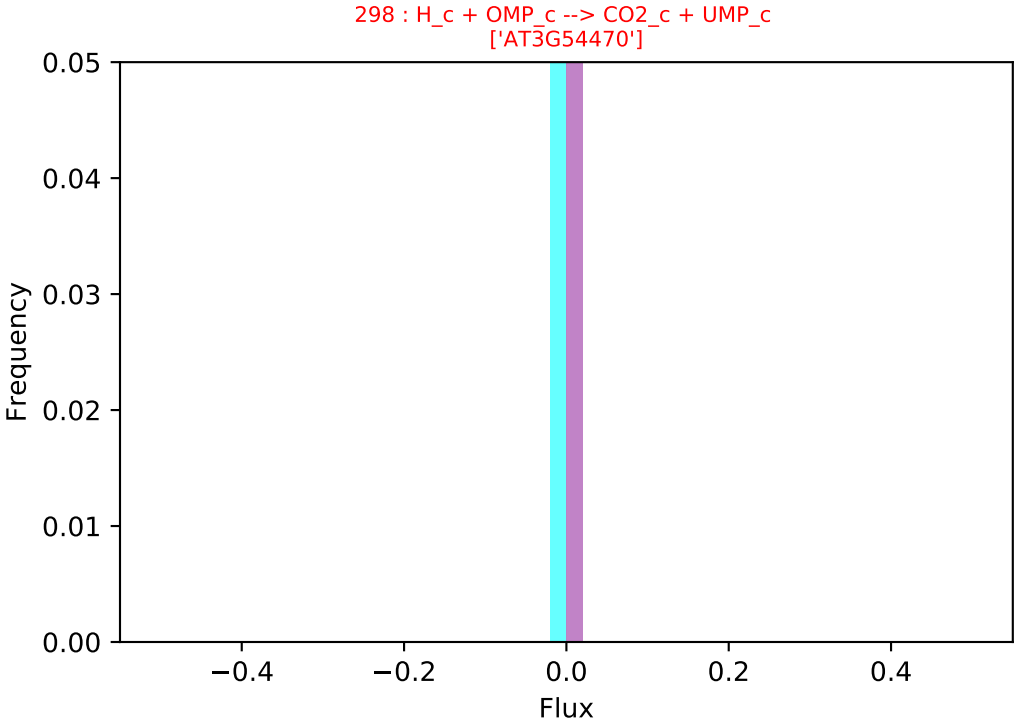

293 : DC_DASH_AMP_h --> AMP_h + Fum_h
['AT4G18440', 'AT1G36280']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

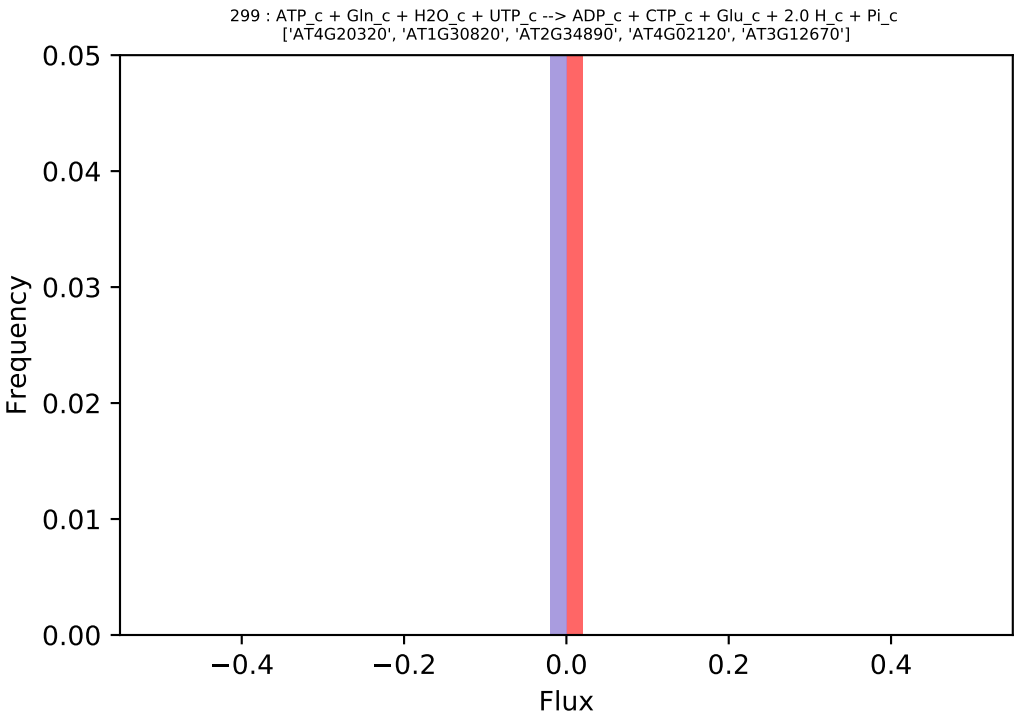

294 : Asp_h + CBP_h --> CB_DASH_Asp_h + Pi_h
['AT3G20330']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

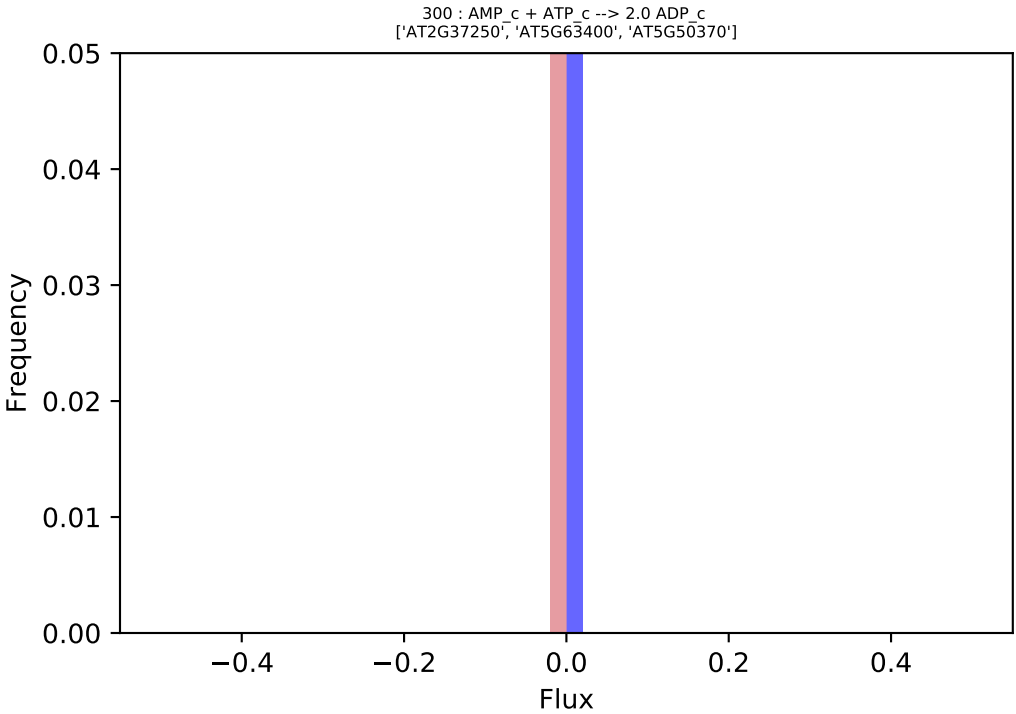

295 : CB_DASH_Asp_h --> DHO_h + H2O_h
['AT4G22930']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

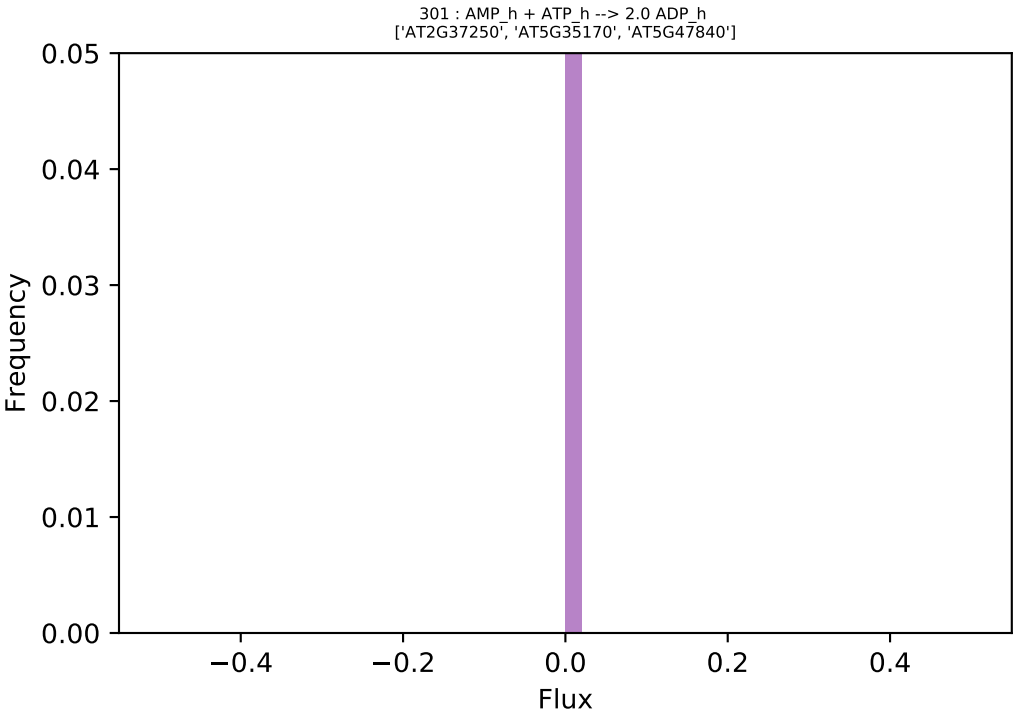

296 : DHO_m + H_m + Q_m --> QH2_m + orO_m
['AT5G23300']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

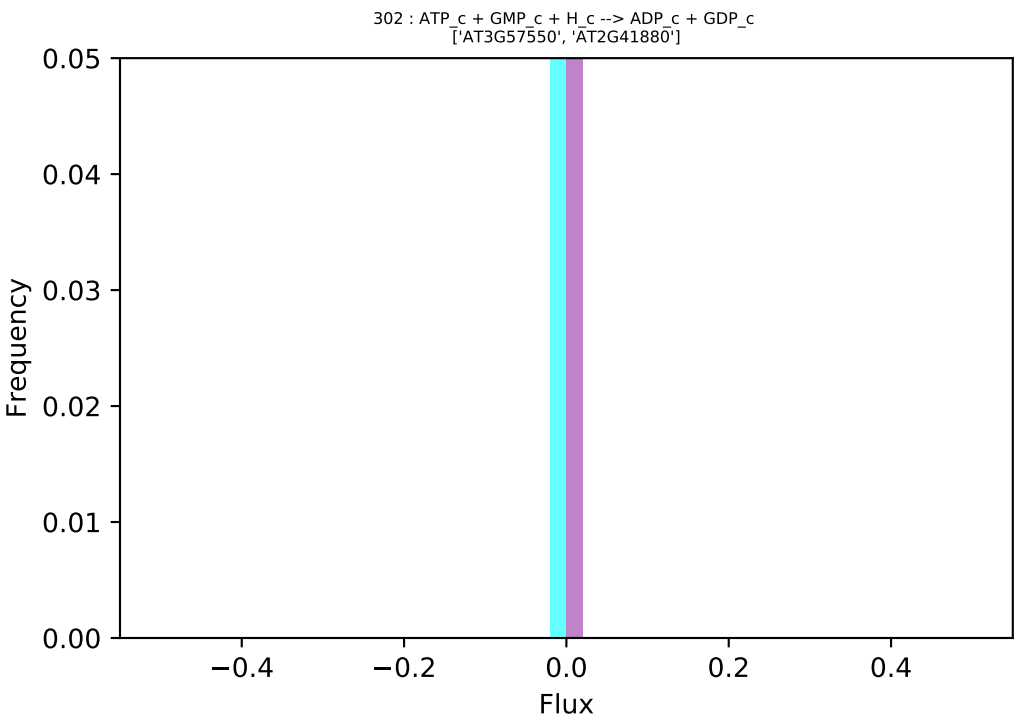

297 : PRPP_c + orO_c --> H_c + OMP_c + PPi_c
['AT3G54470']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

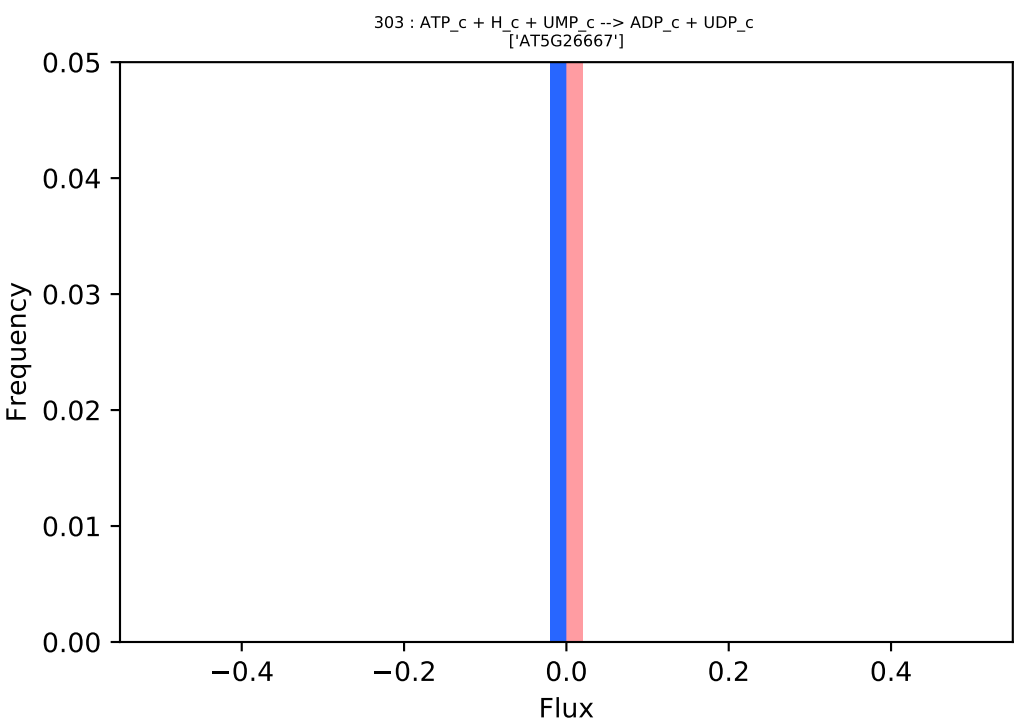

298 : H_c + OMP_c --> CO2_c + UMP_c
['AT3G54470']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

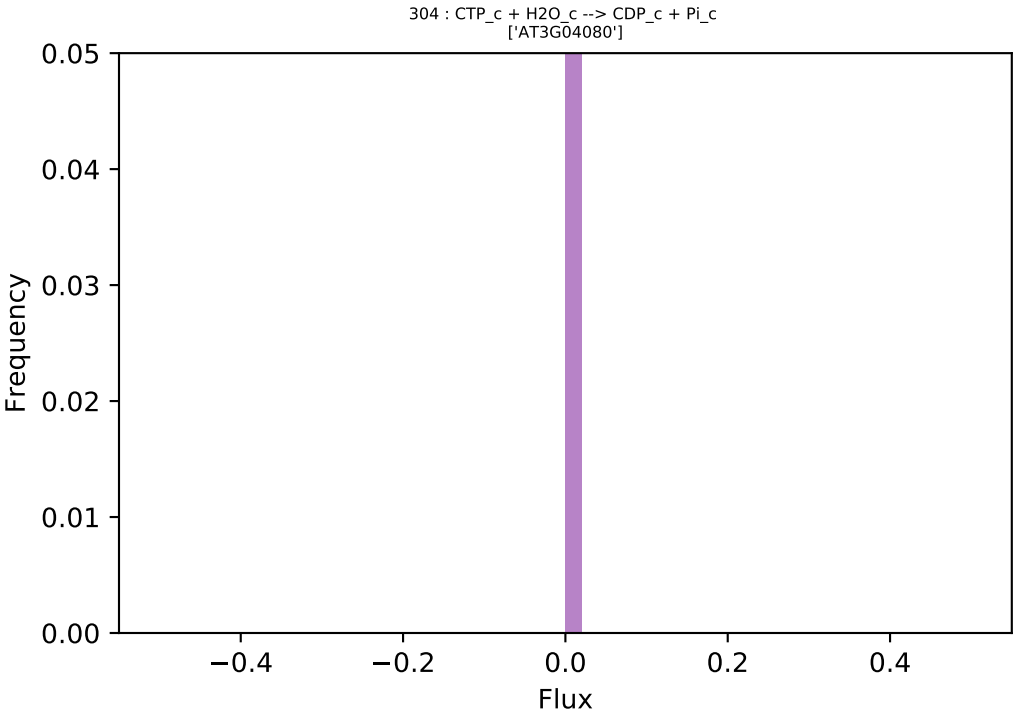

299 : ATP_c + Gln_c + H2O_c + UTP_c --> ADP_c + CTP_c + Glu_c + 2.0 H_c + Pi_c
['AT4G20320', 'AT1G30820', 'AT2G34890', 'AT4G02120', 'AT3G12670']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

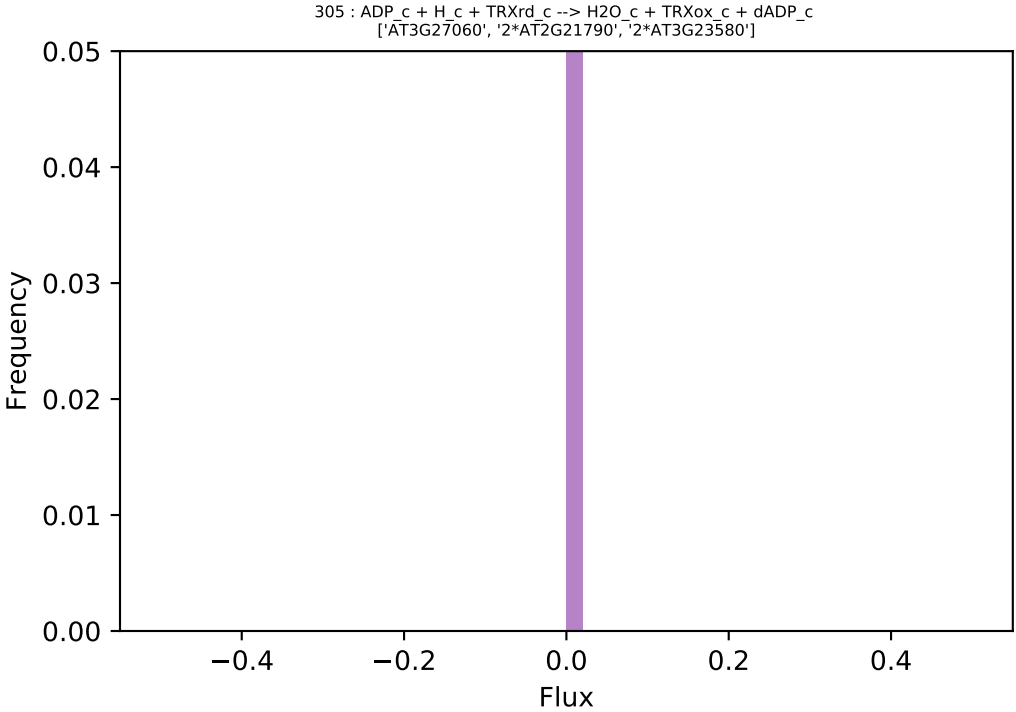

300 : AMP_c + ATP_c --> 2.0 ADP_c
['AT2G37250', 'AT5G63400', 'AT5G50370']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

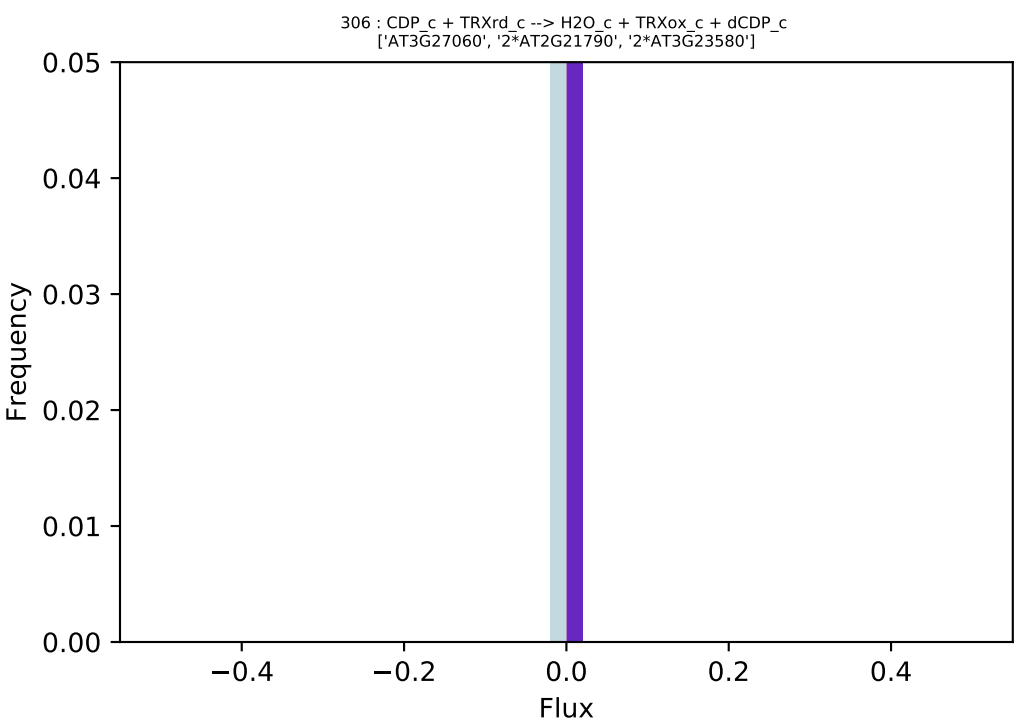

301 : AMP_h + ATP_h --> 2.0 ADP_h
['AT2G37250', 'AT5G35170', 'AT5G47840']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

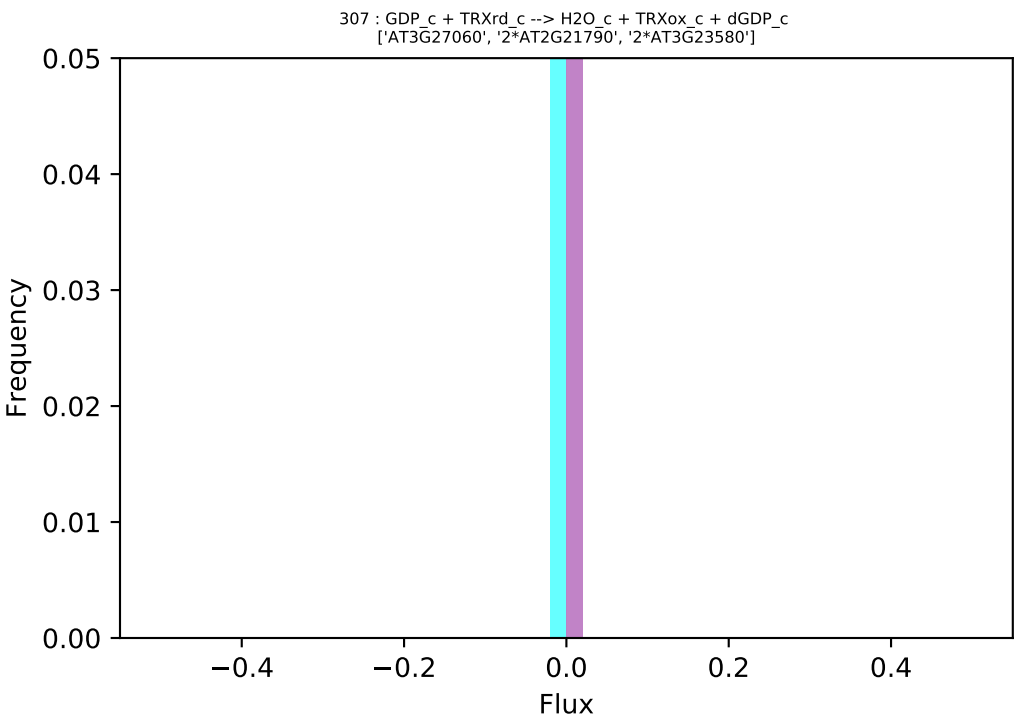

302 : ATP_c + GMP_c + H_c --> ADP_c + GDP_c
['AT3G57550', 'AT2G41880']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

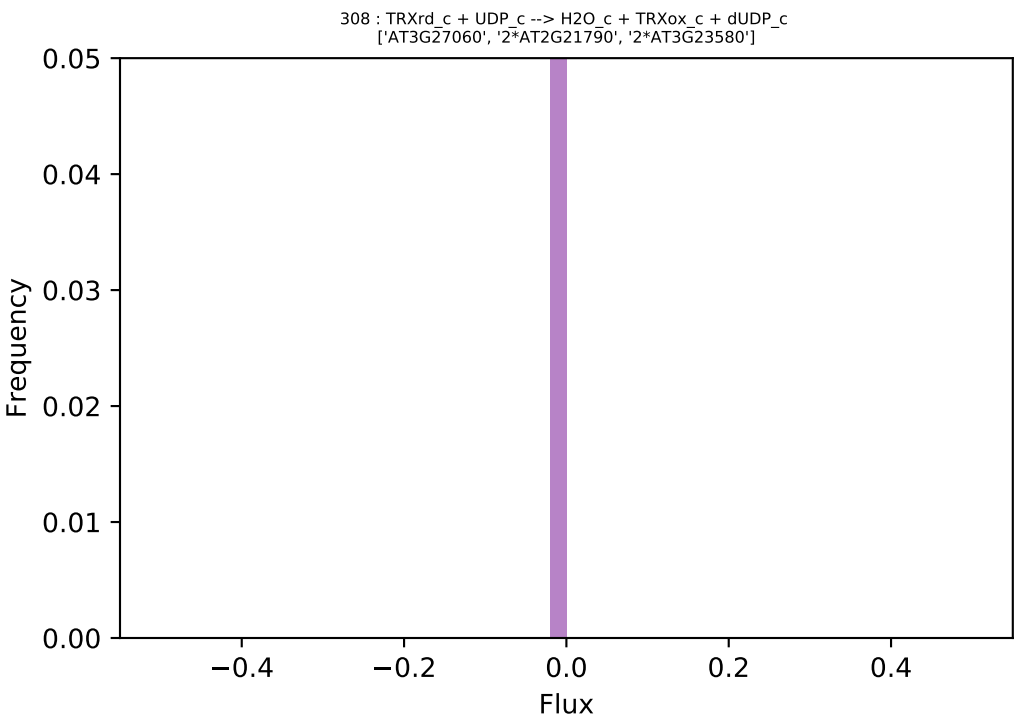

303 : ATP_c + H_c + UMP_c --> ADP_c + UDP_c
['AT5G26667']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

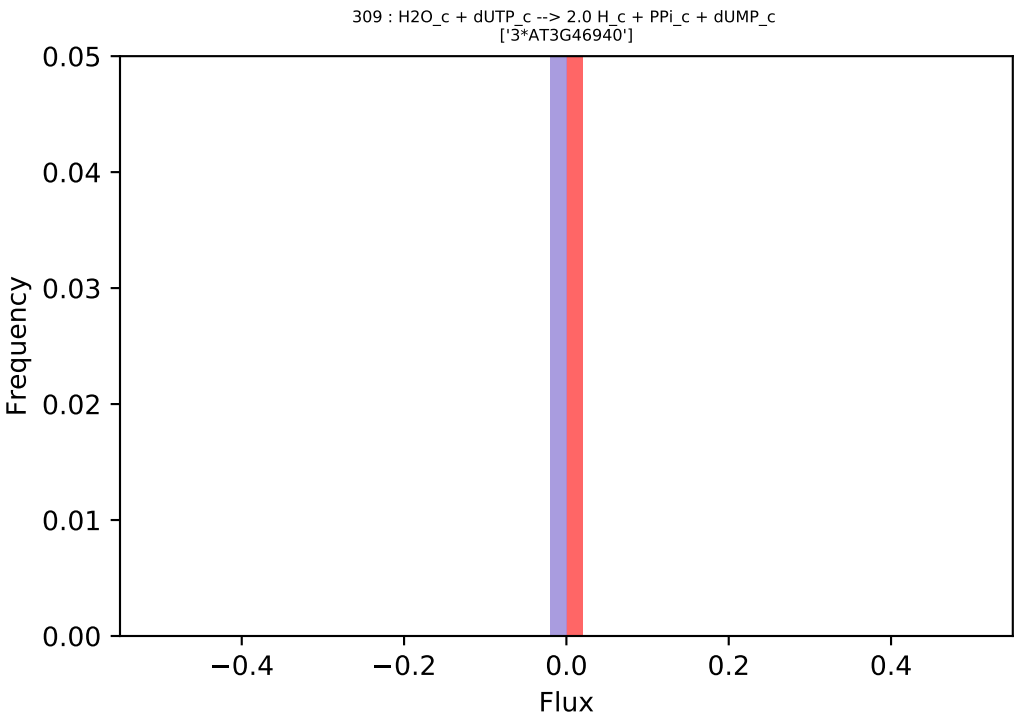

304 : CTP_c + H2O_c --> CDP_c + Pi_c
['AT3G04080']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

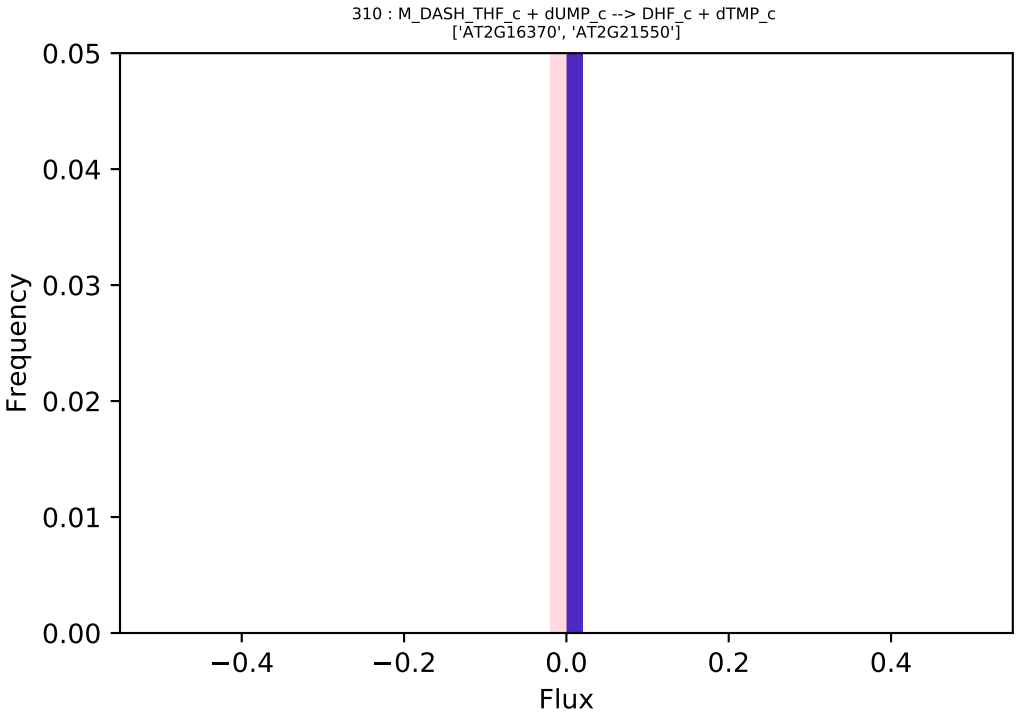

305 : ADP_c + H_c + TRXrd_c --> H2O_c + TRXox_c + dADP_c
['AT3G27060', '2*AT2G21790', '2*AT3G23580']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

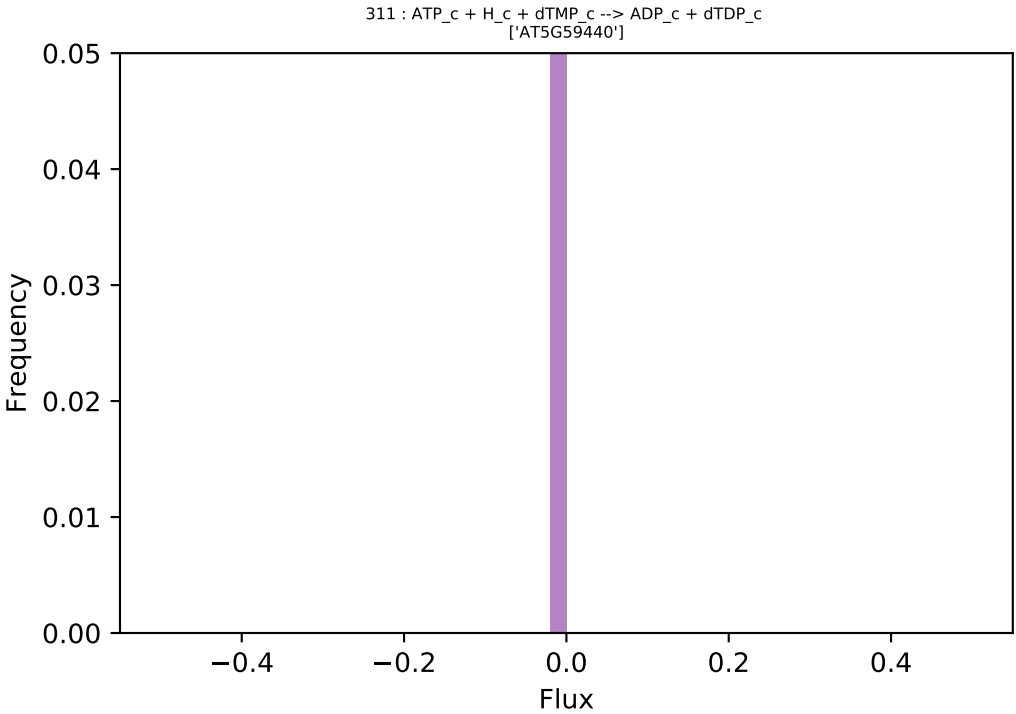

306 : CDP_c + TRXrd_c --> H2O_c + TRXox_c + dCDP_c
['AT3G27060', '2*AT2G21790', '2*AT3G23580']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

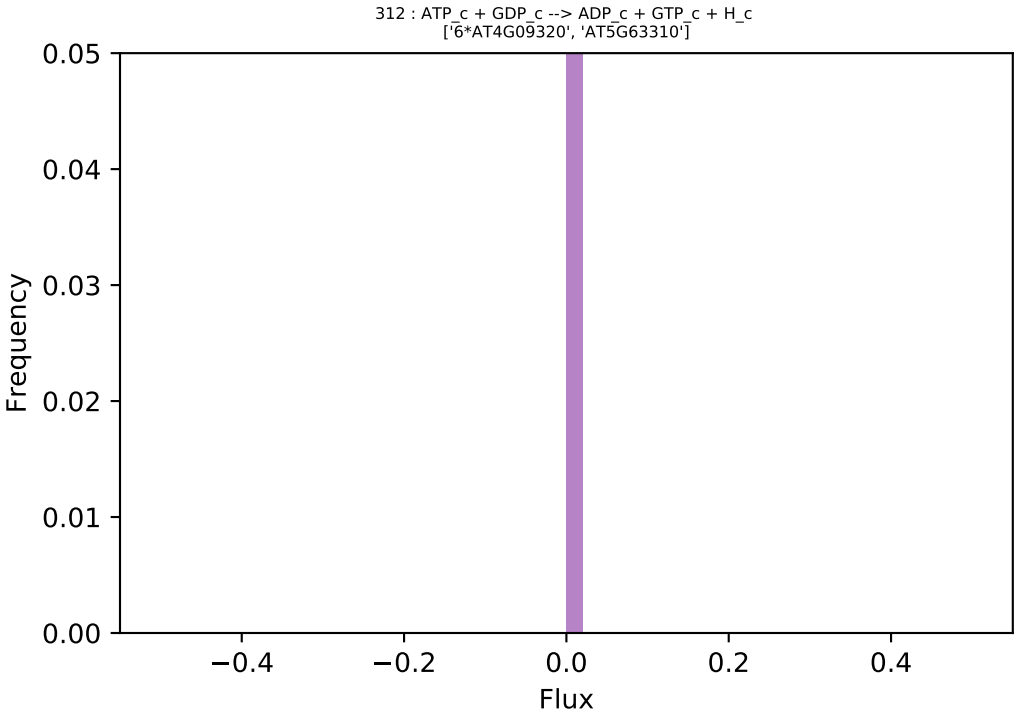

307 : GDP_c + TRXrd_c --> H2O_c + TRXox_c + dGDP_c
['AT3G27060', '2*AT2G21790', '2*AT3G23580']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

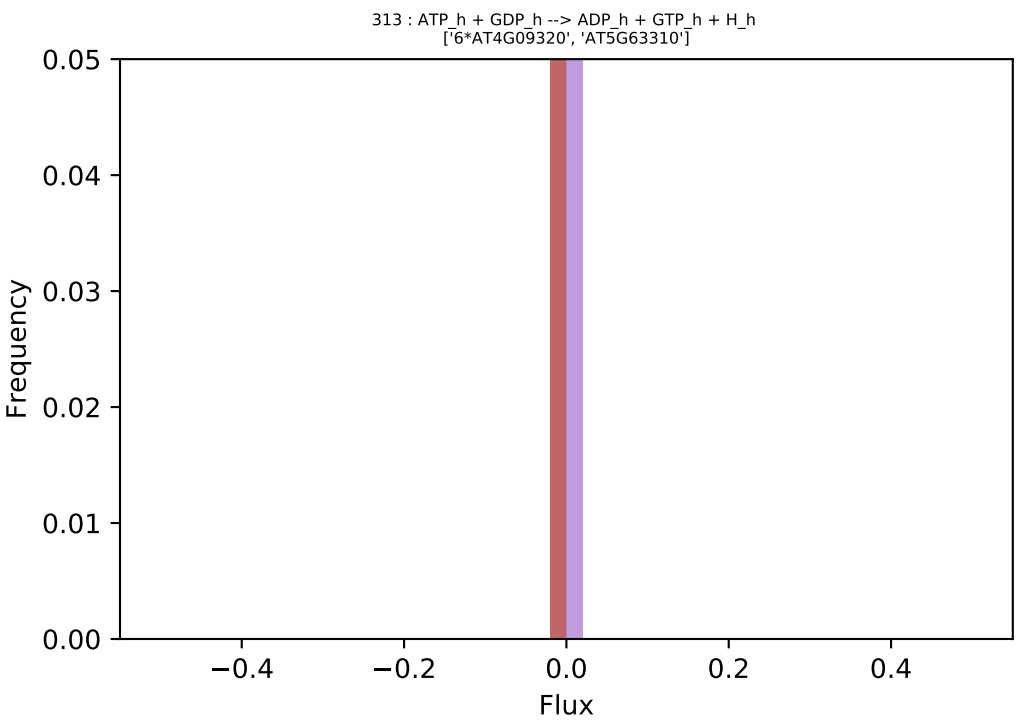

308 : TRXrd_c + UDP_c --> H2O_c + TRXox_c + dUDP_c
['AT3G27060', '2*AT2G21790', '2*AT3G23580']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

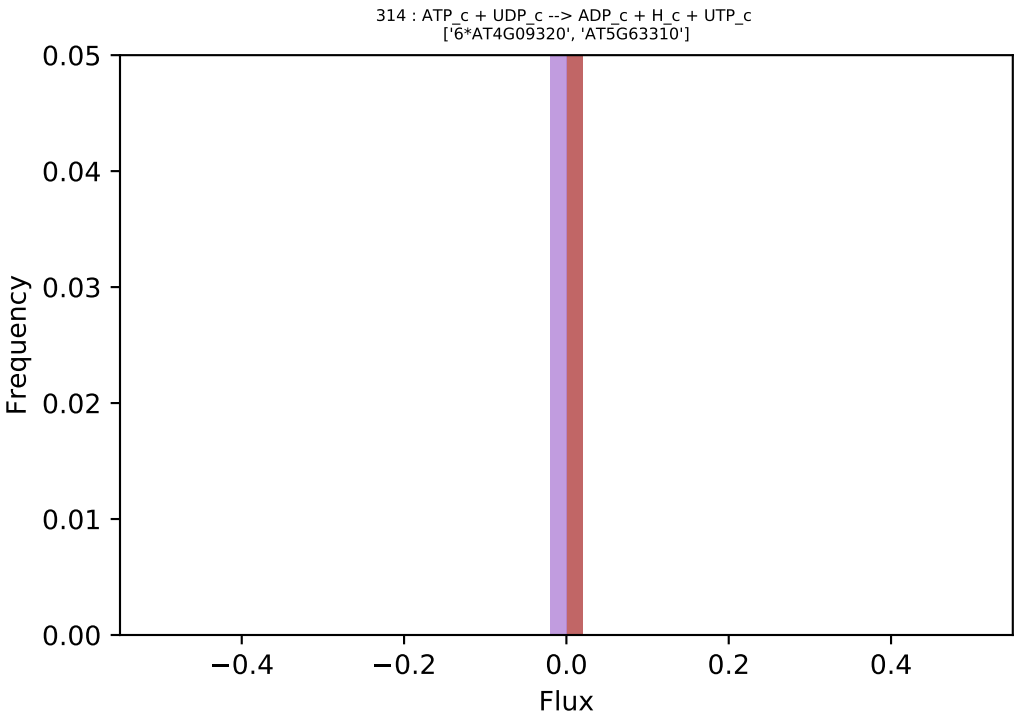

309 : H2O_c + dUTP_c --> 2.0 H_c + PPi_c + dUMP_c
['3*AT3G46940']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

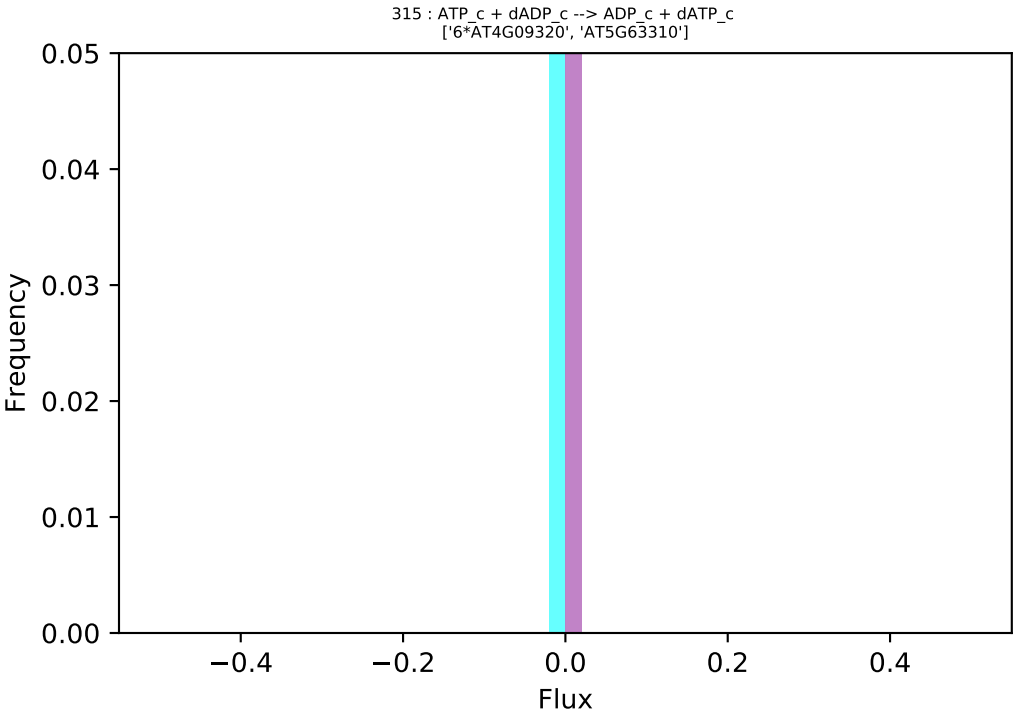

310 : M_DASH_THF_c + dUMP_c --> DHF_c + dTMP_c
['AT2G16370', 'AT2G21550']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

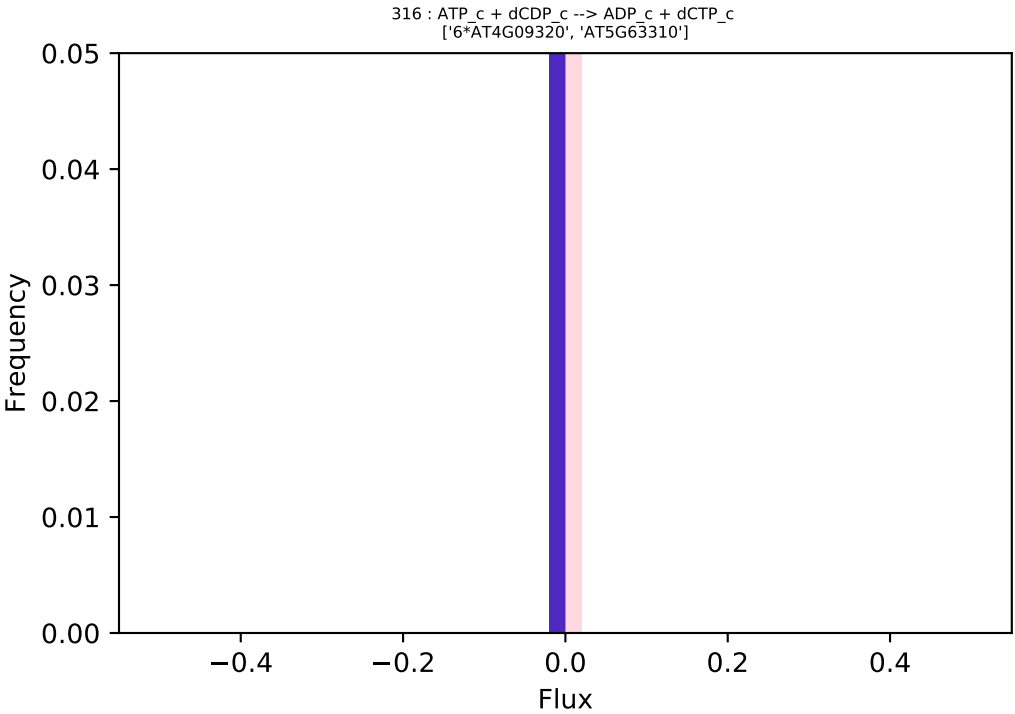

311 : ATP_c + H_c + dTMP_c --> ADP_c + dTDP_c
['AT5G59440']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

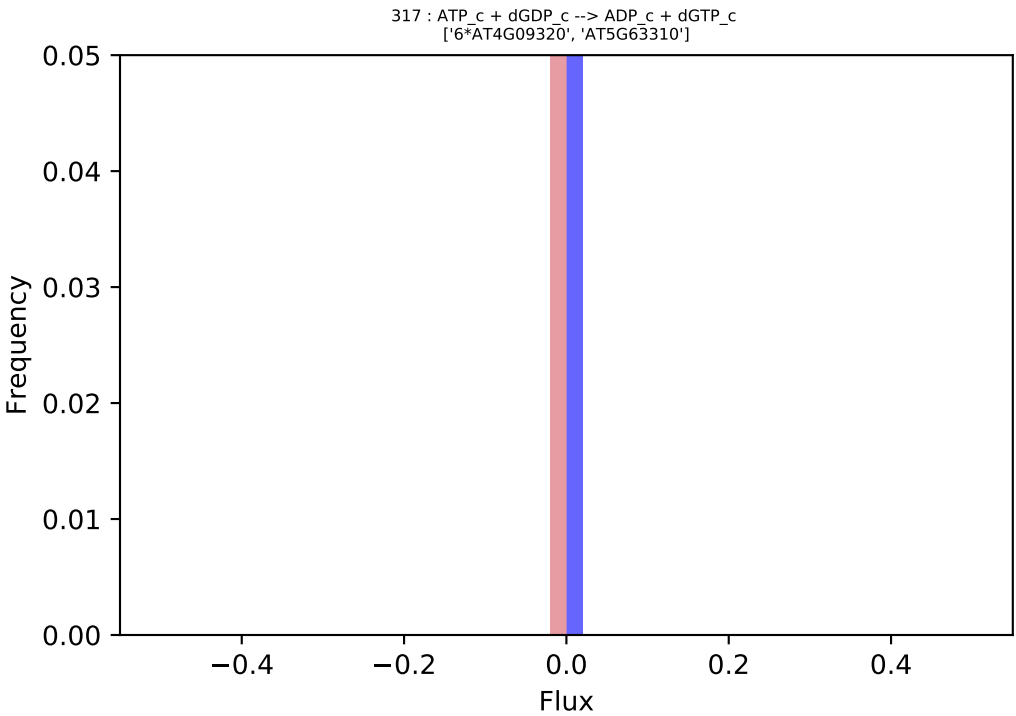

312 : ATP_c + GDP_c --> ADP_c + GTP_c + H_c
['6*AT4G09320', 'AT5G63310']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

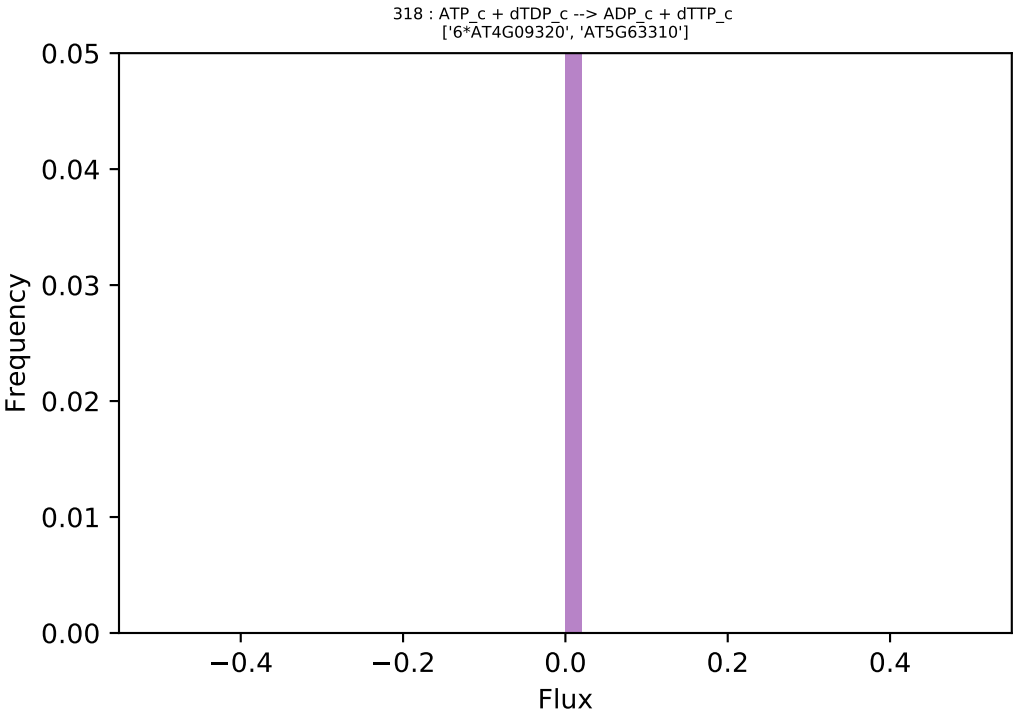

313 : ATP_h + GDP_h --> ADP_h + GTP_h + H_h
['6*AT4G09320', 'AT5G63310']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

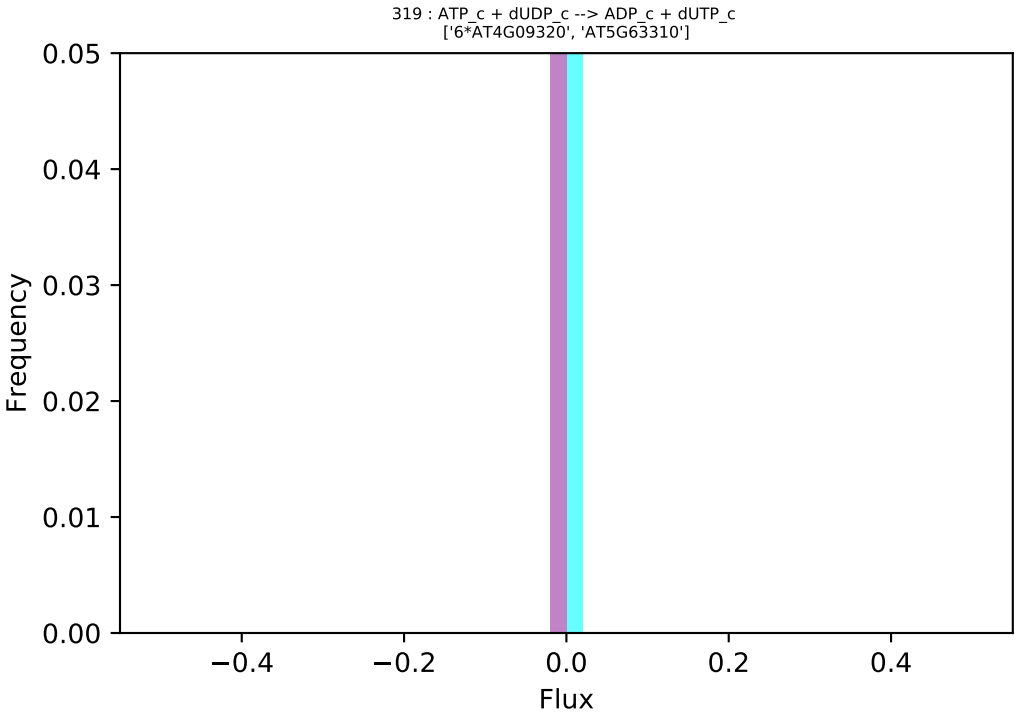

314 : ATP_c + UDP_c --> ADP_c + H_c + UTP_c
['6*AT4G09320', 'AT5G63310']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

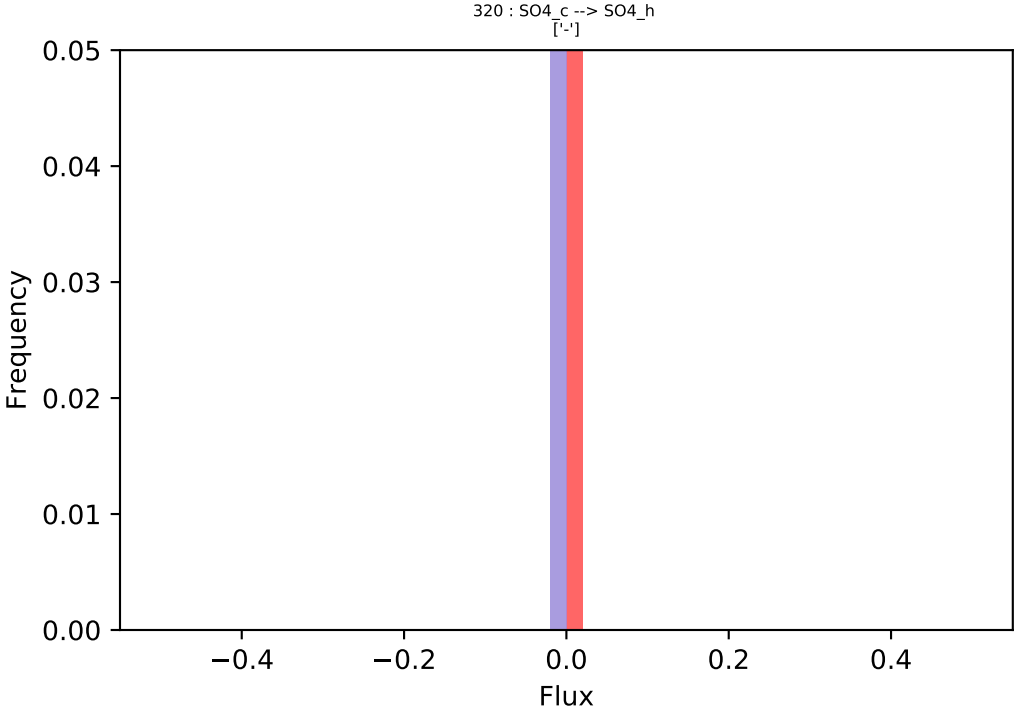

315 : ATP_c + dADP_c --> ADP_c + dATP_c
['6*AT4G09320', 'AT5G63310']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

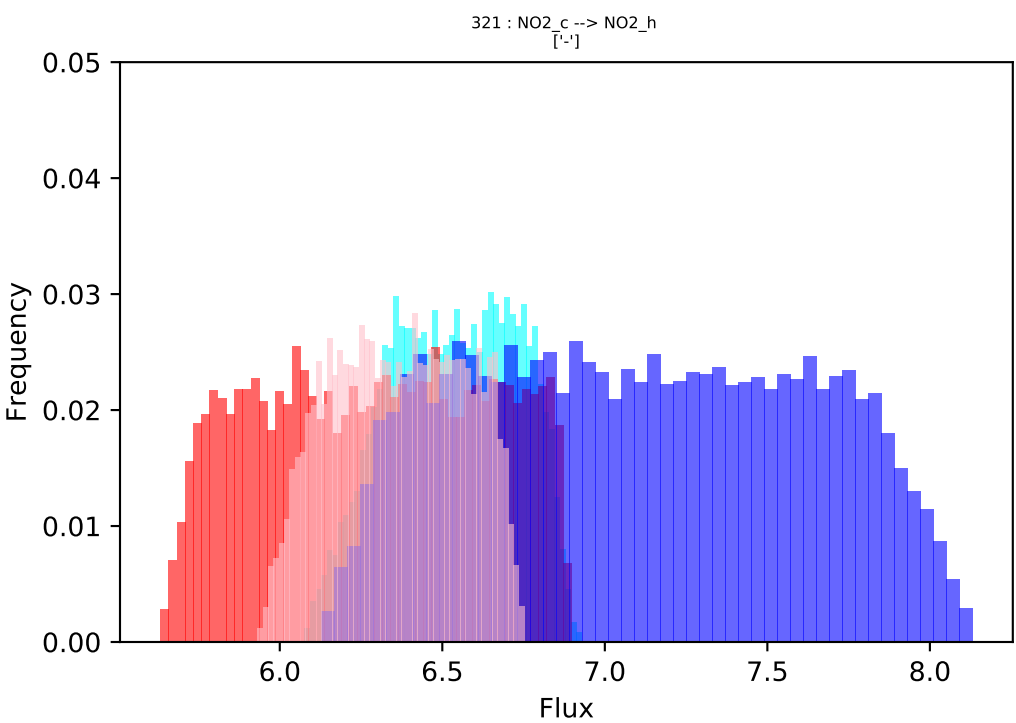

316 : ATP_c + dCDP_c --> ADP_c + dCTP_c
['6*AT4G09320', 'AT5G63310']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

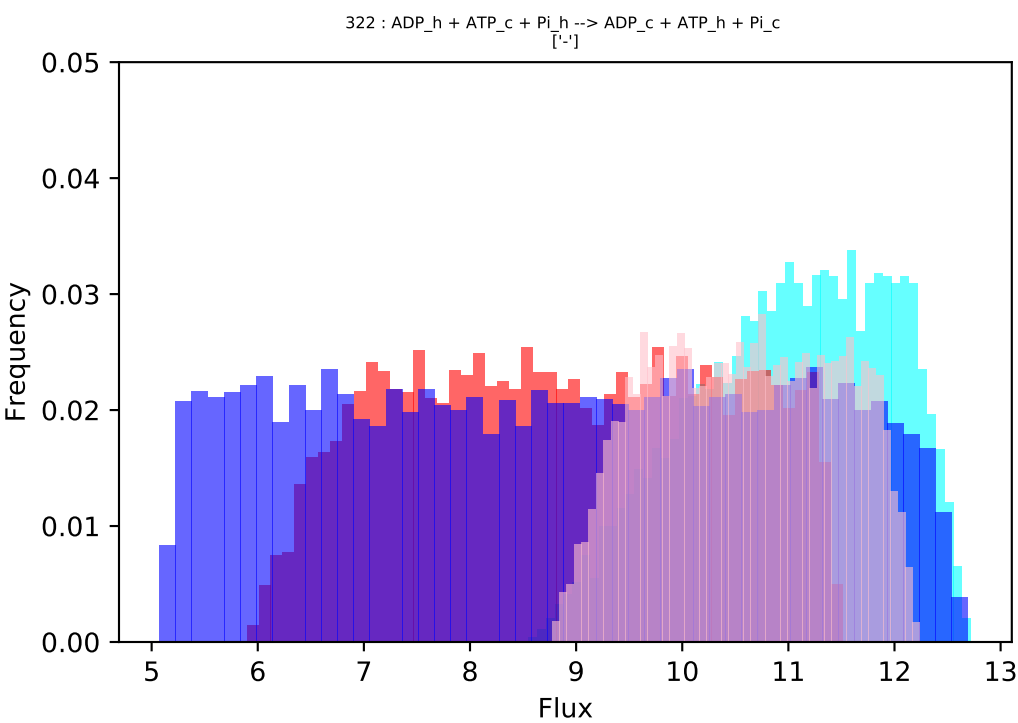

317 : ATP_c + dGDP_c --> ADP_c + dGTP_c
['6*AT4G09320', 'AT5G63310']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

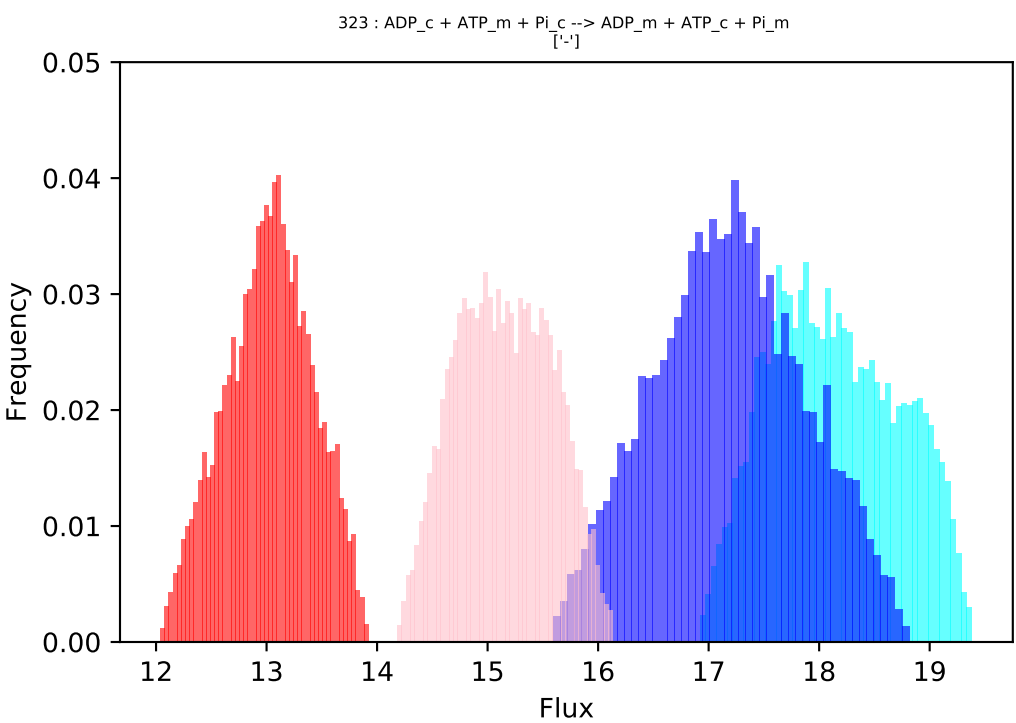

318 : ATP_c + dTDP_c --> ADP_c + dTTP_c
['6*AT4G09320', 'AT5G63310']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

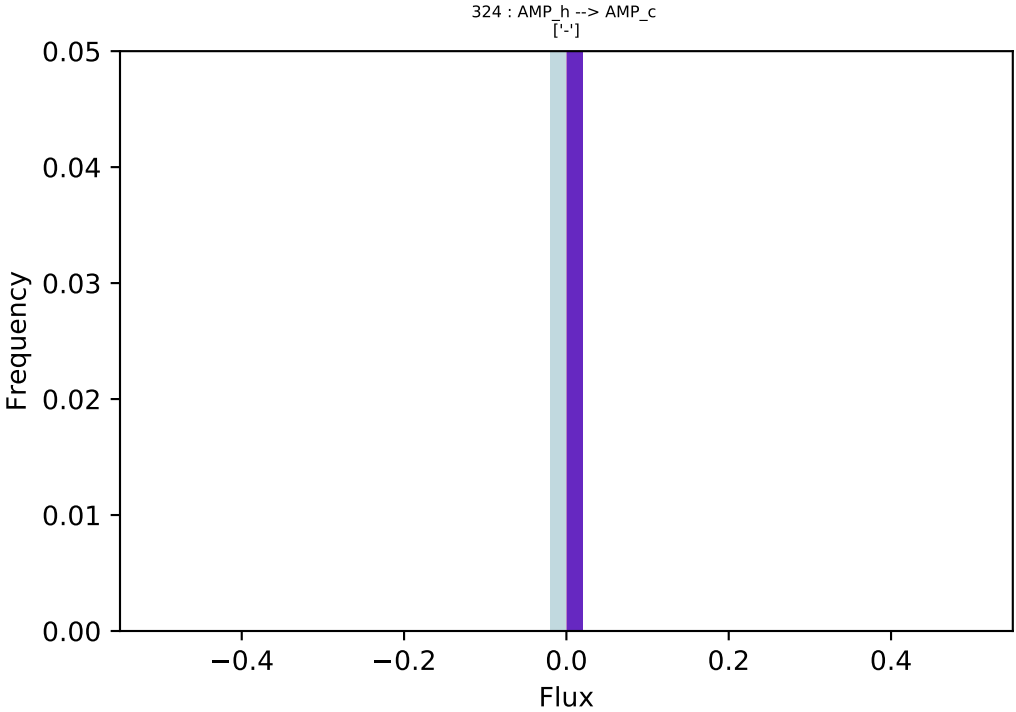

319 : ATP_c + dUDP_c --> ADP_c + dUTP_c
['6*AT4G09320', 'AT5G63310']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

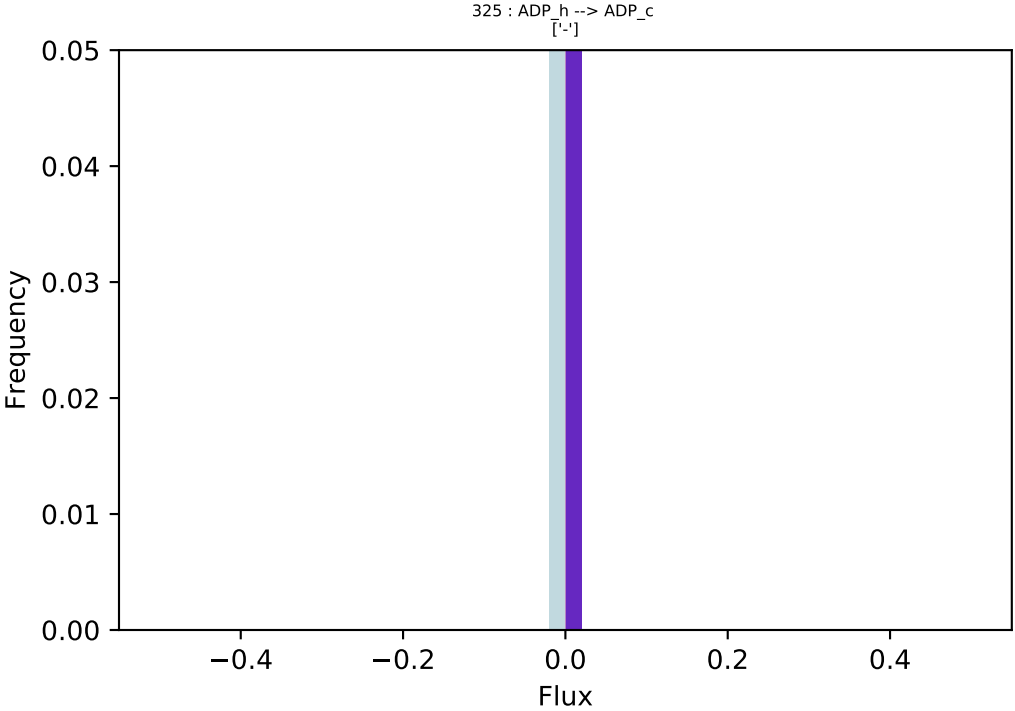

320 : SO4_c --> SO4_h
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

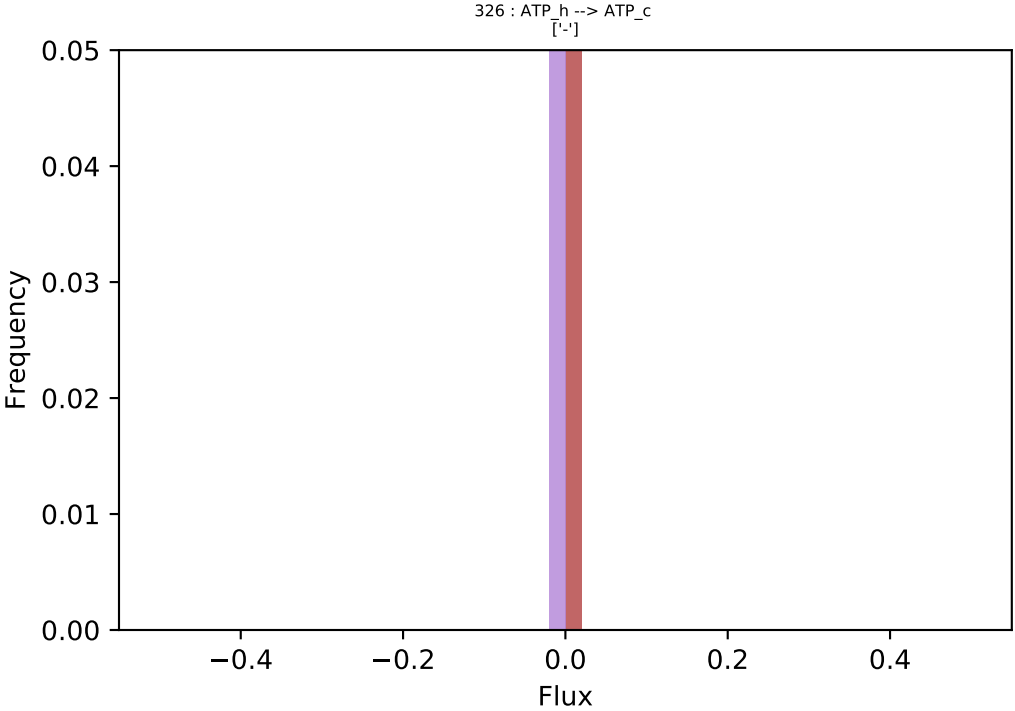

321 : NO2_c --> NO2_h
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
6.0
6.5
7.0
7.5
8.0
Flux

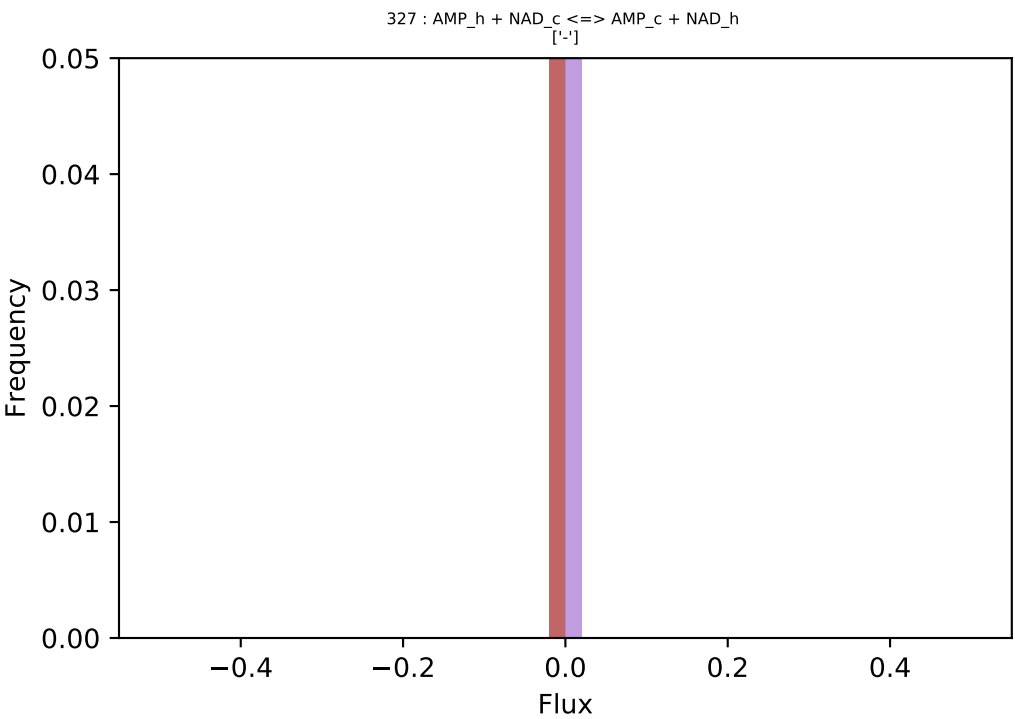

322 : ADP_h + ATP_c + Pi_h --> ADP_c + ATP_h + Pi_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
5
6
7
8
9
10
11
12
13
Flux

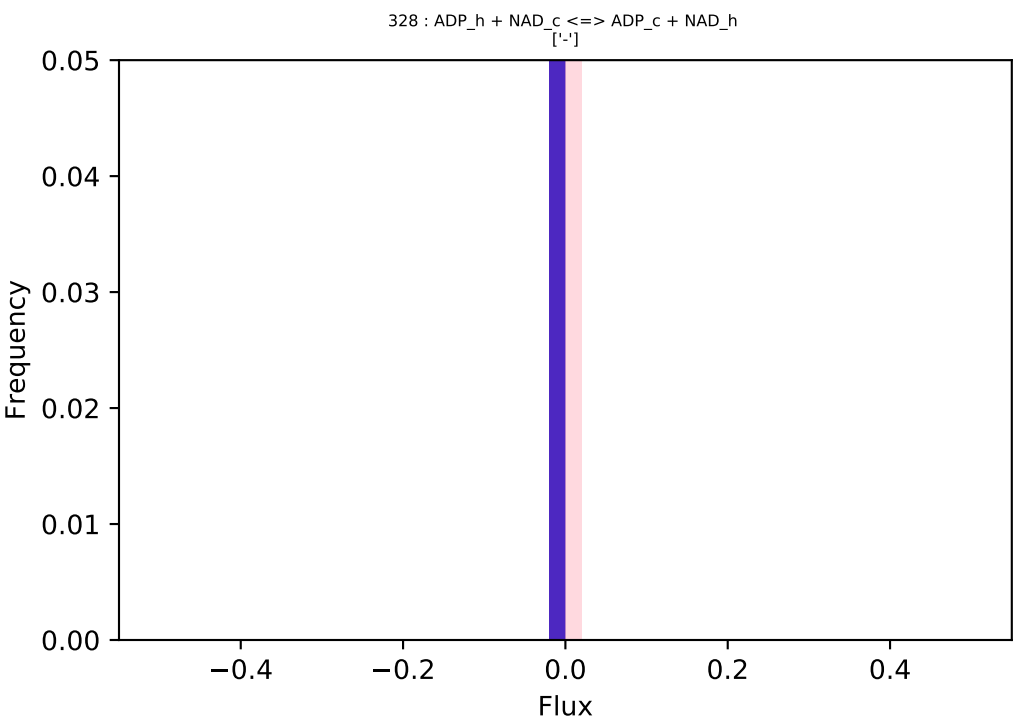

323 : ADP_c + ATP_m + Pi_c --> ADP_m + ATP_c + Pi_m
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
12
13
14
15
16
17
18
19
Flux

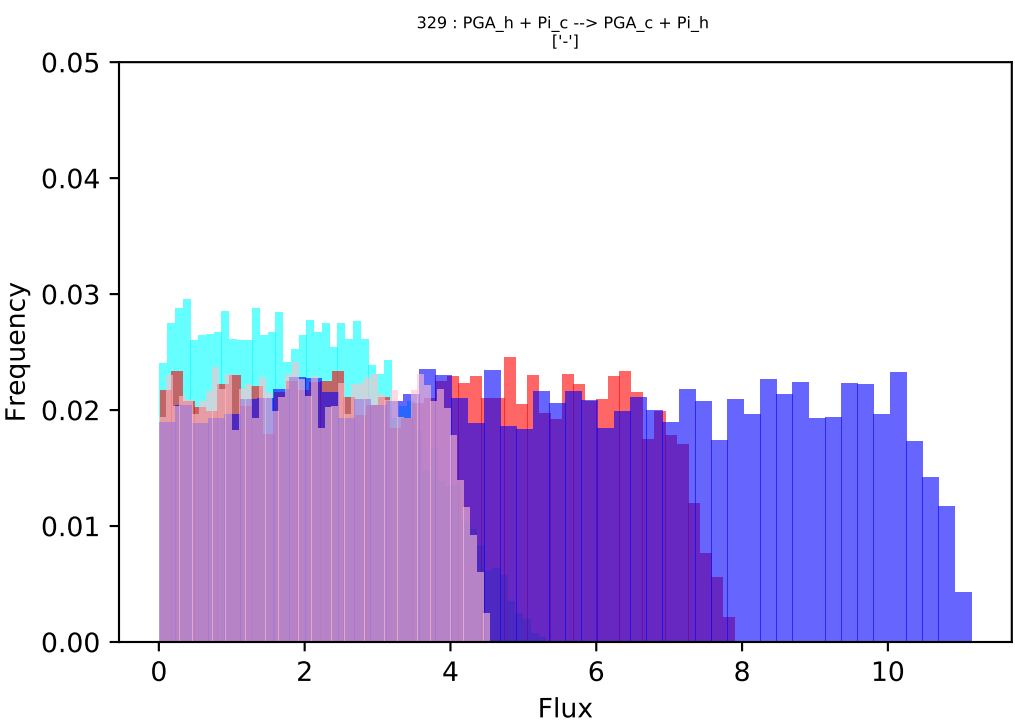

324 : AMP_h --> AMP_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

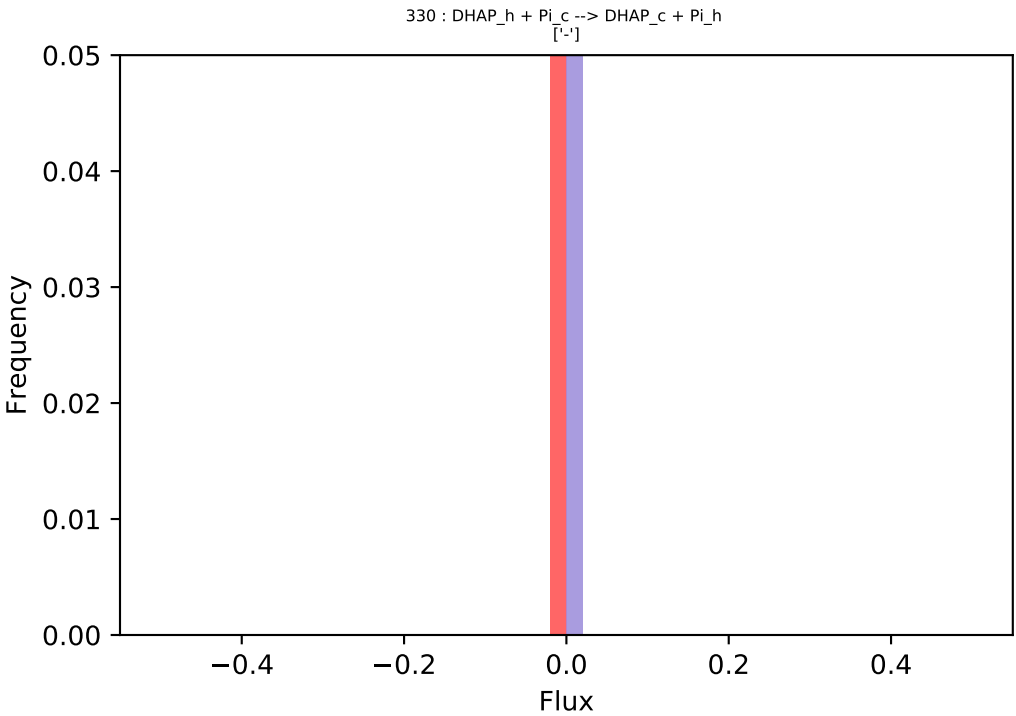

325 : ADP_h --> ADP_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

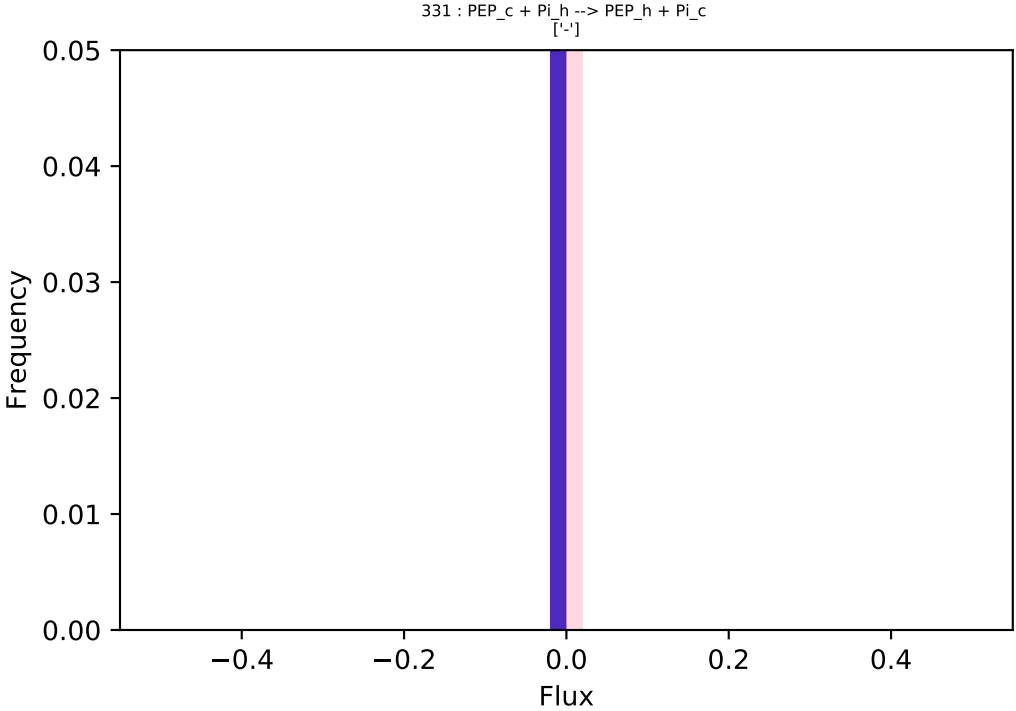

326 : ATP_h --> ATP_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

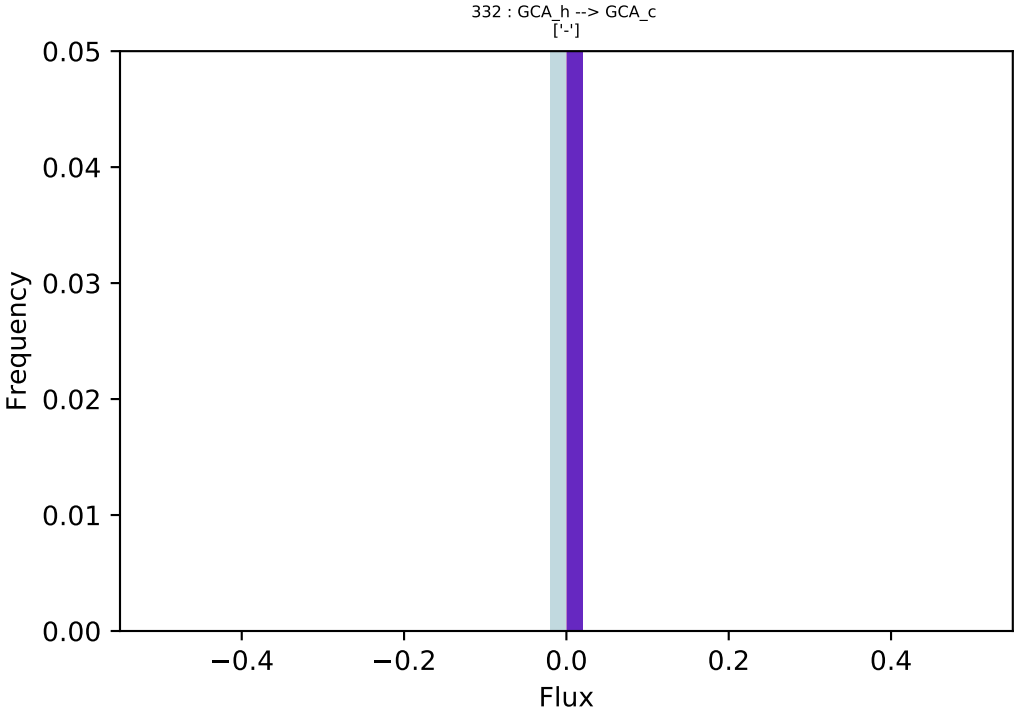

327 : AMP_h + NAD_c <=> AMP_c + NAD_h
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

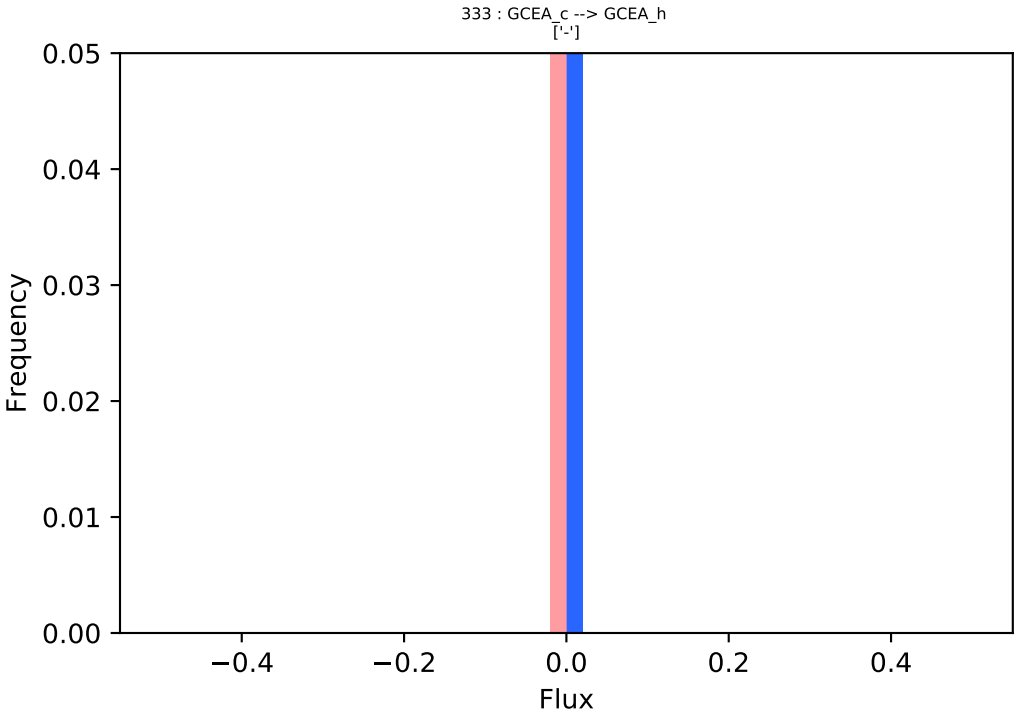

328 : ADP_h + NAD_c <=> ADP_c + NAD_h
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

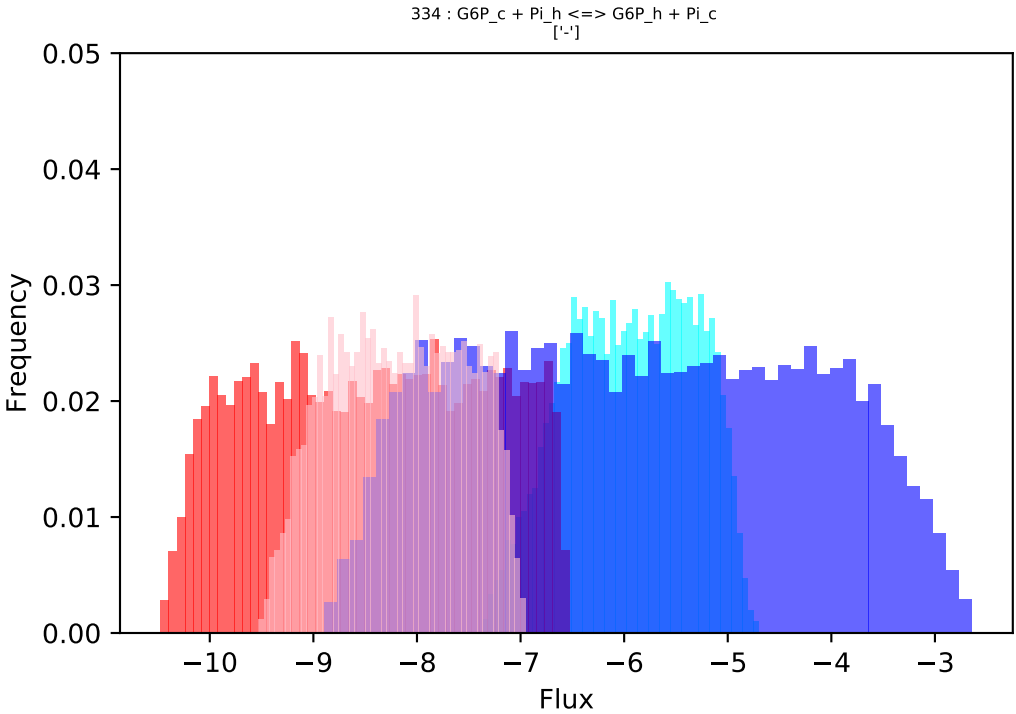

329 : PGA_h + Pi_c --> PGA_c + Pi_h
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
0
2
4
6
8
10
Flux

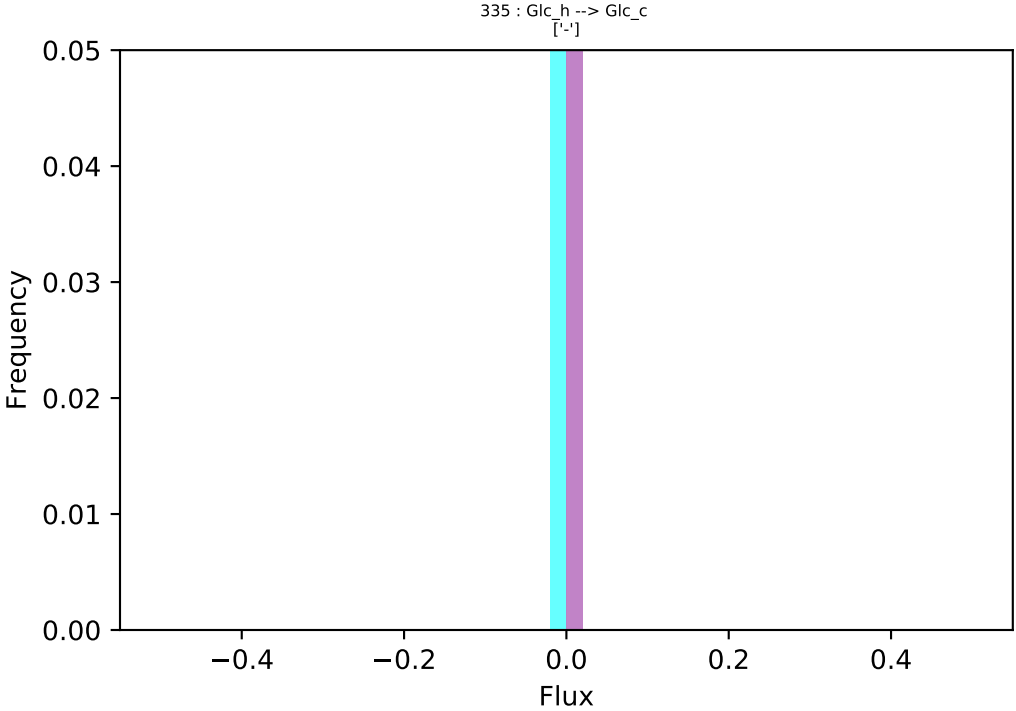

330 : DHAP_h + Pi_c --> DHAP_c + Pi_h
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

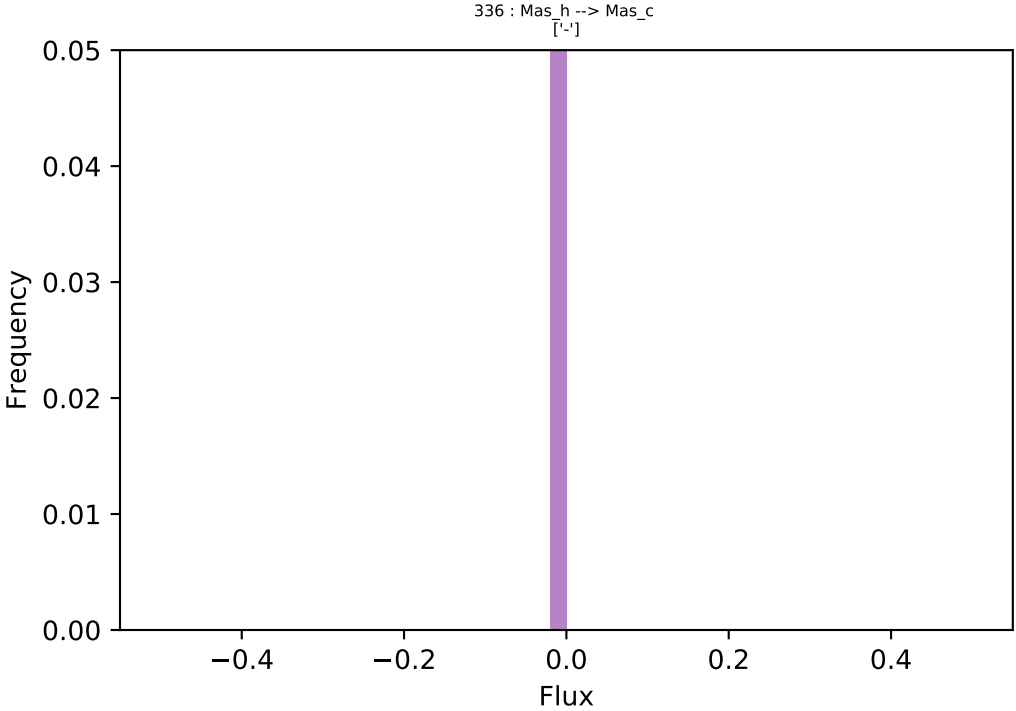

331 : PEP_c + Pi_h --> PEP_h + Pi_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

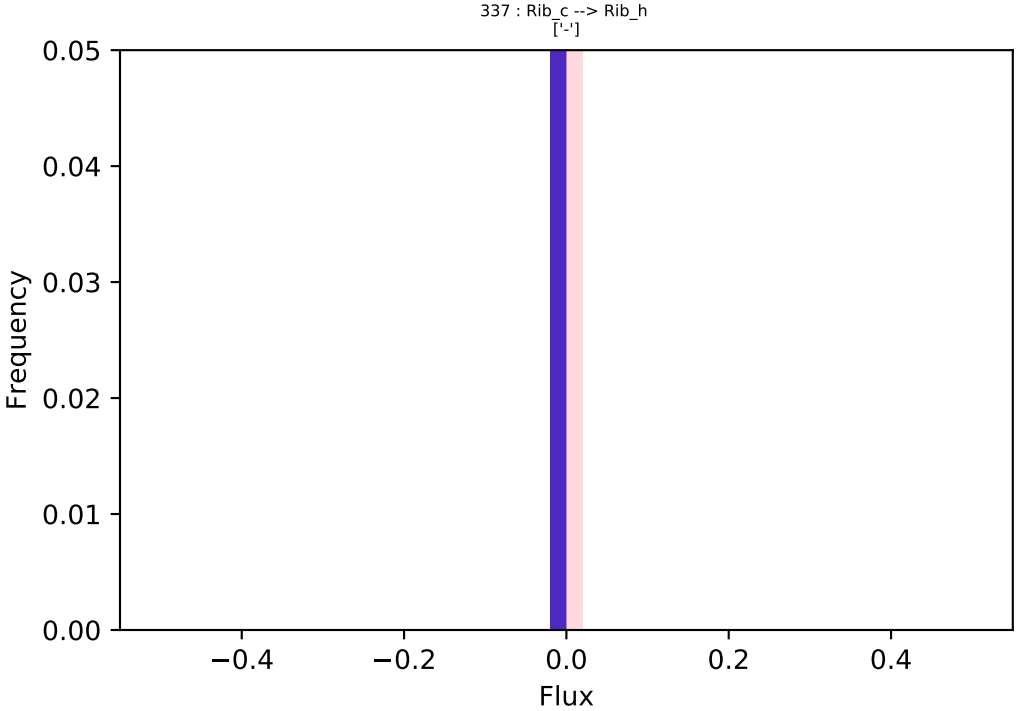

332 : GCA_h --> GCA_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

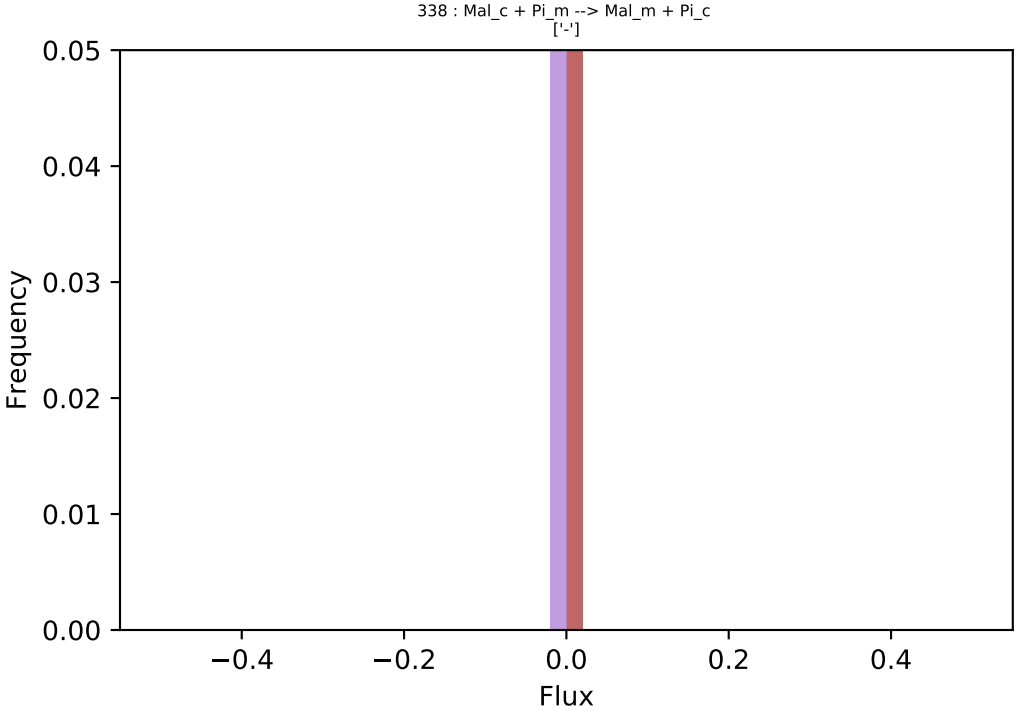

333 : GCEA_c --> GCEA_h
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

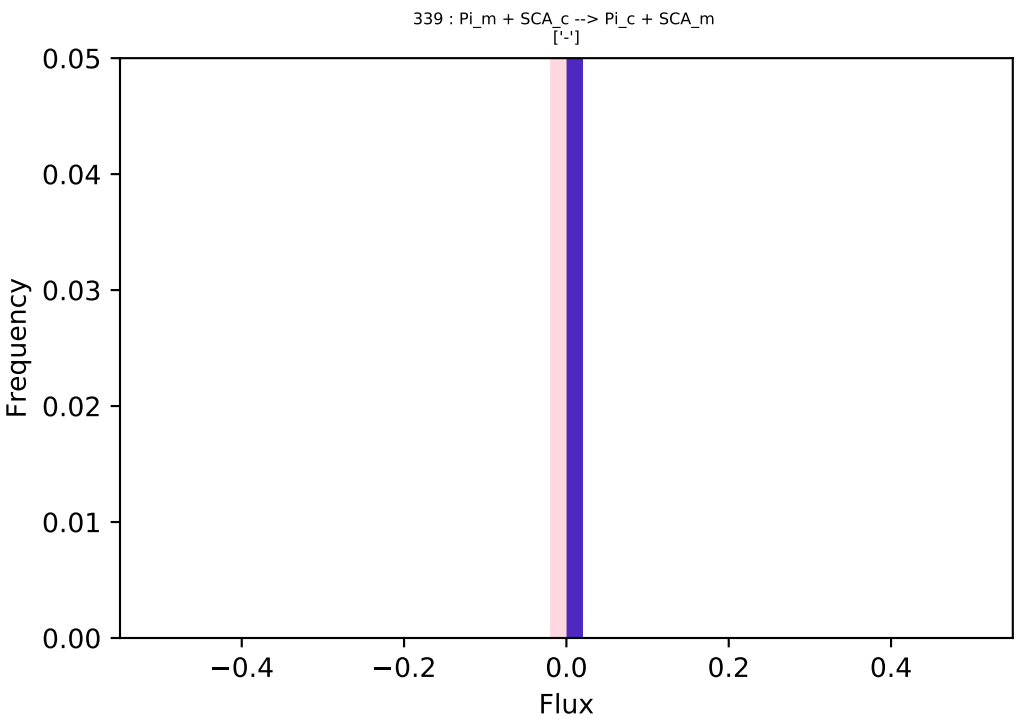

334 : G6P_c + Pi_h <=> G6P_h + Pi_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−10
−9
−8
−7
−6
−5
−4
−3
Flux

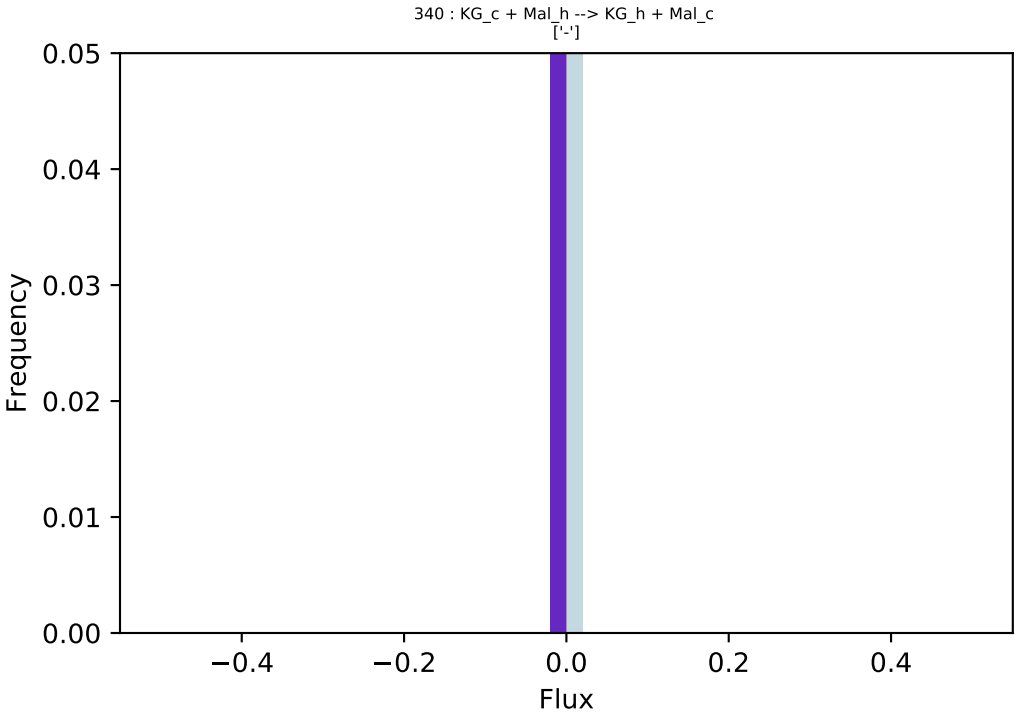

335 : Glc_h --> Glc_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

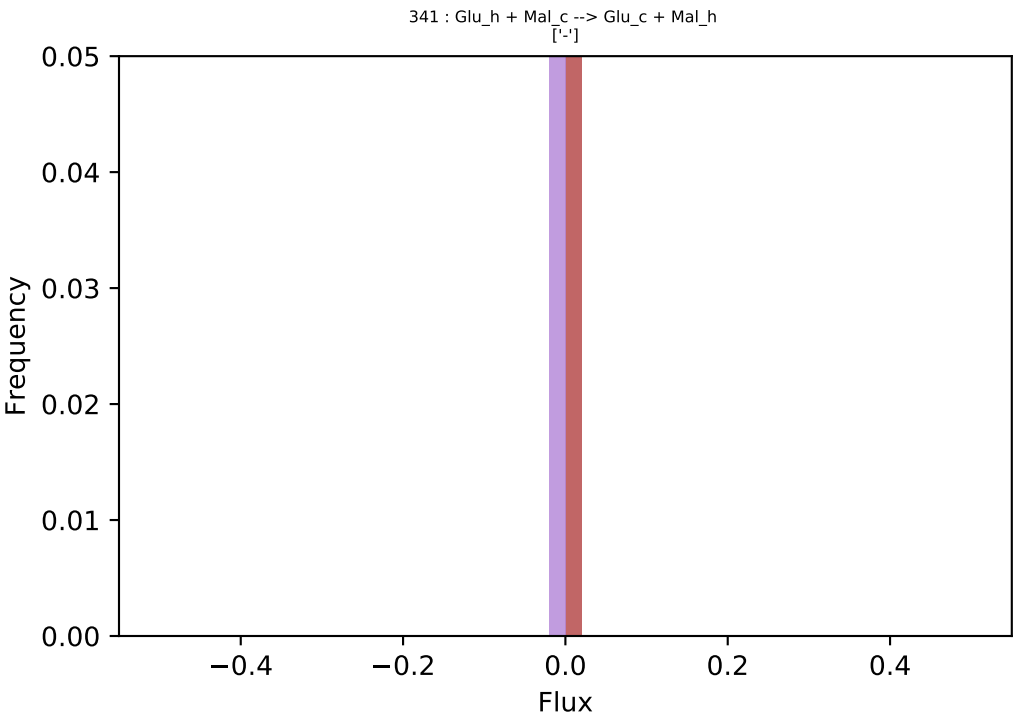

336 : Mas_h --> Mas_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

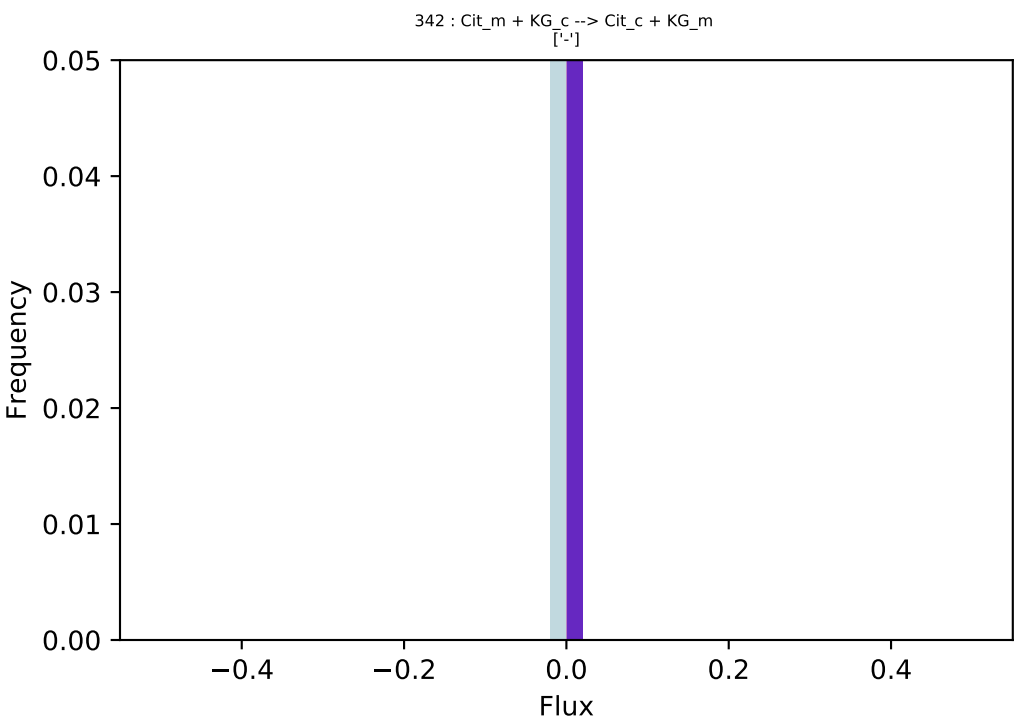

337 : Rib_c --> Rib_h
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

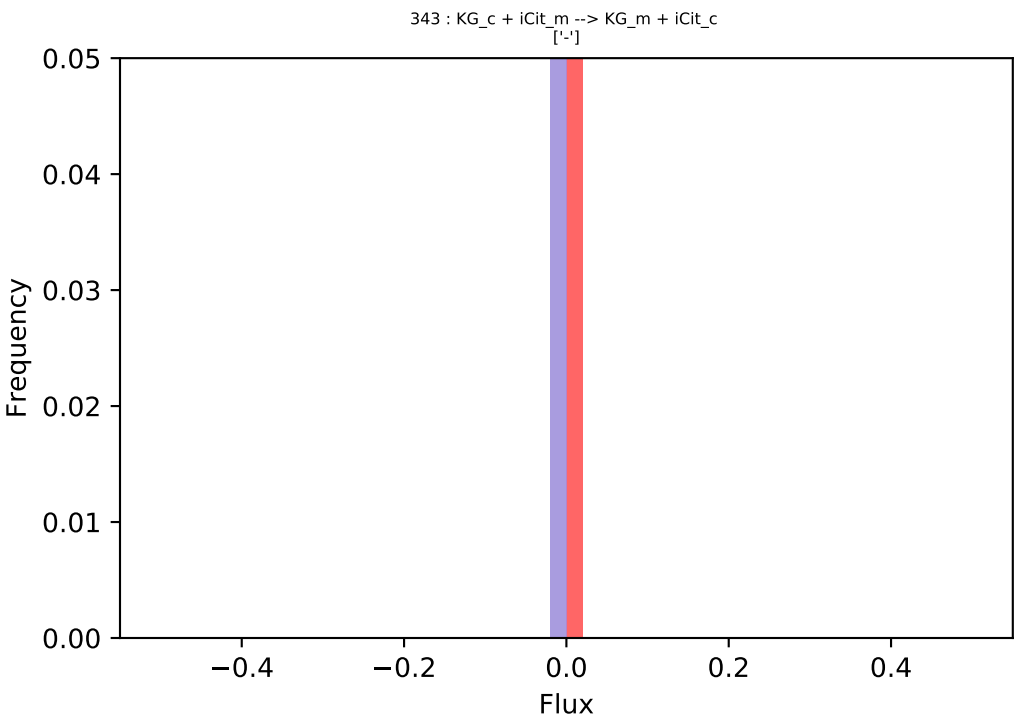

338 : Mal_c + Pi_m --> Mal_m + Pi_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

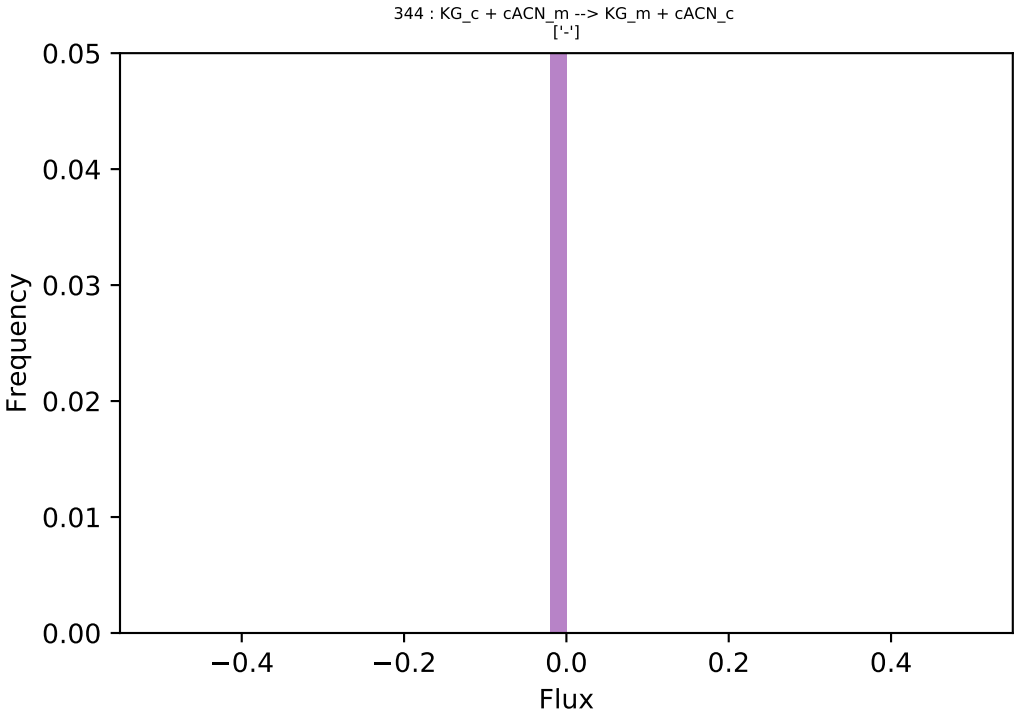

339 : Pi_m + SCA_c --> Pi_c + SCA_m
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

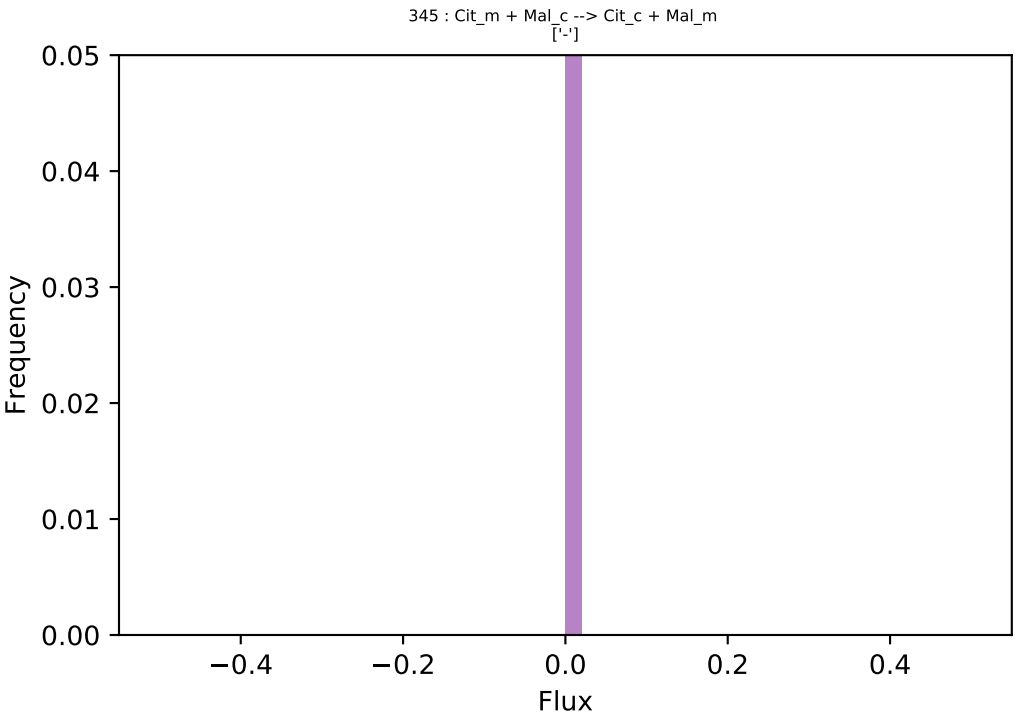

340 : KG_c + Mal_h --> KG_h + Mal_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

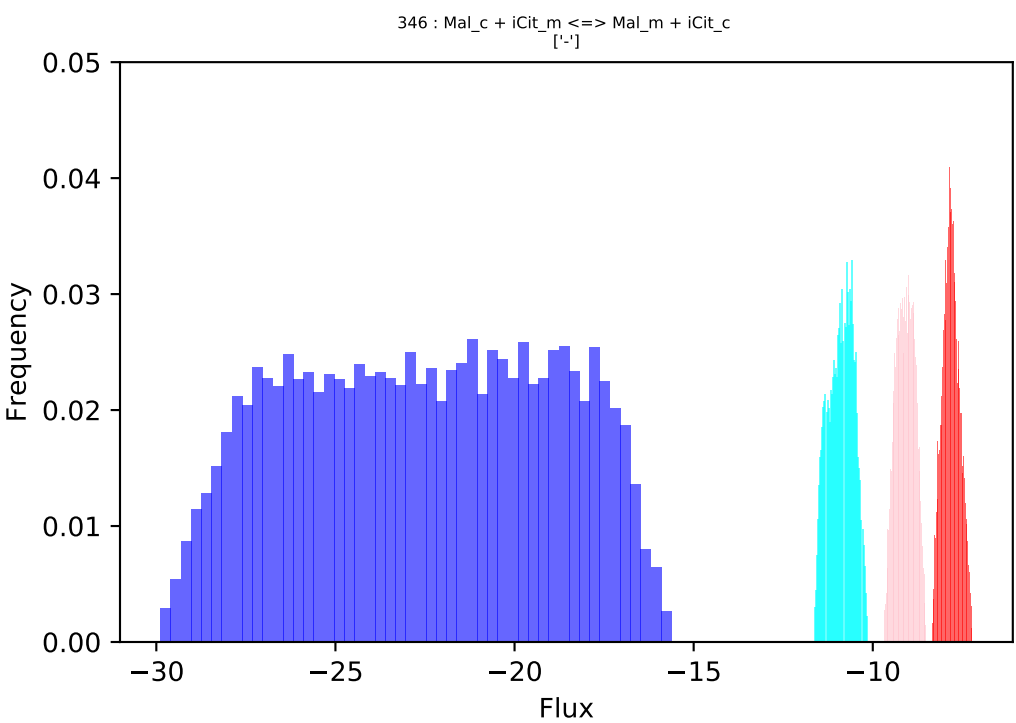

341 : Glu_h + Mal_c --> Glu_c + Mal_h
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

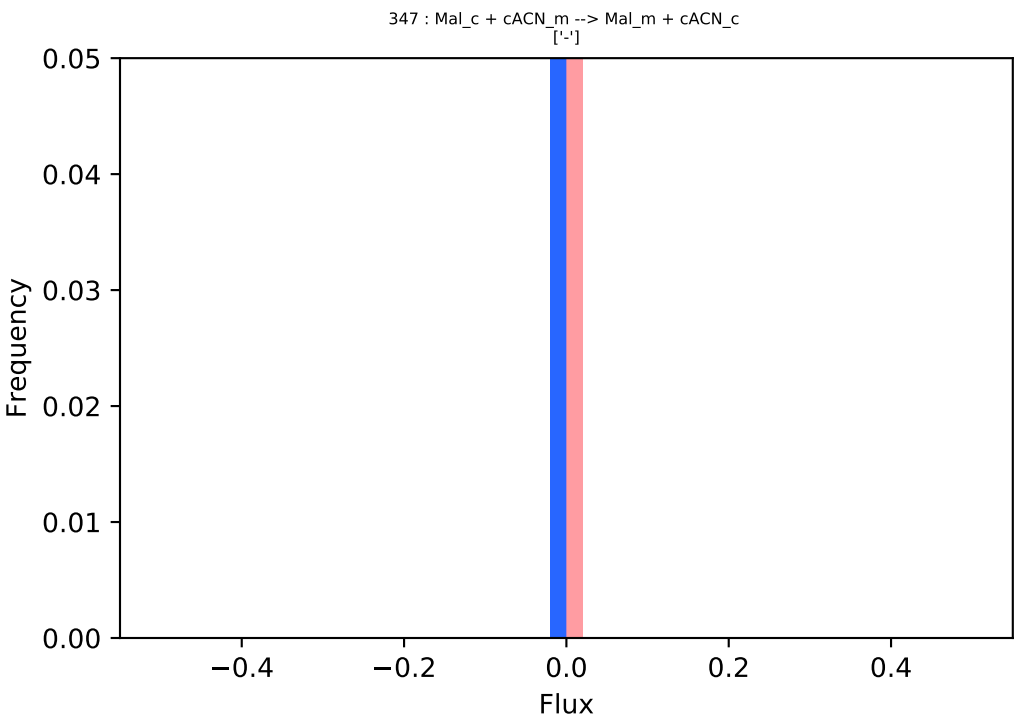

342 : Cit_m + KG_c --> Cit_c + KG_m
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

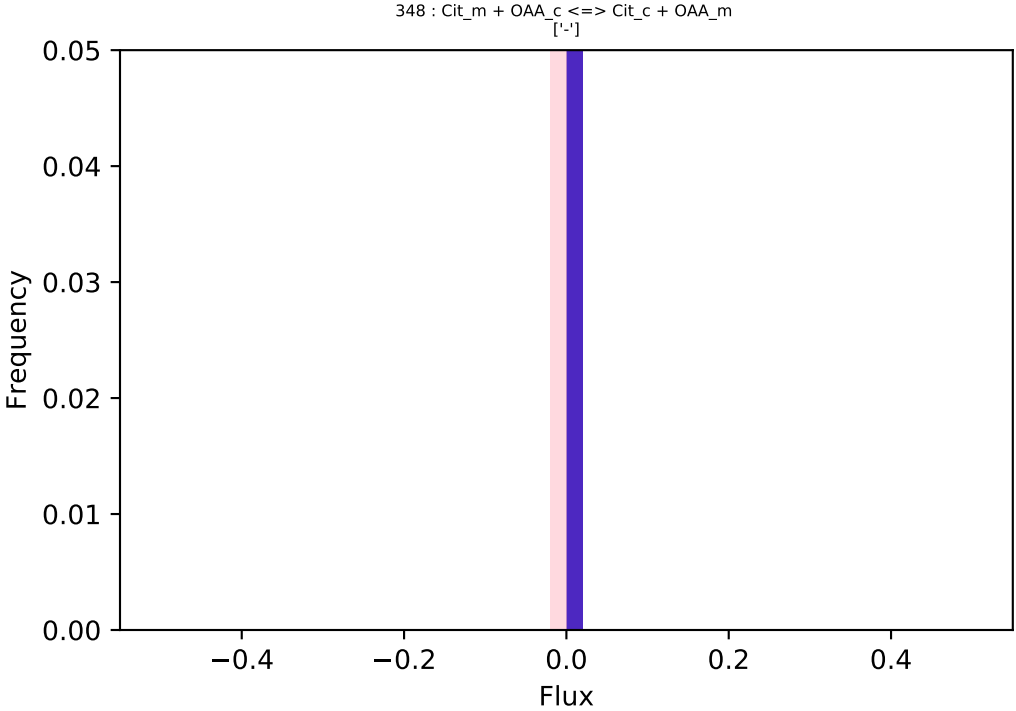

343 : KG_c + iCit_m --> KG_m + iCit_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

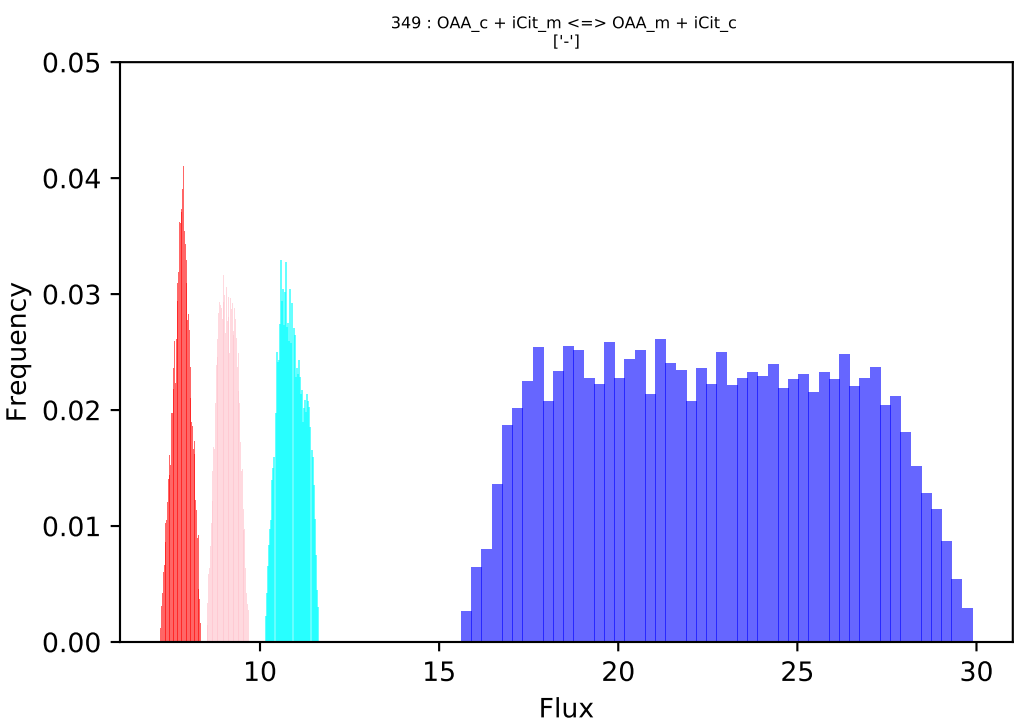

344 : KG_c + cACN_m --> KG_m + cACN_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

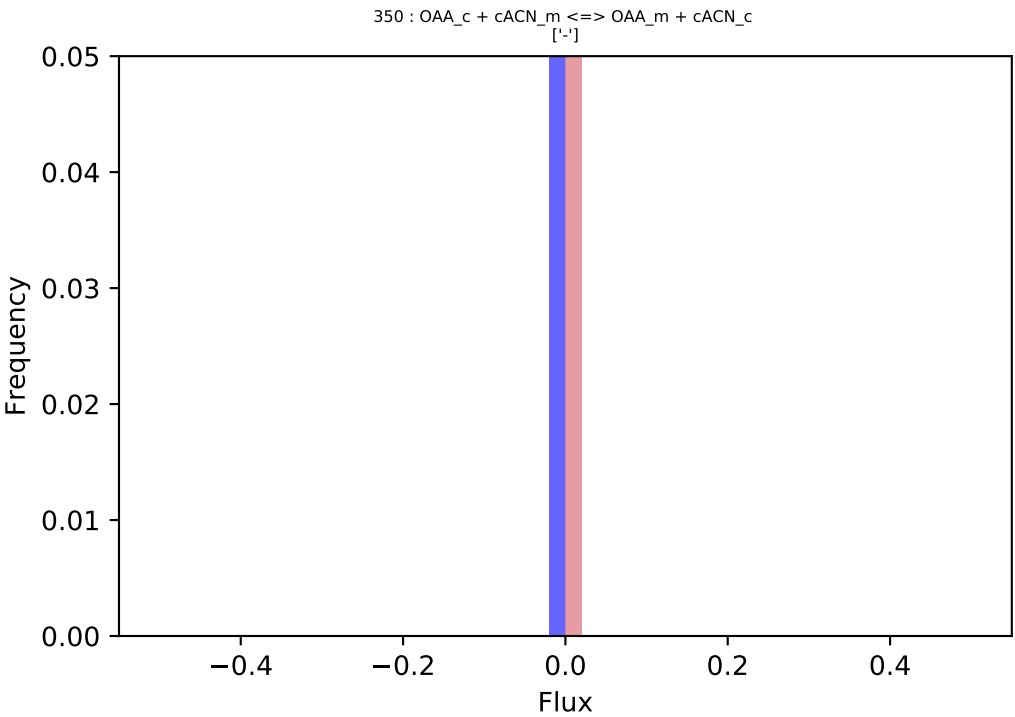

345 : Cit_m + Mal_c --> Cit_c + Mal_m
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

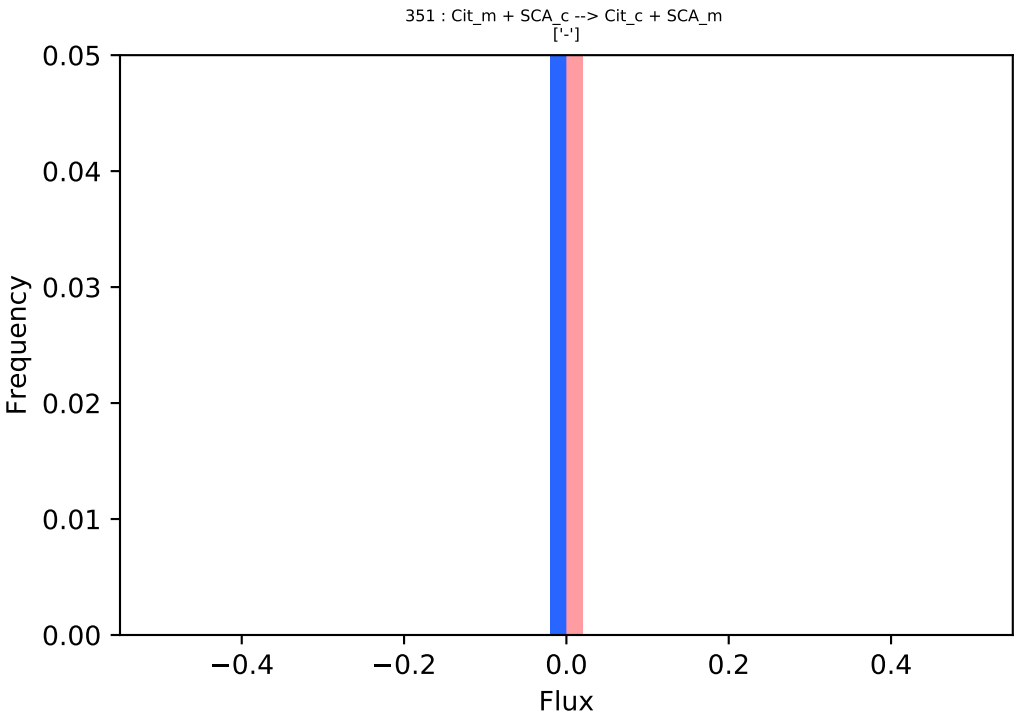

346 : Mal_c + iCit_m <=> Mal_m + iCit_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−30
−25
−20
−15
−10
Flux

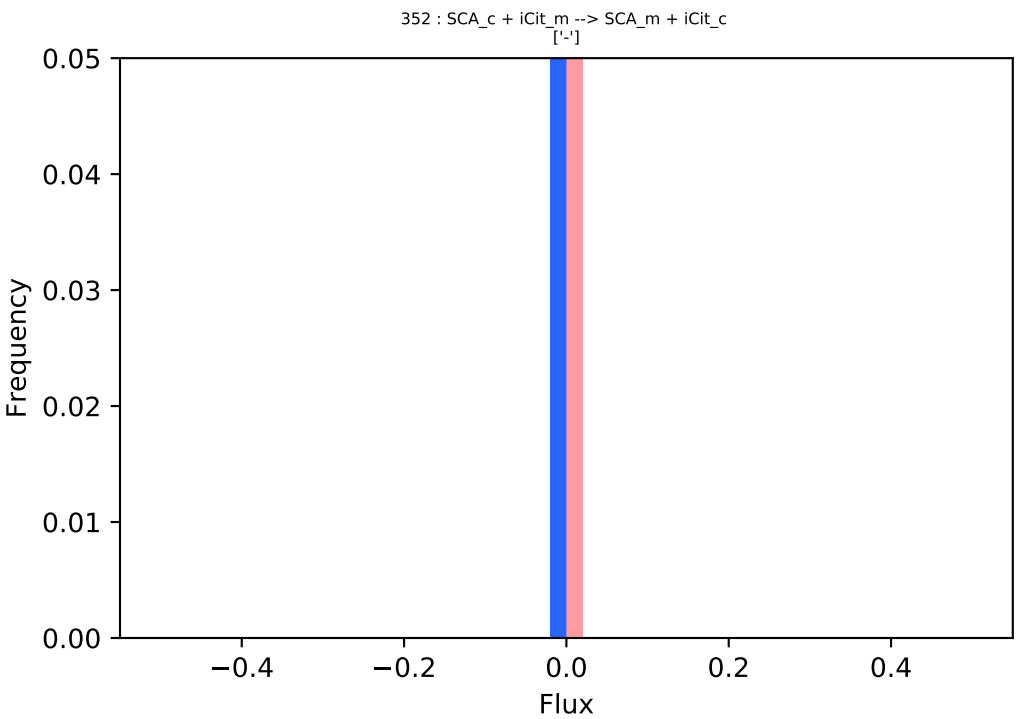

347 : Mal_c + cACN_m --> Mal_m + cACN_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

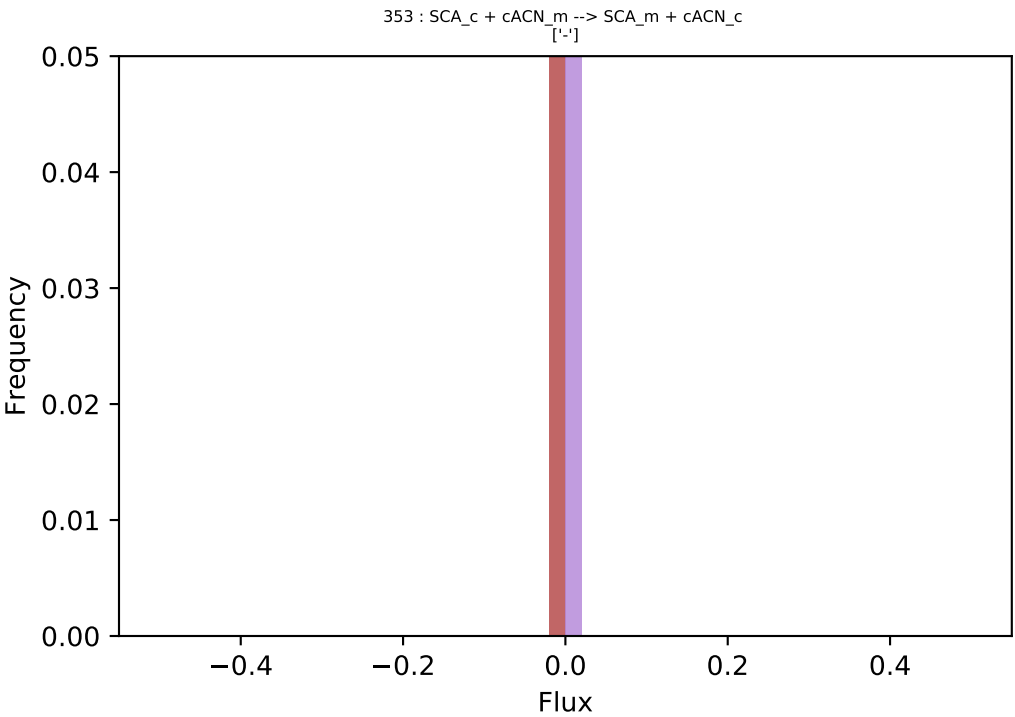

348 : Cit_m + OAA_c <=> Cit_c + OAA_m
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

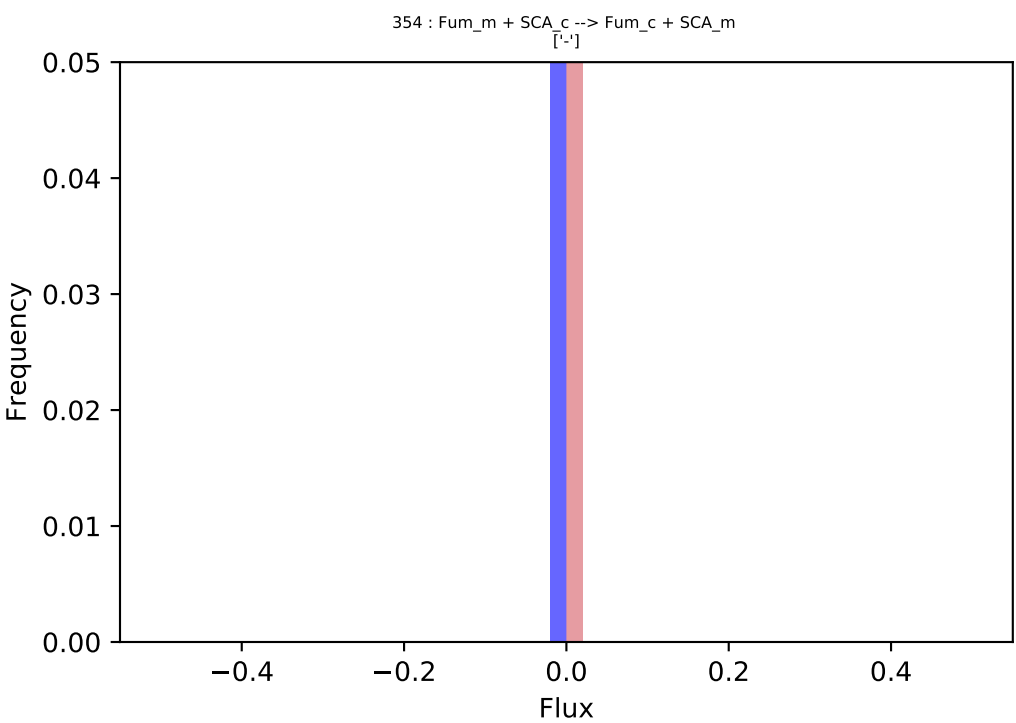

349 : OAA_c + iCit_m <=> OAA_m + iCit_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
10
15
20
25
30
Flux

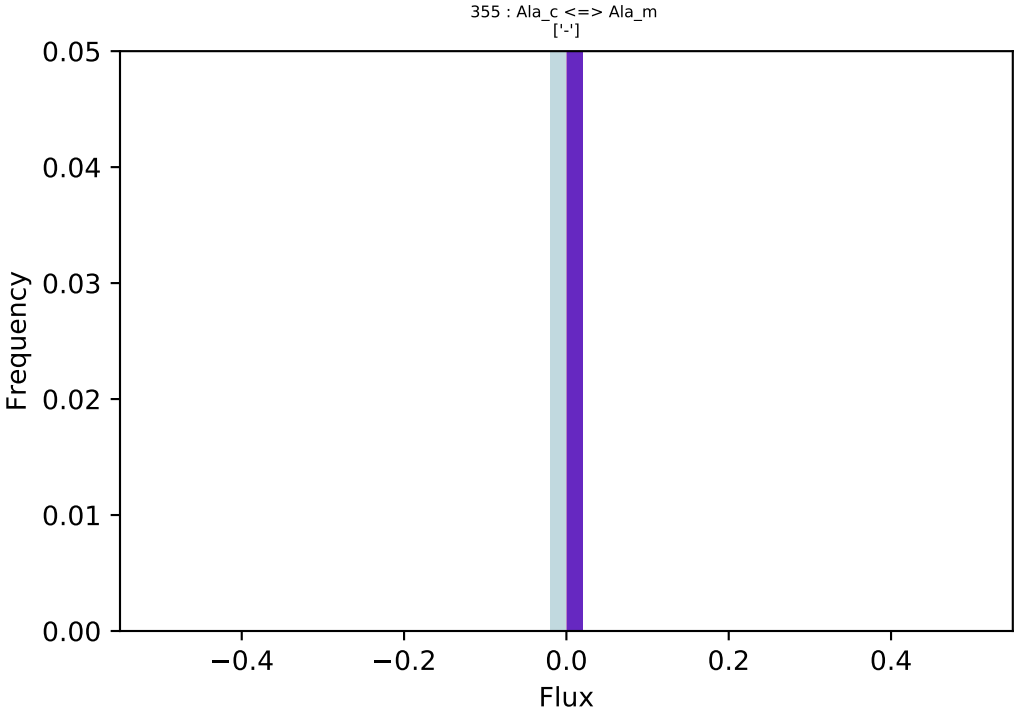

350 : OAA_c + cACN_m <=> OAA_m + cACN_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

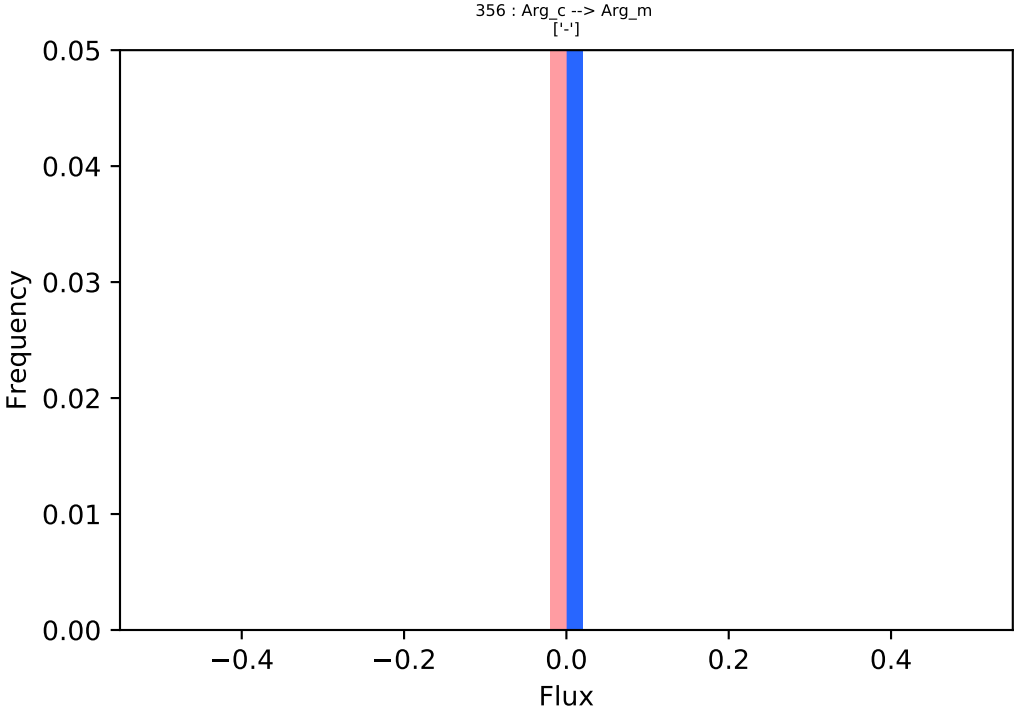

351 : Cit_m + SCA_c --> Cit_c + SCA_m
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

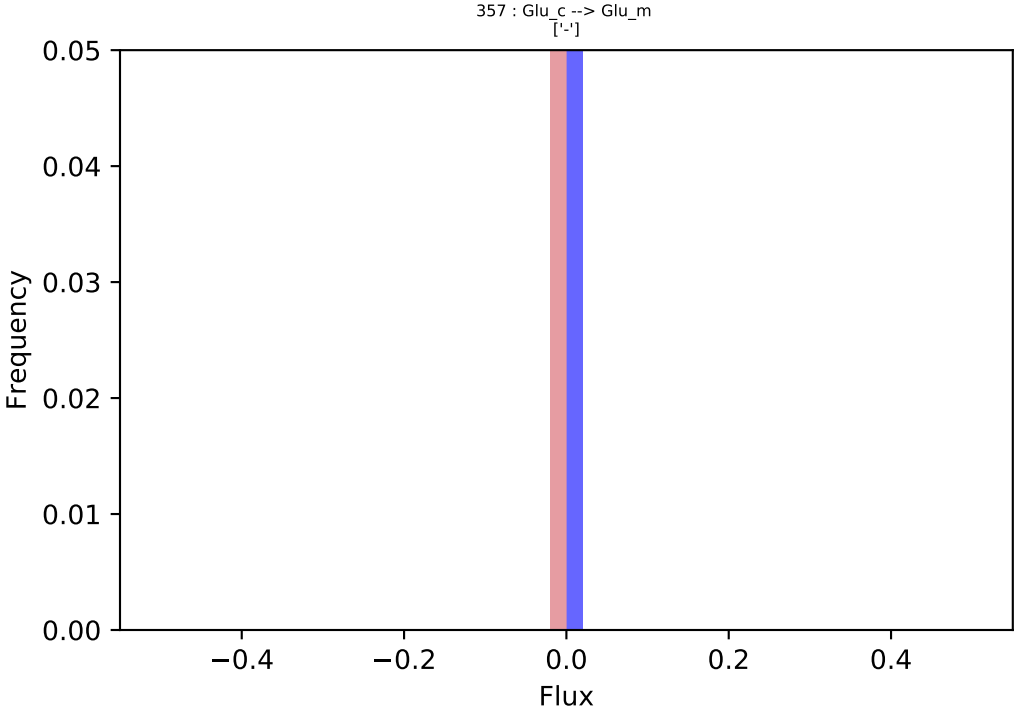

352 : SCA_c + iCit_m --> SCA_m + iCit_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

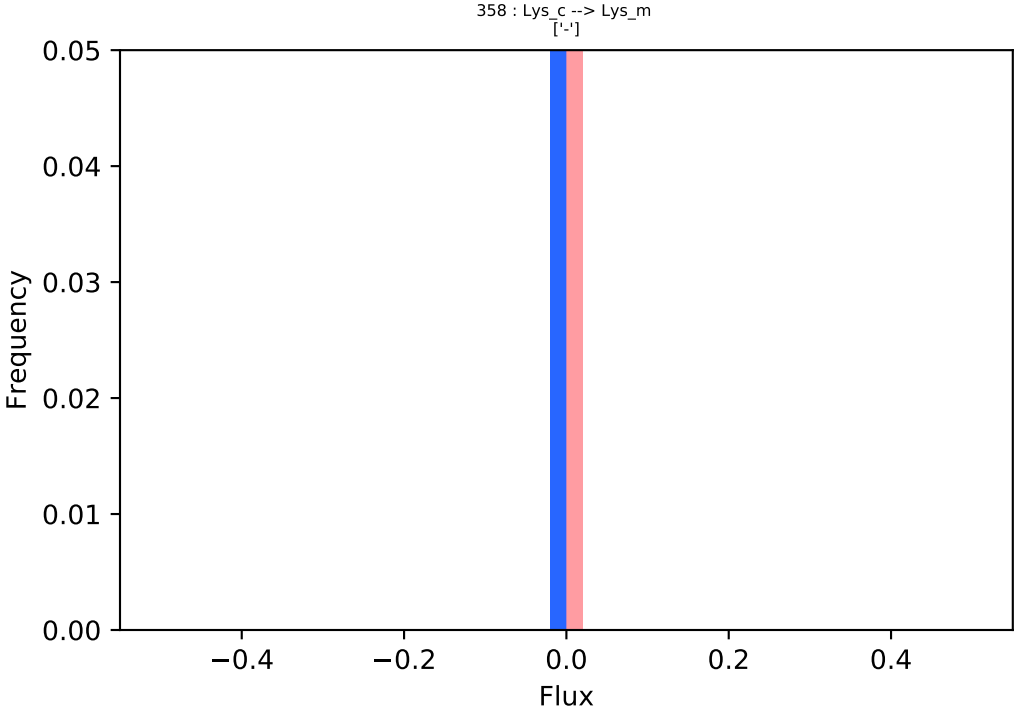

353 : SCA_c + cACN_m --> SCA_m + cACN_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

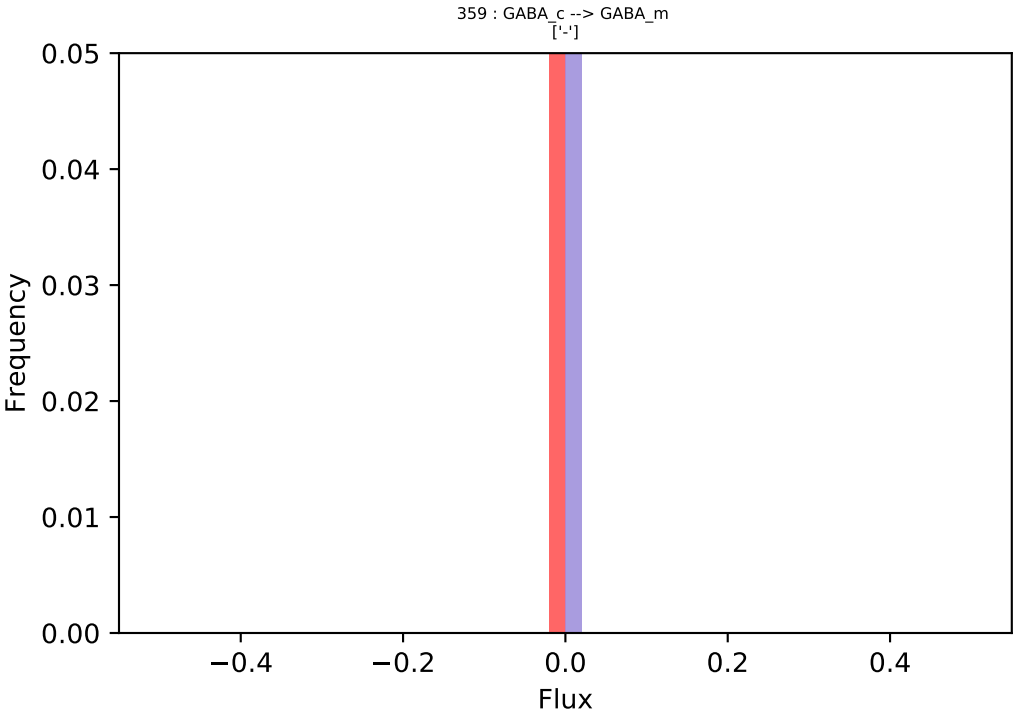

354 : Fum_m + SCA_c --> Fum_c + SCA_m
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

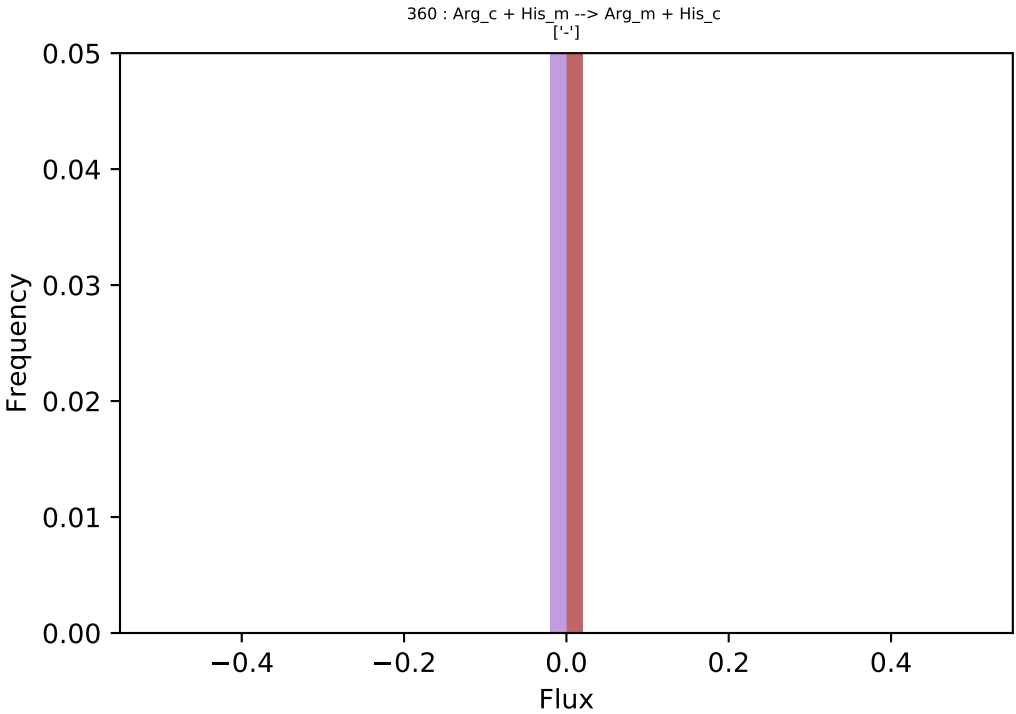

355 : Ala_c <=> Ala_m
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

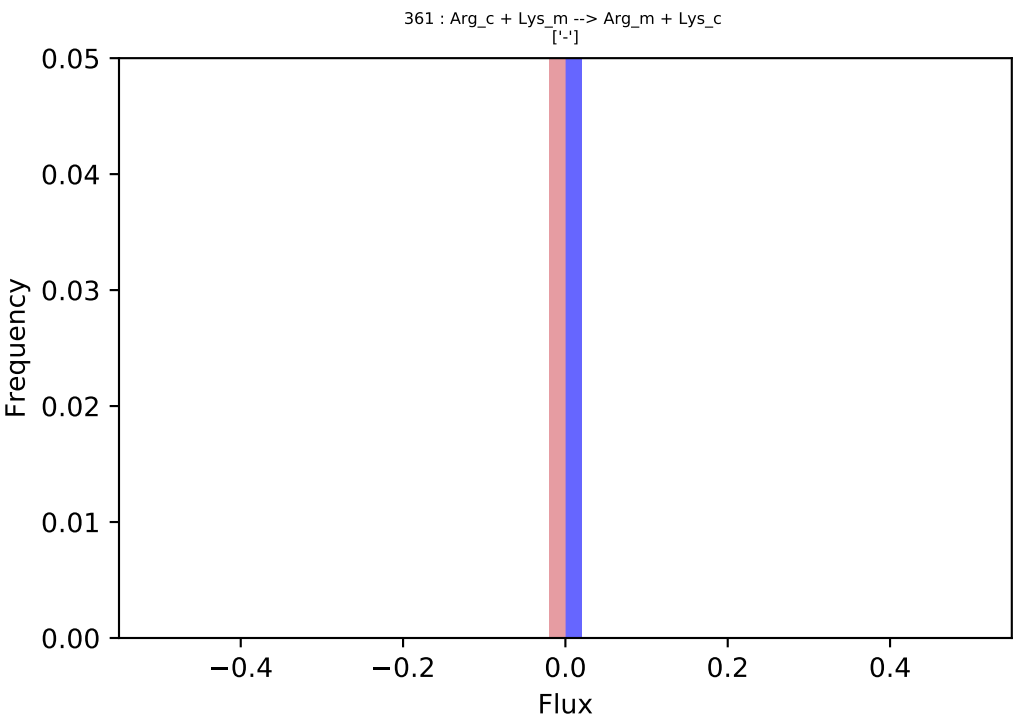

356 : Arg_c --> Arg_m
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

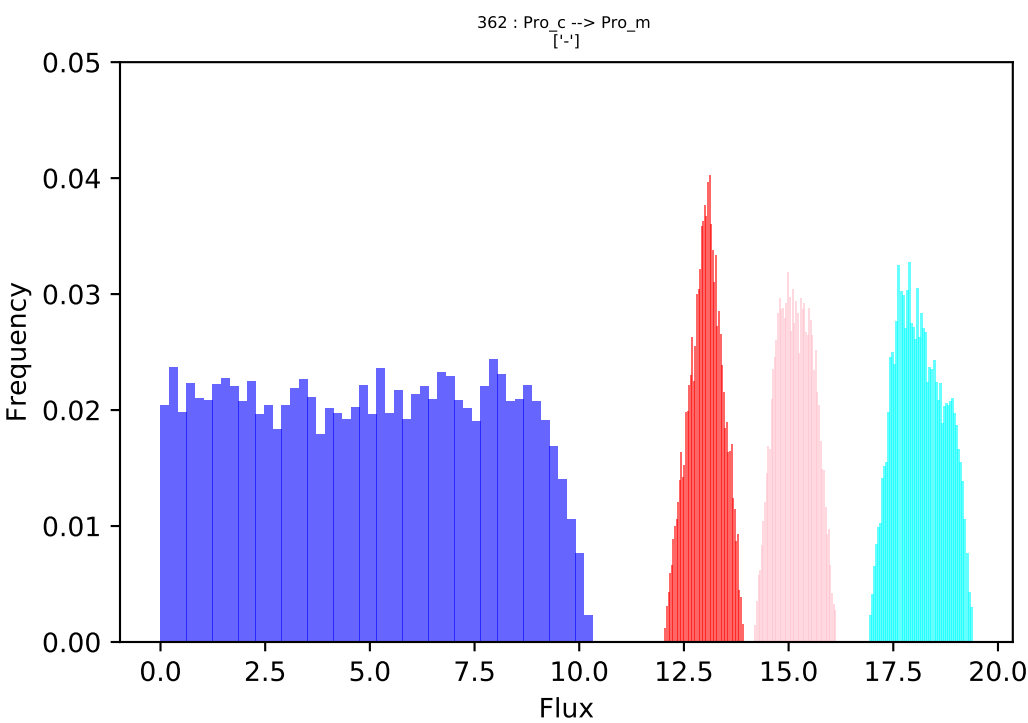

357 : Glu_c --> Glu_m
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

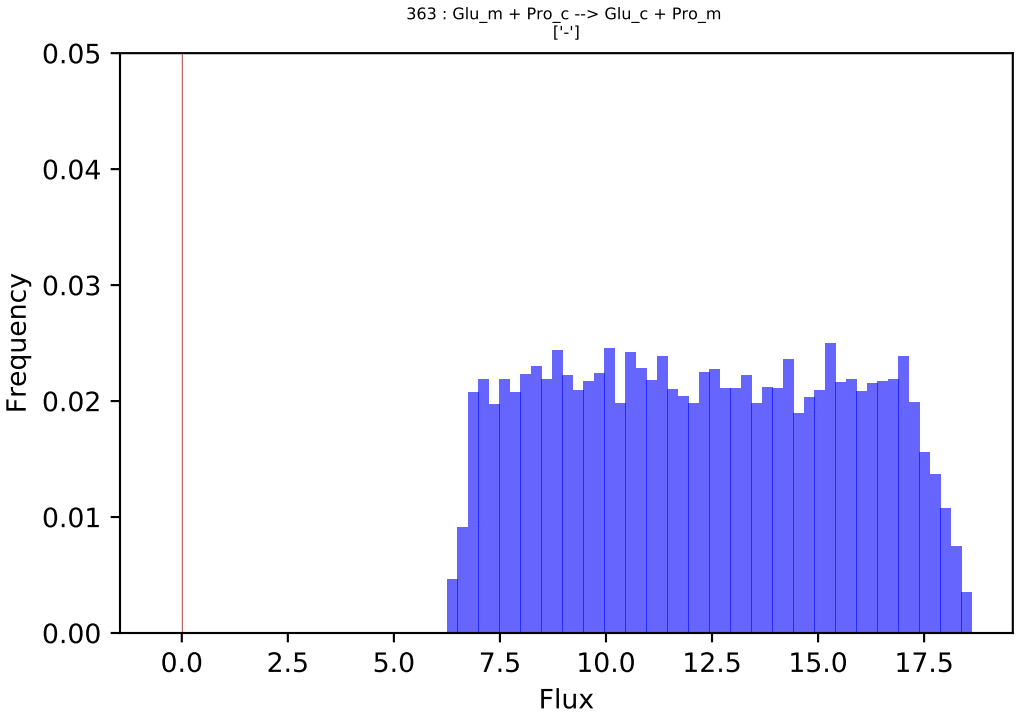

358 : Lys_c --> Lys_m
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

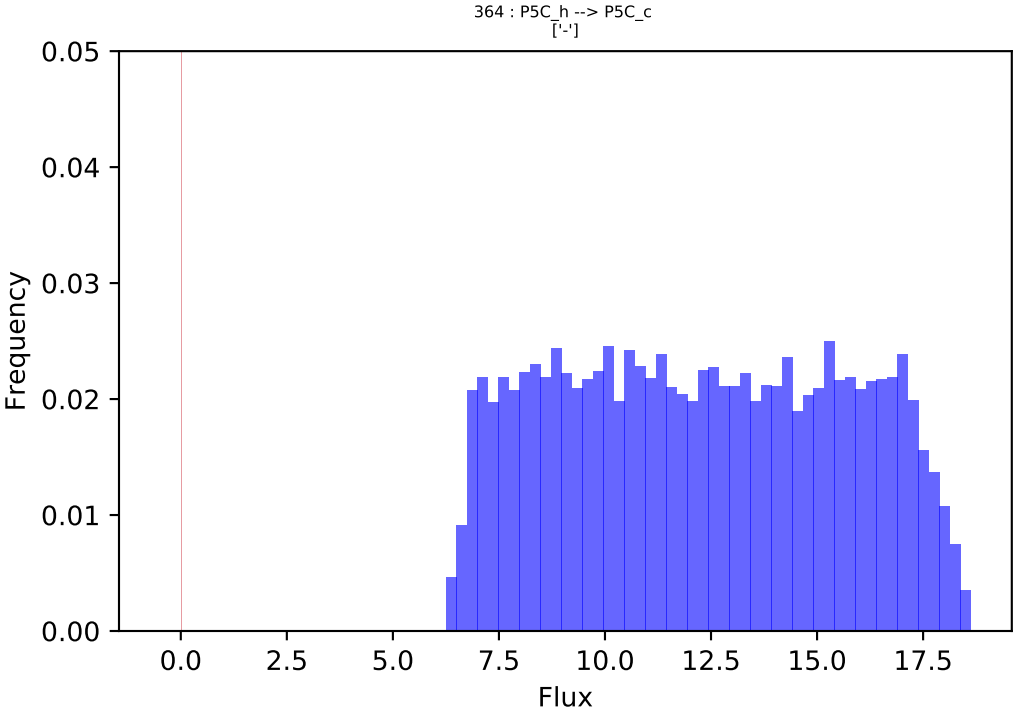

359 : GABA_c --> GABA_m
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

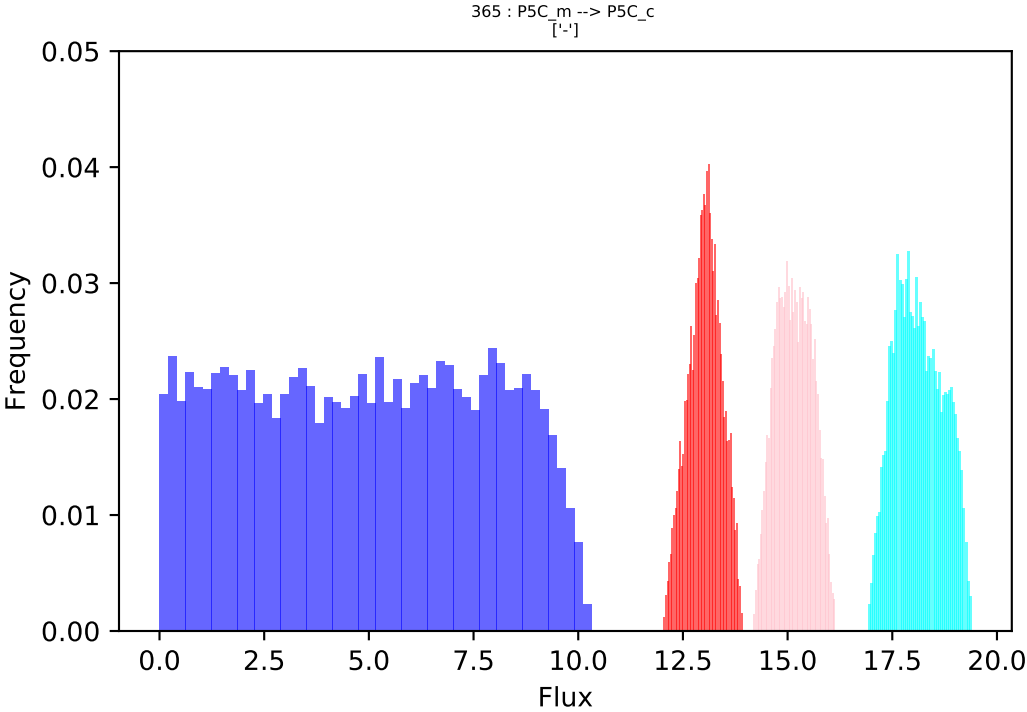

360 : Arg_c + His_m --> Arg_m + His_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

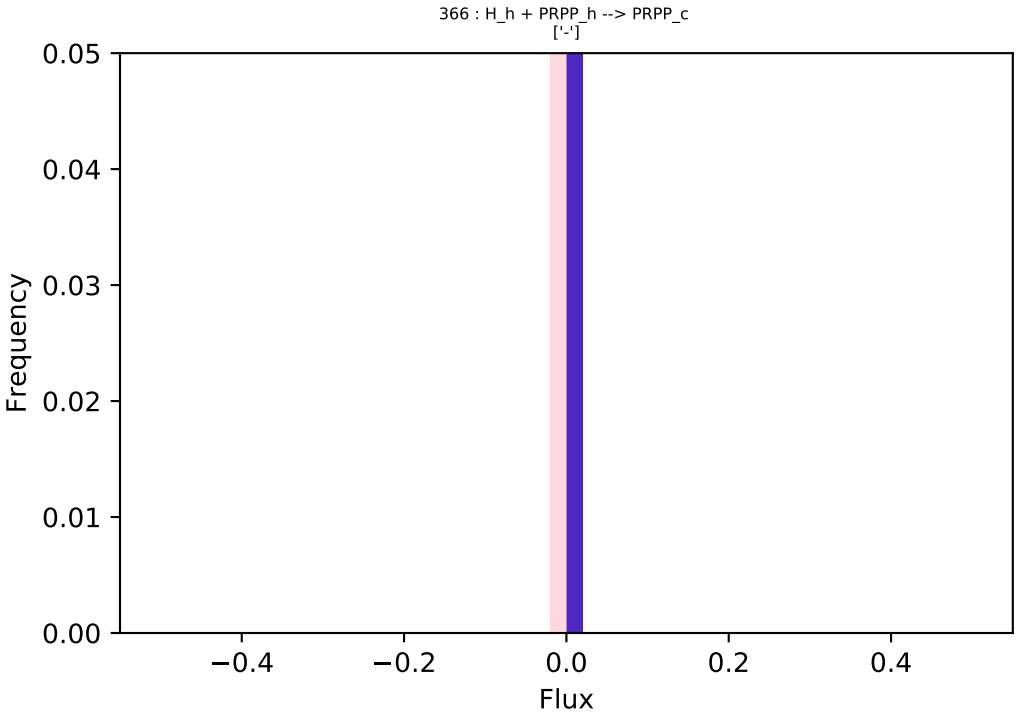

361 : Arg_c + Lys_m --> Arg_m + Lys_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

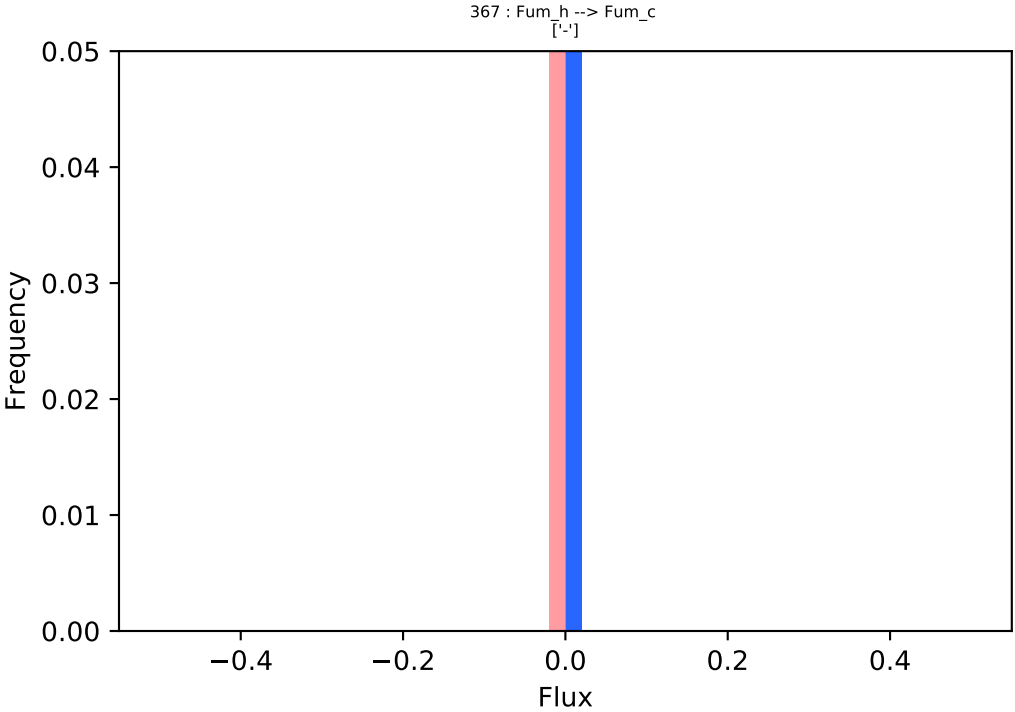

362 : Pro_c --> Pro_m
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
Flux

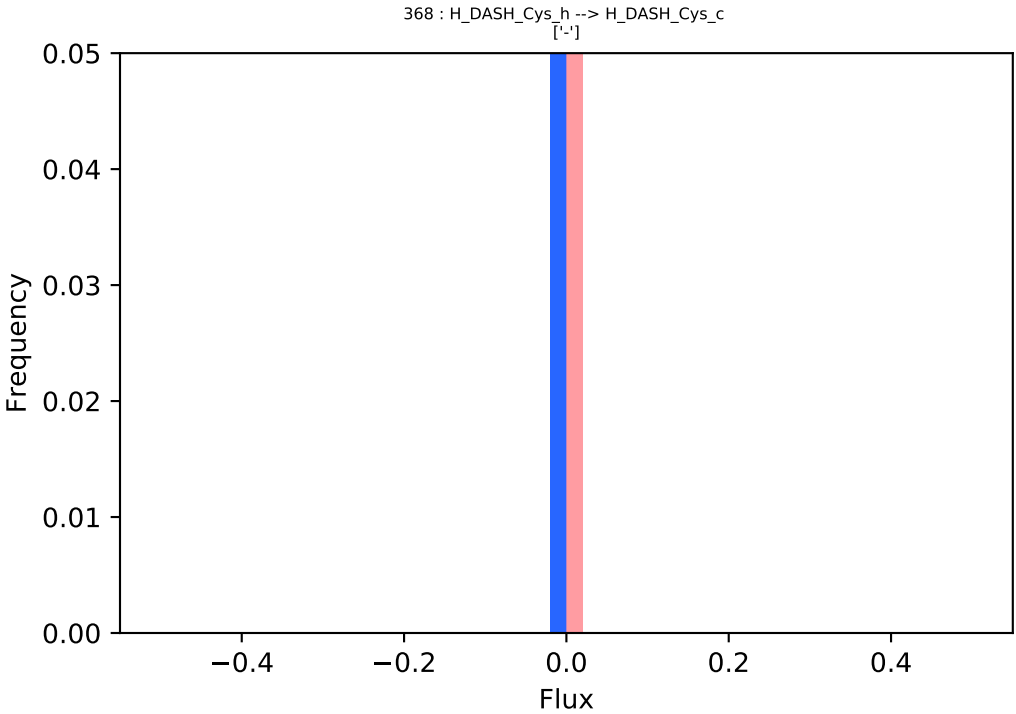

363 : Glu_m + Pro_c --> Glu_c + Pro_m
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
Flux

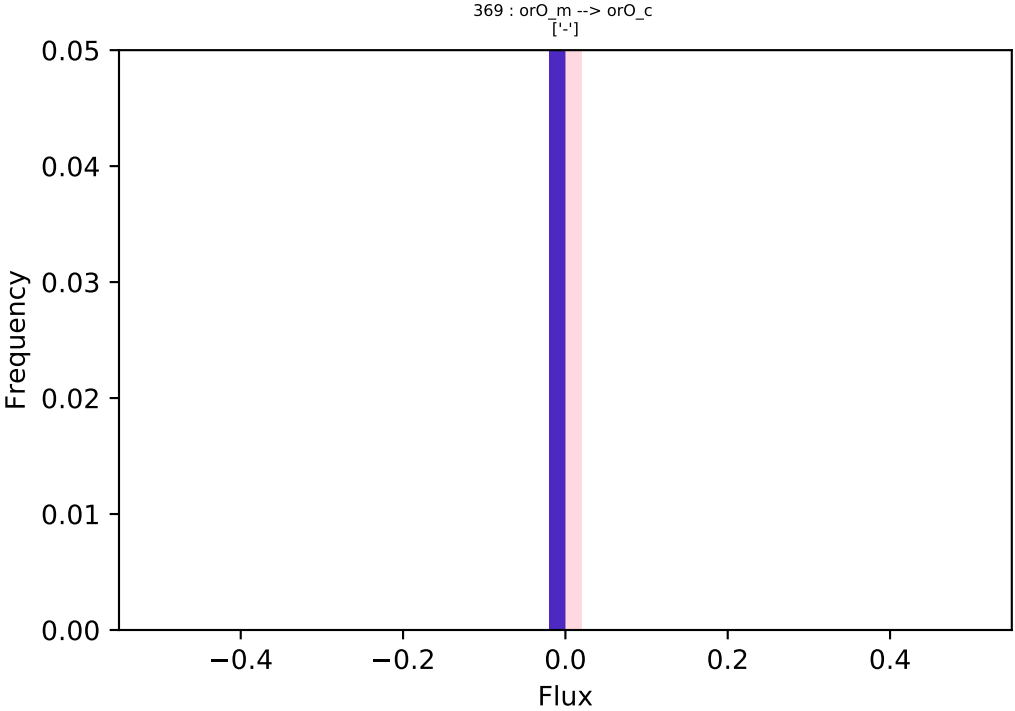

364 : P5C_h --> P5C_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
Flux

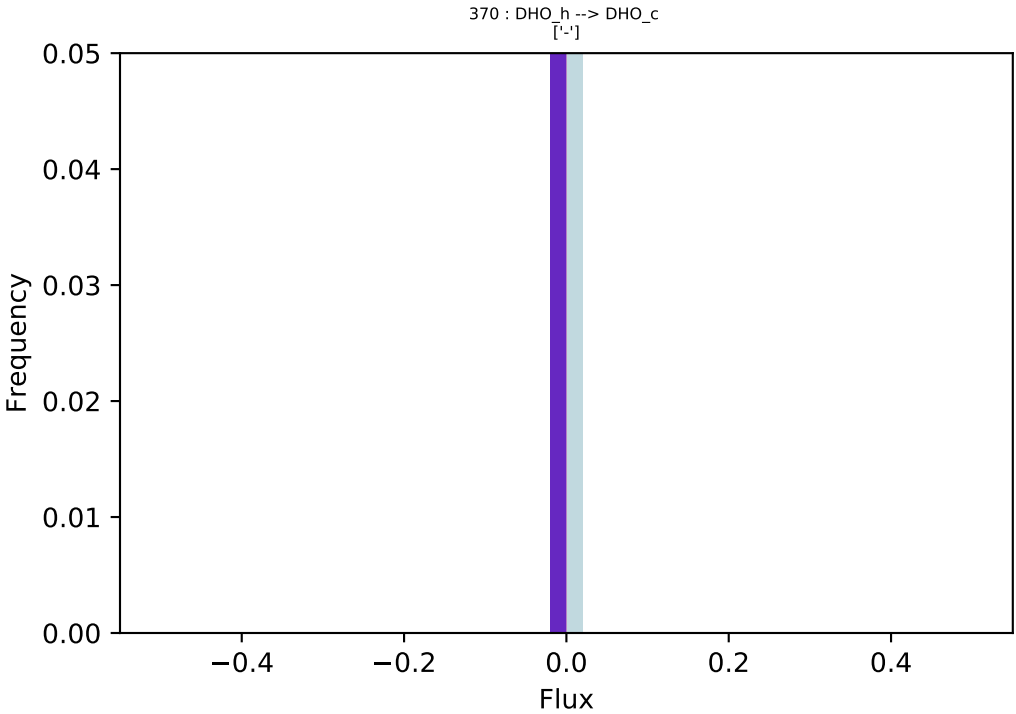

365 : P5C_m --> P5C_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
Flux

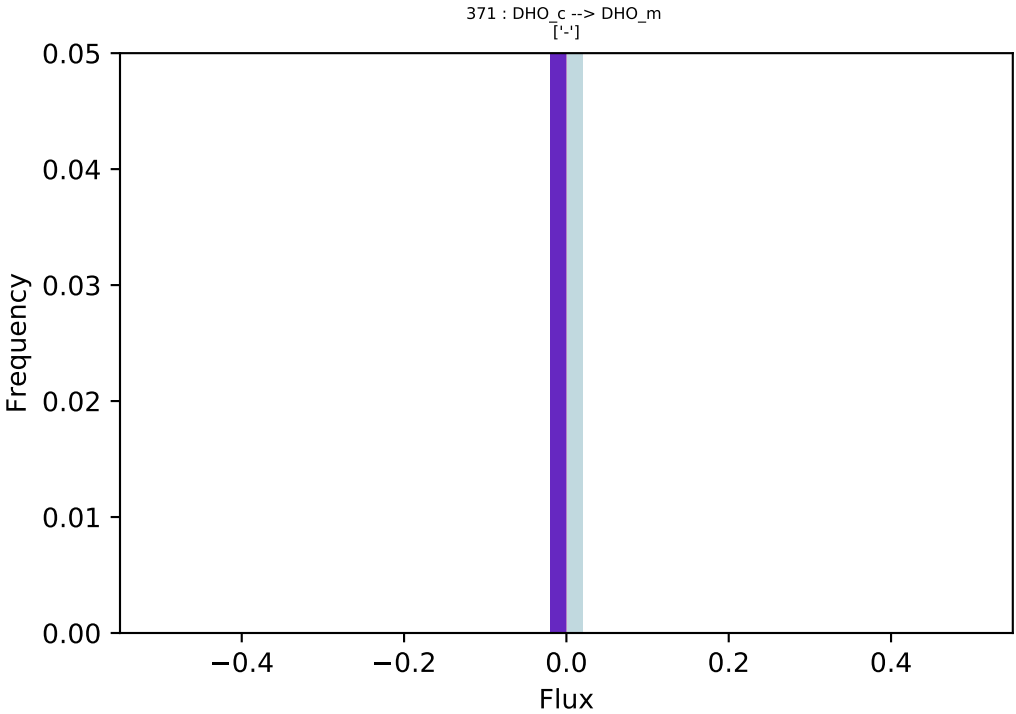

366 : H_h + PRPP_h --> PRPP_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

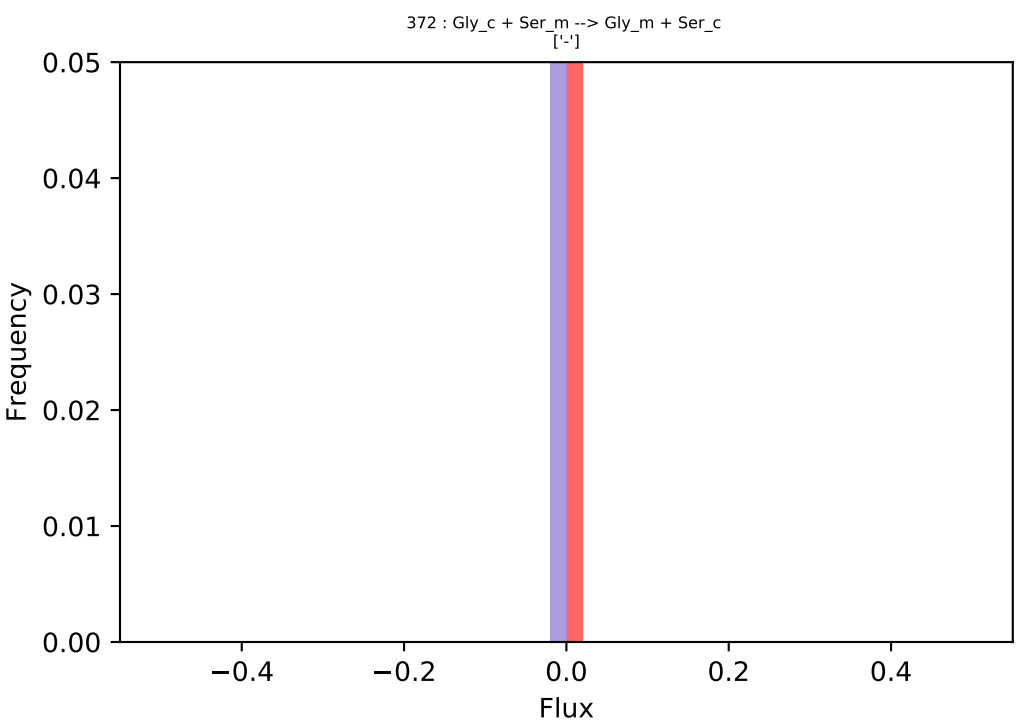

367 : Fum_h --> Fum_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

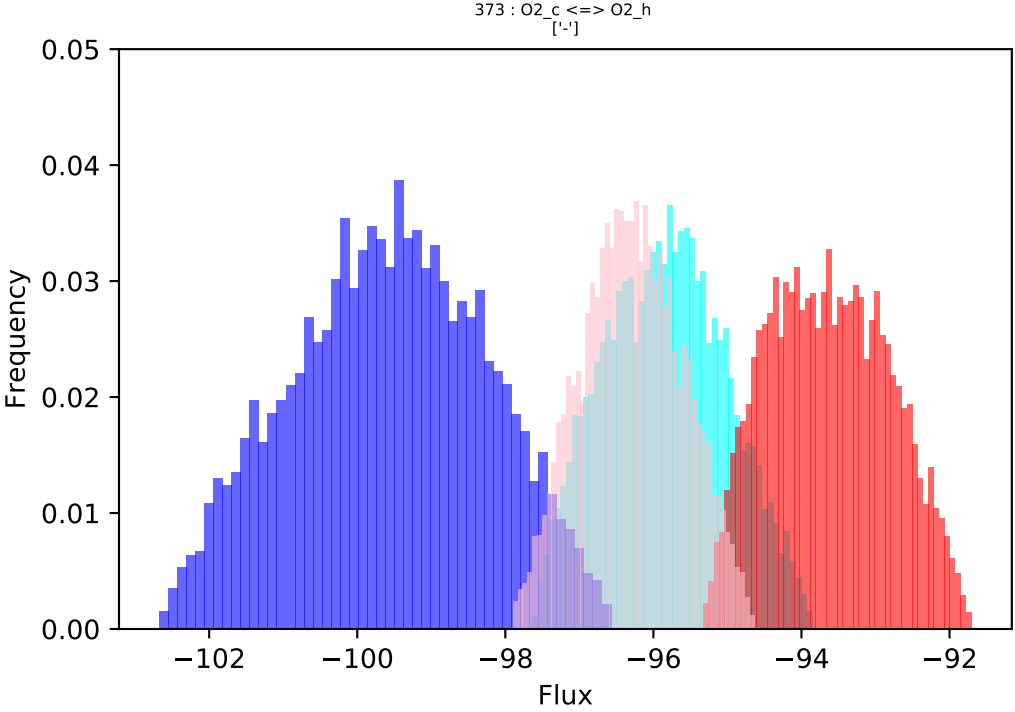

368 : H_DASH_Cys_h --> H_DASH_Cys_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

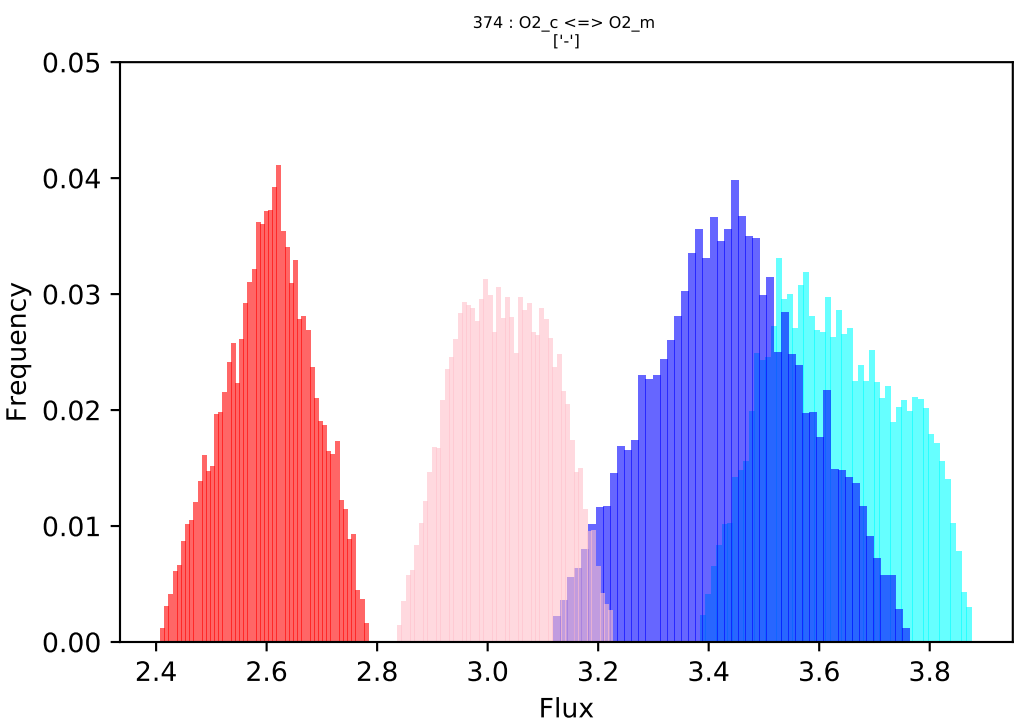

369 : orO_m --> orO_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

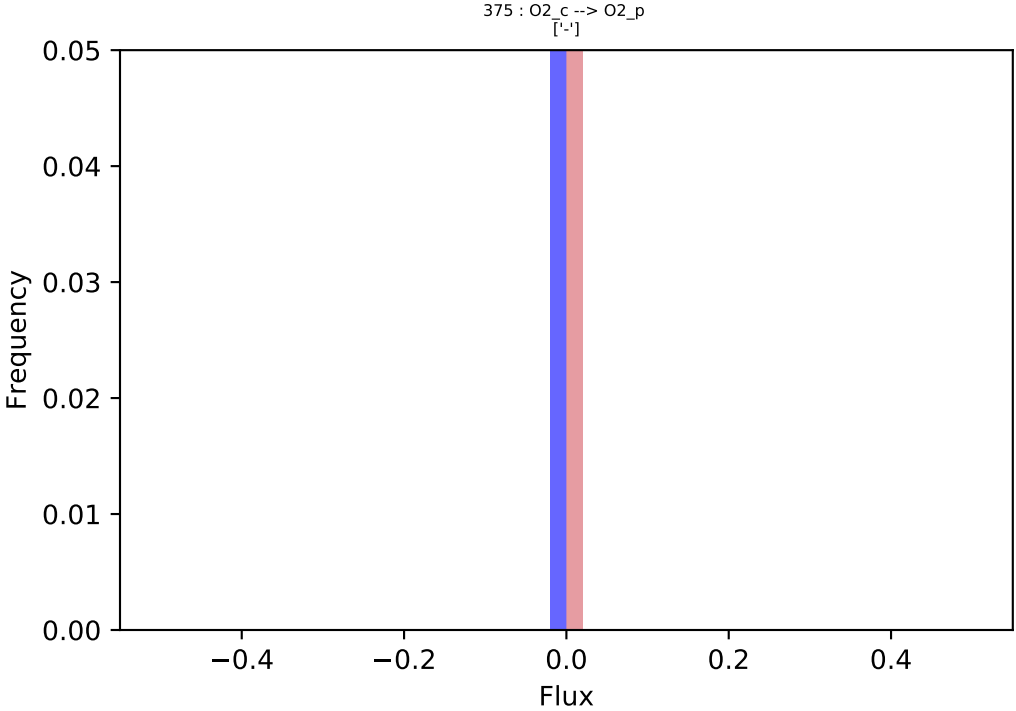

370 : DHO_h --> DHO_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

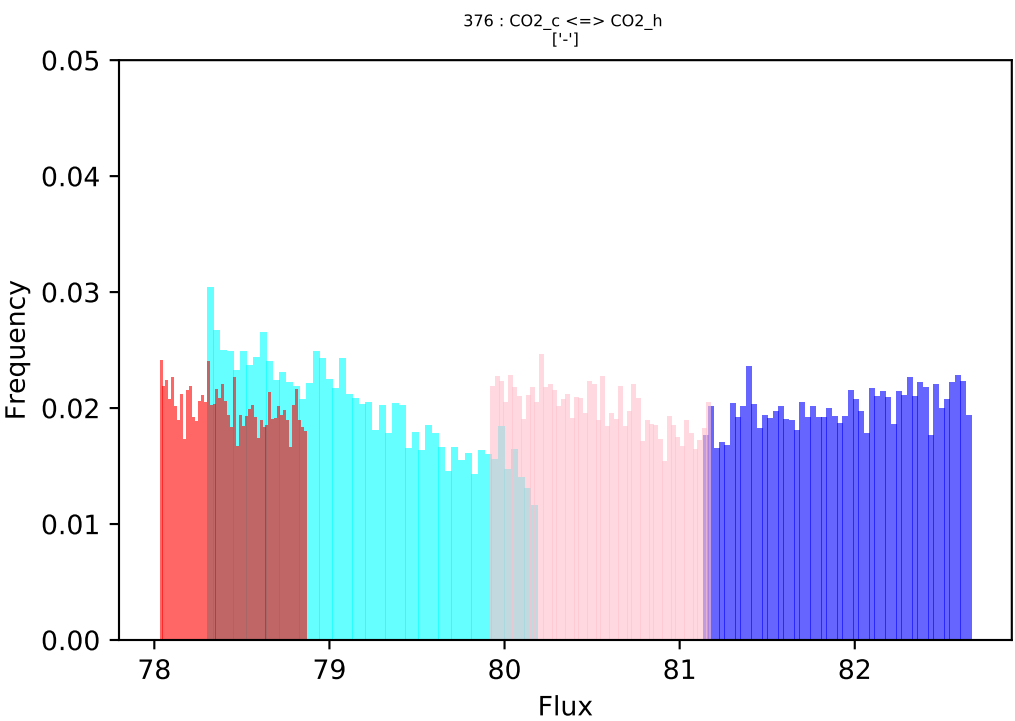

371 : DHO_c --> DHO_m
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

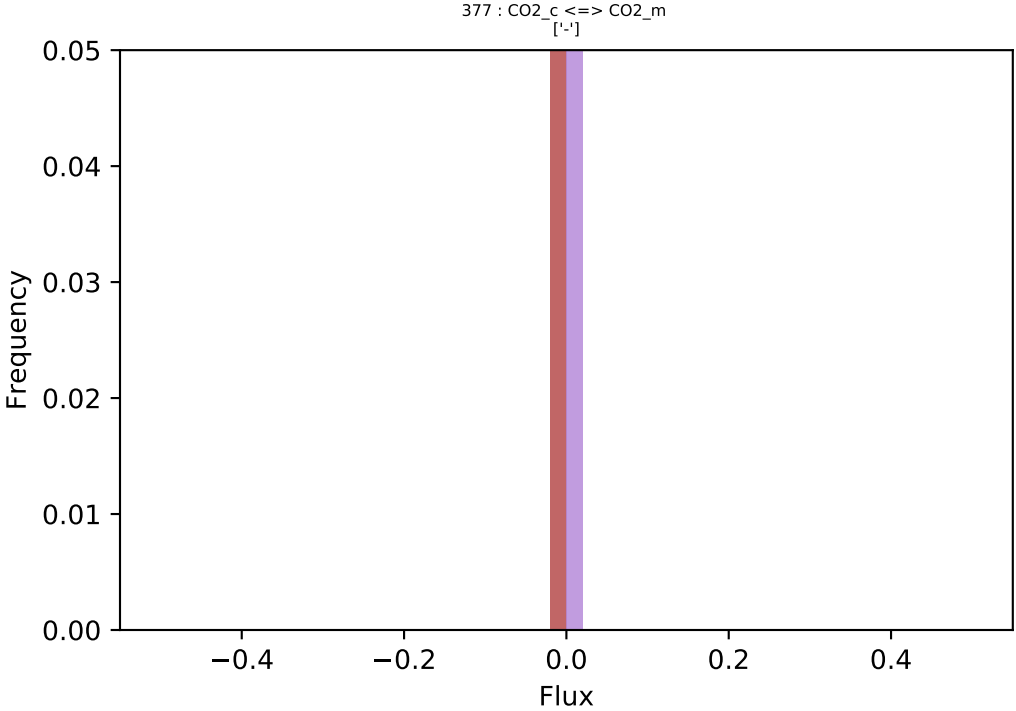

372 : Gly_c + Ser_m --> Gly_m + Ser_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

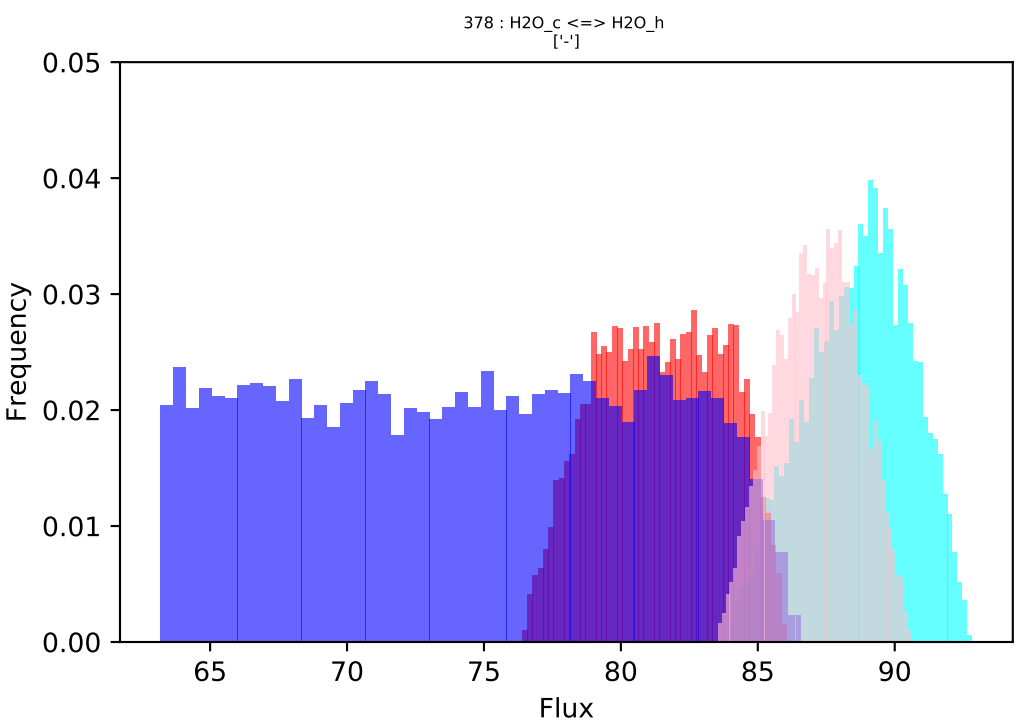

373 : O2_c <=> O2_h
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−102
−100
−98
−96
−94
−92
Flux

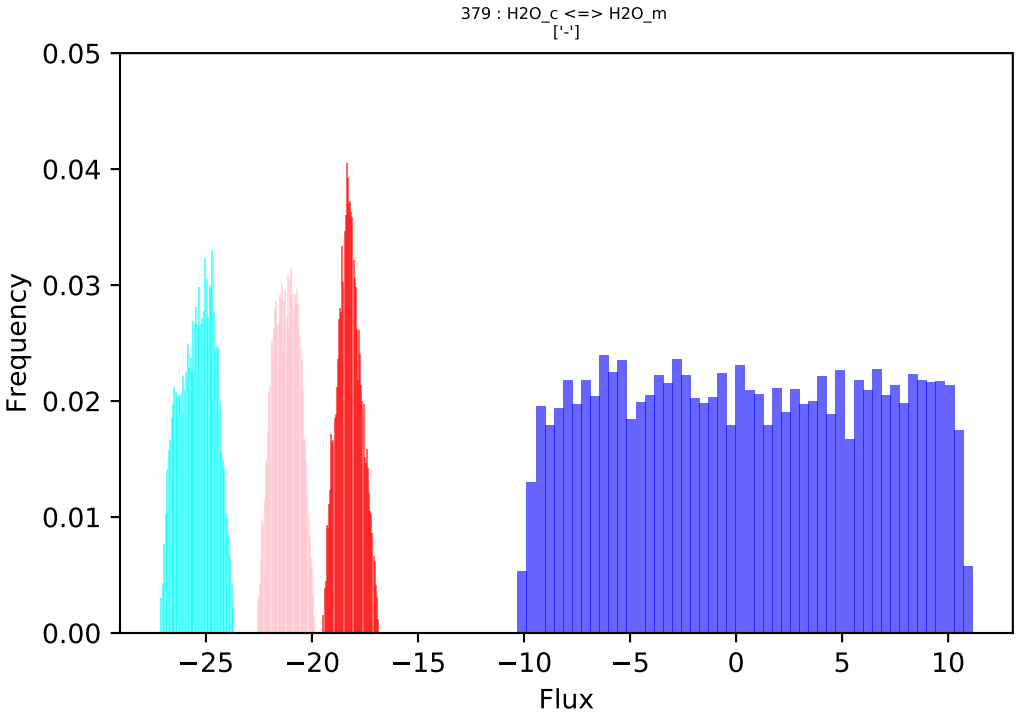

374 : O2_c <=> O2_m
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8
Flux

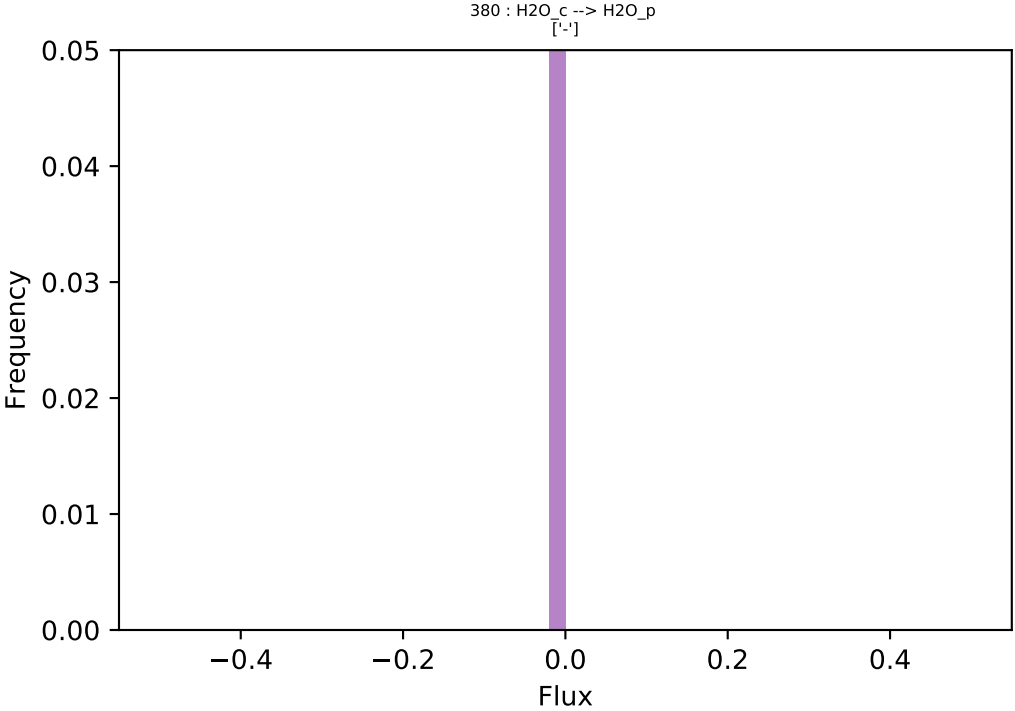

375 : O2_c --> O2_p
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

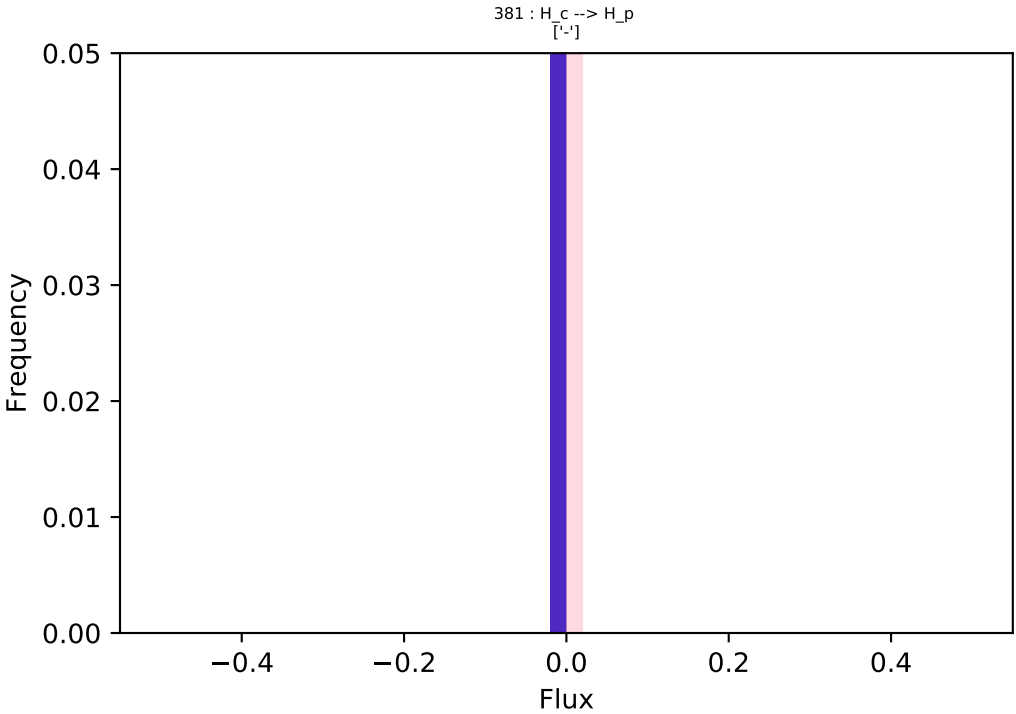

376 : CO2_c <=> CO2_h
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
78
79
80
81
82
Flux

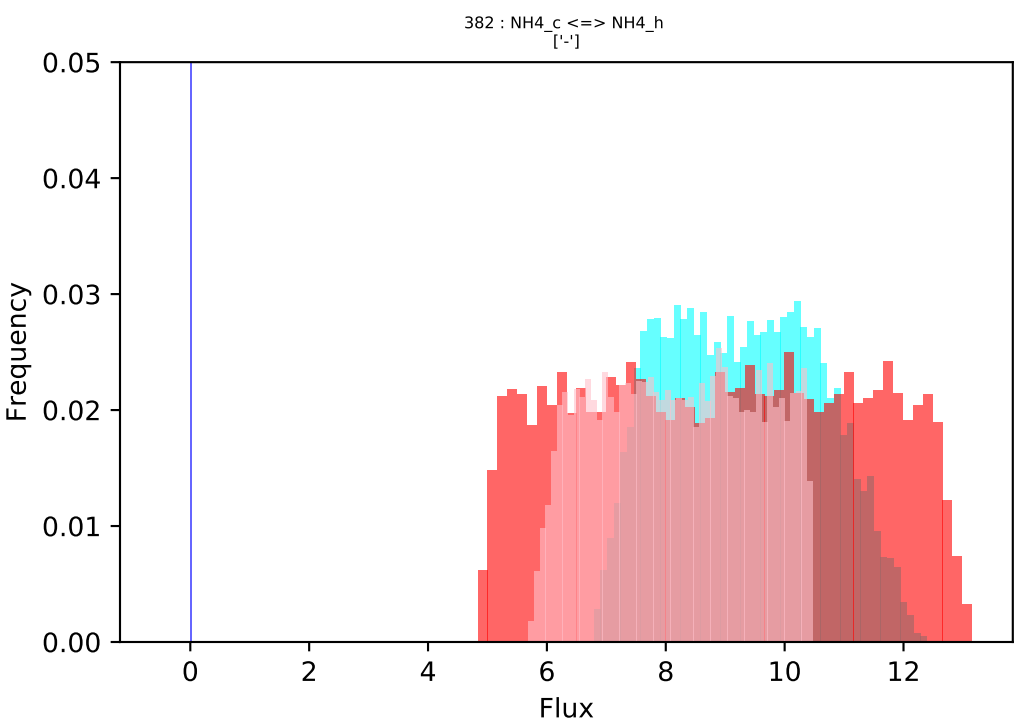

377 : CO2_c <=> CO2_m
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

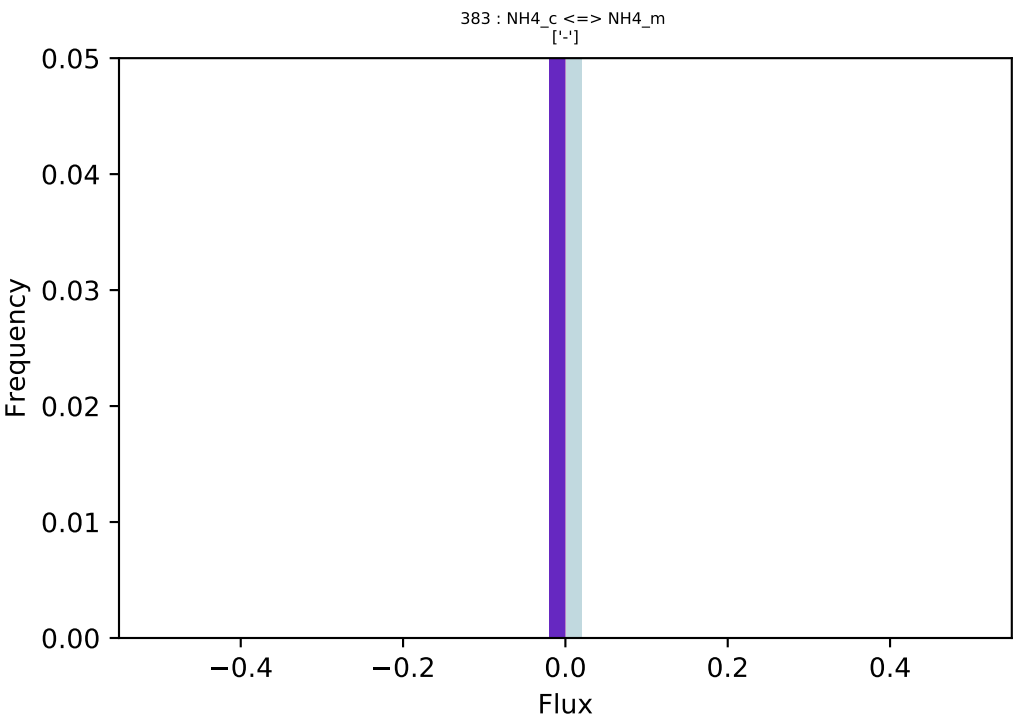

378 : H2O_c <=> H2O_h
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
65
70
75
80
85
90
Flux

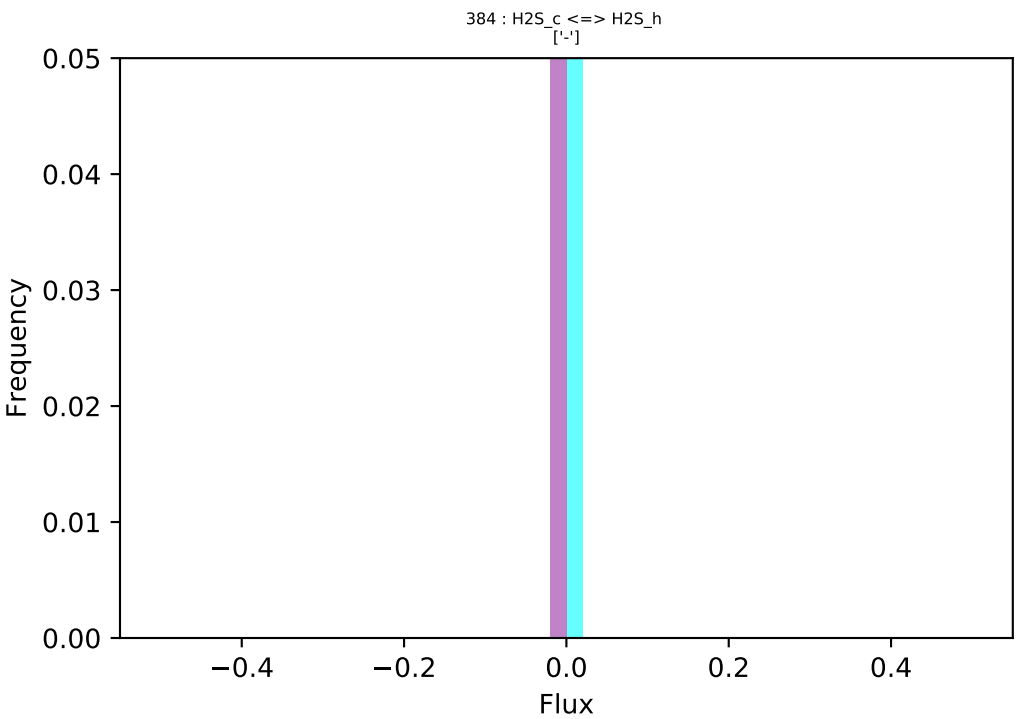

379 : H2O_c <=> H2O_m
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−25
−20
−15
−10
−5
0
5
10
Flux

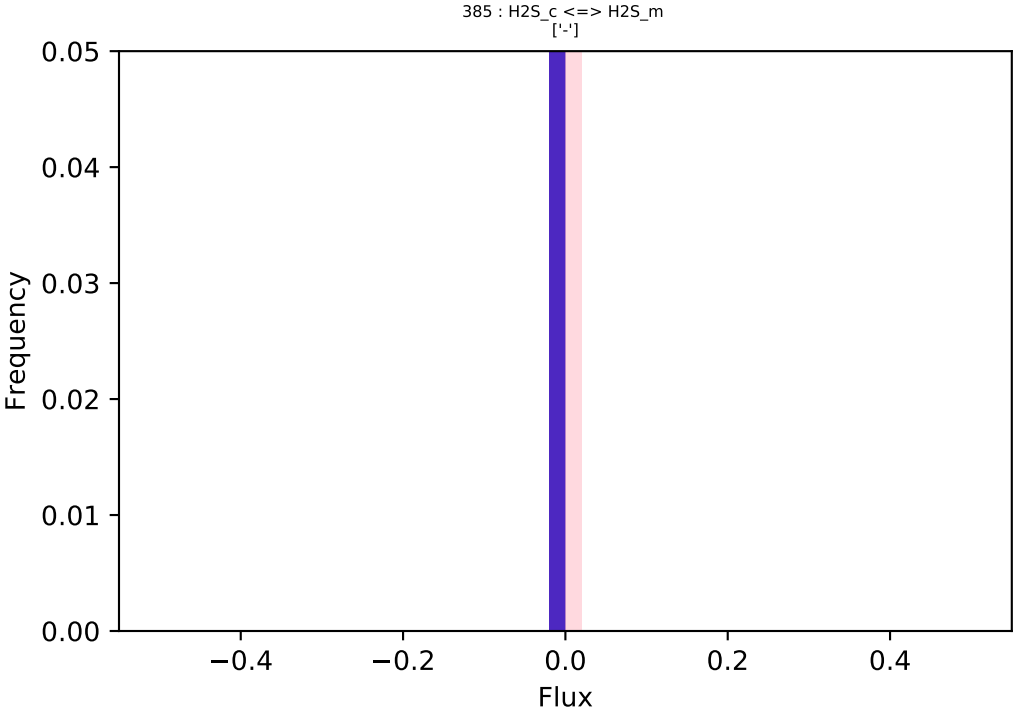

380 : H2O_c --> H2O_p
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

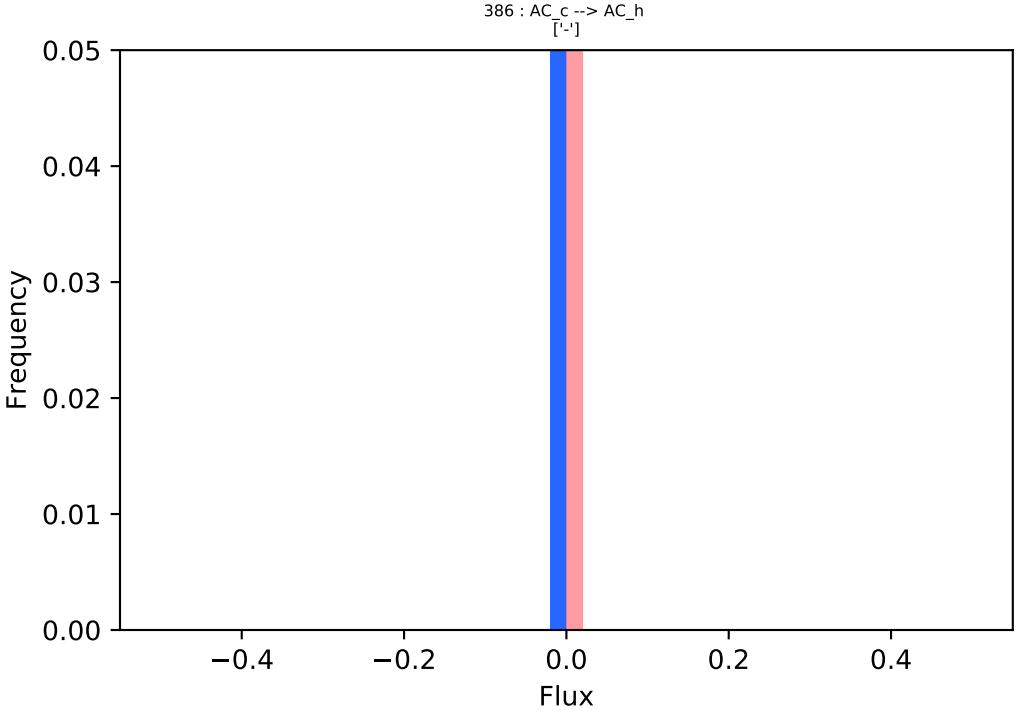

381 : H_c --> H_p
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

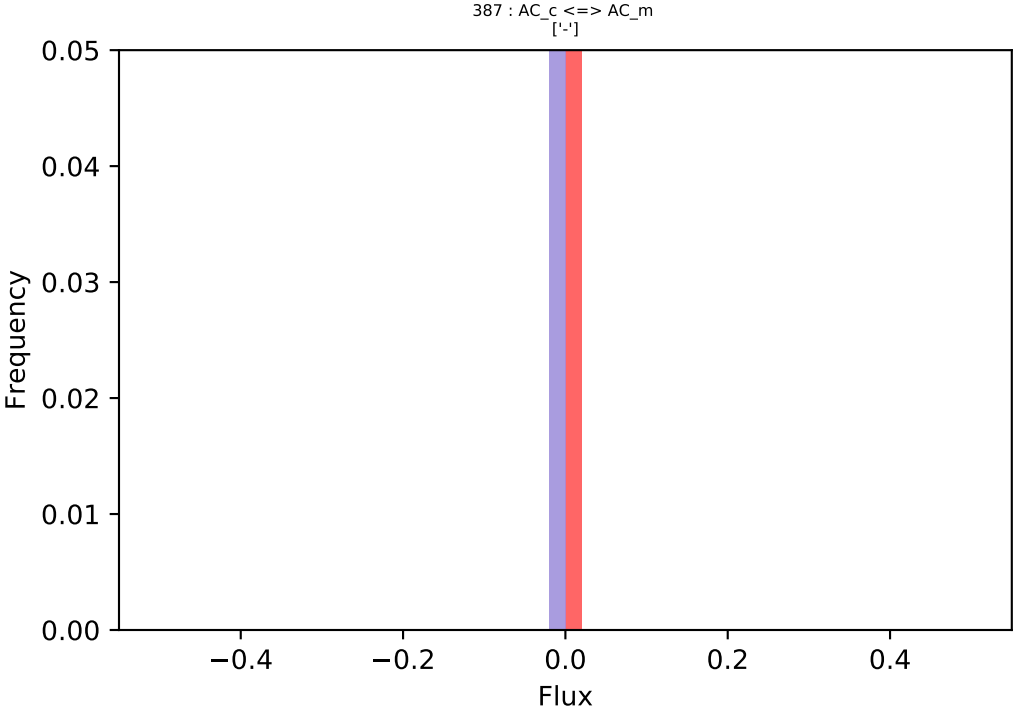

382 : NH4_c <=> NH4_h
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
0
2
4
6
8
10
12
Flux

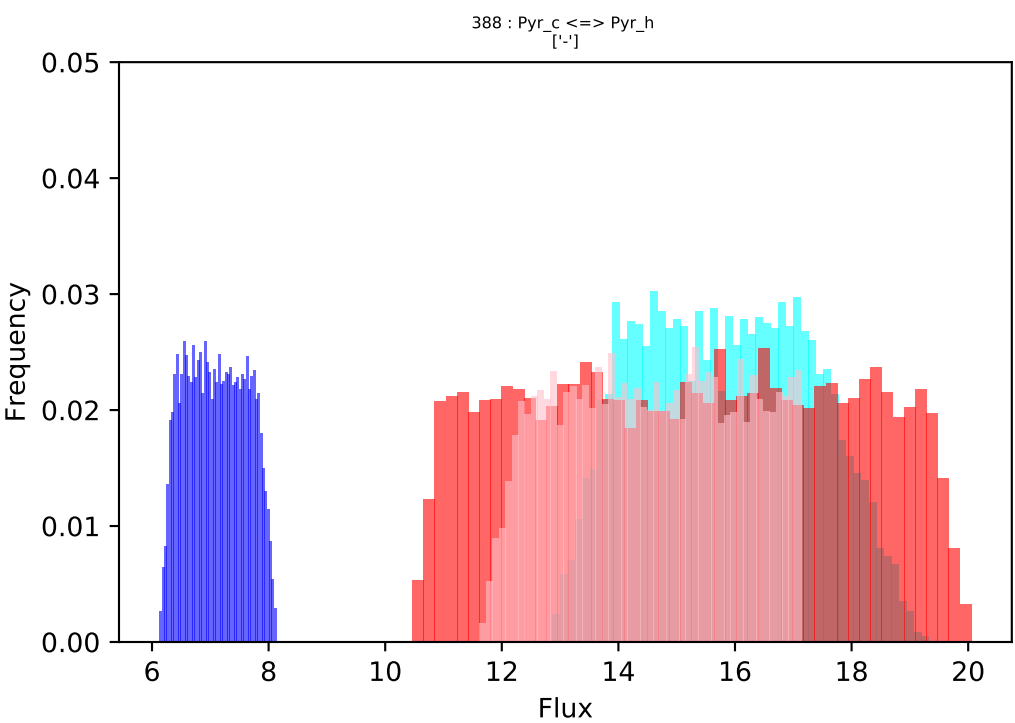

383 : NH4_c <=> NH4_m
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

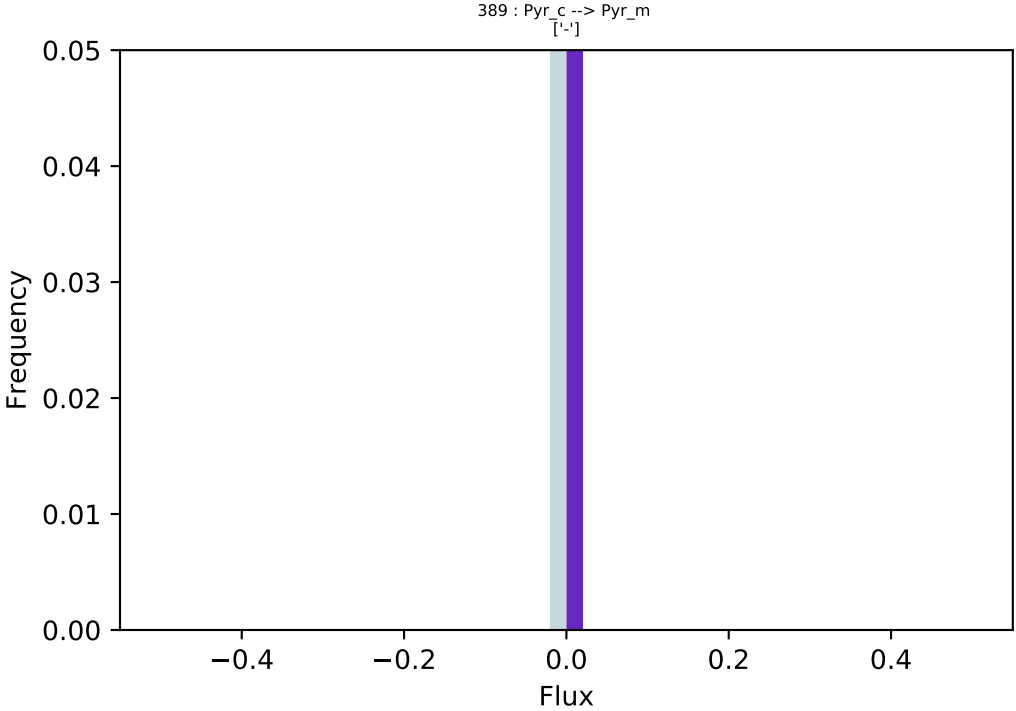

384 : H2S_c <=> H2S_h
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

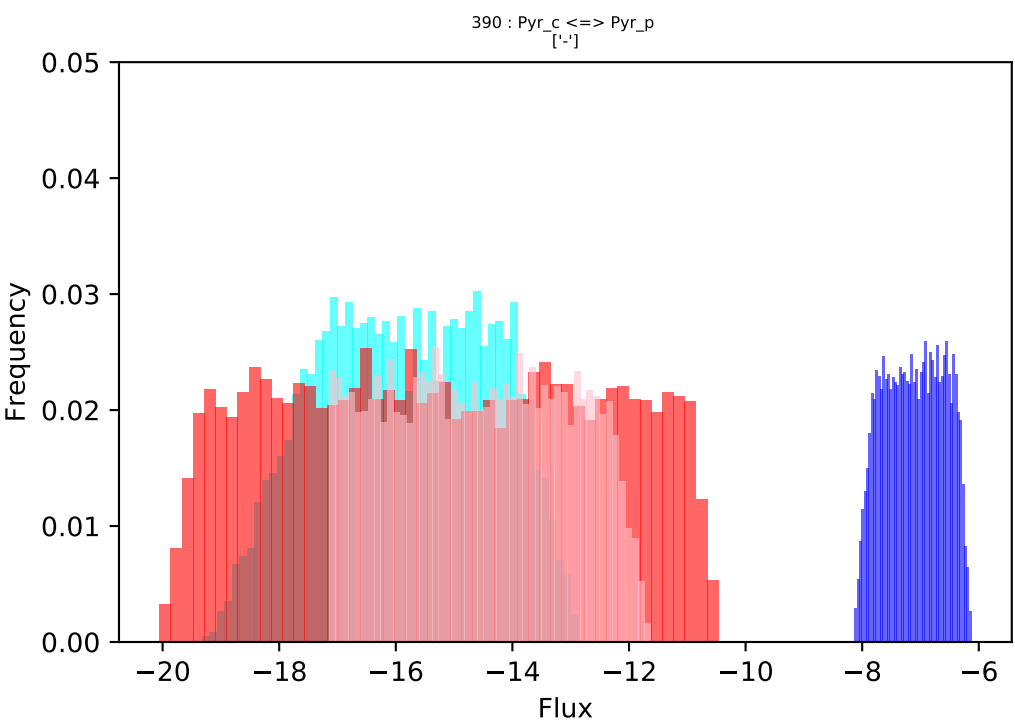

385 : H2S_c <=> H2S_m
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

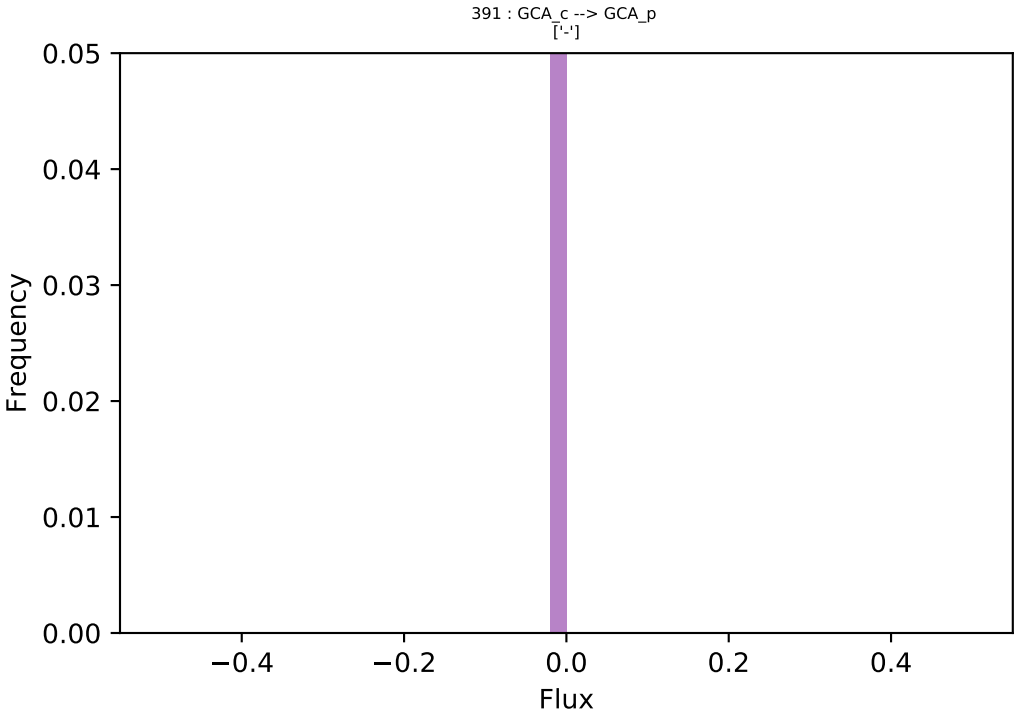

386 : AC_c --> AC_h
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

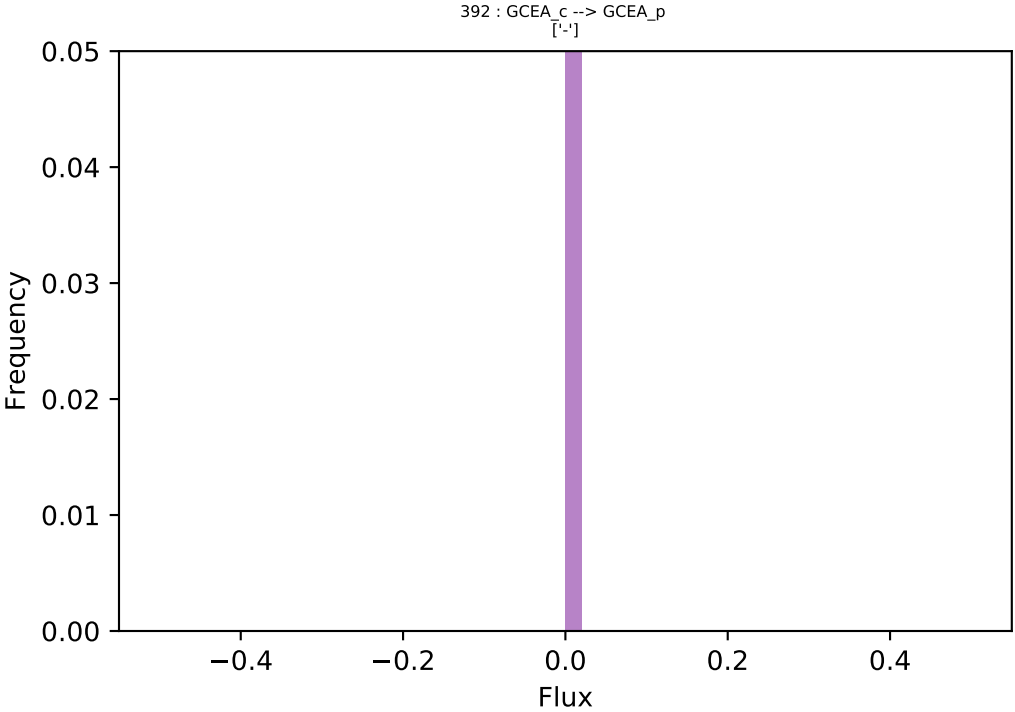

387 : AC_c <=> AC_m
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

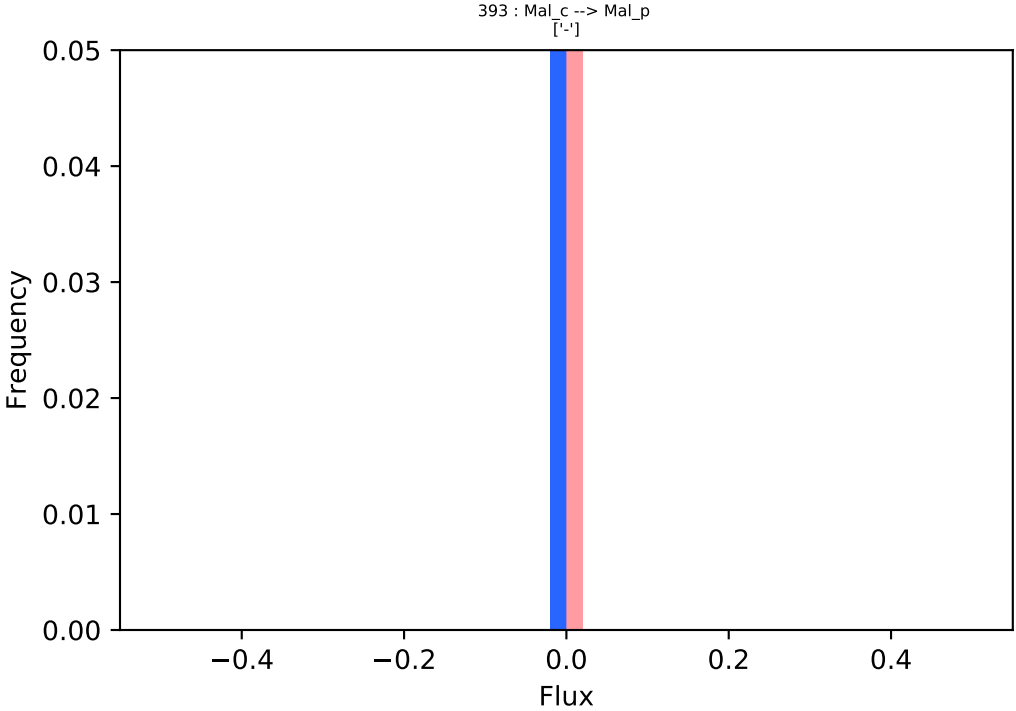

388 : Pyr_c <=> Pyr_h
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
6
8
10
12
14
16
18
20
Flux

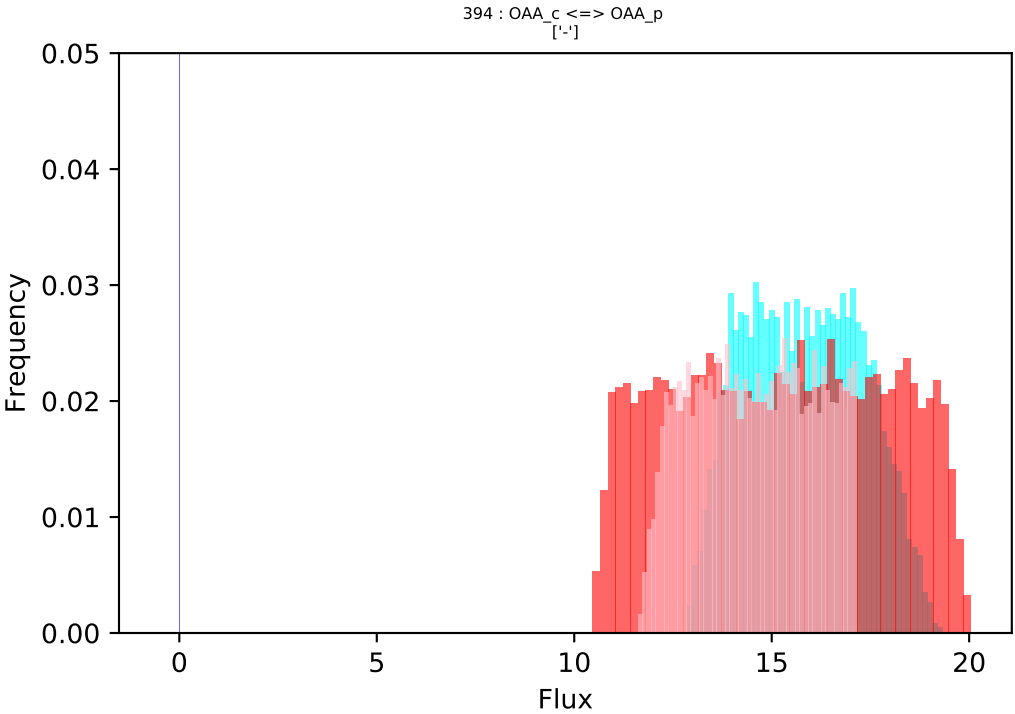

389 : Pyr_c --> Pyr_m
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

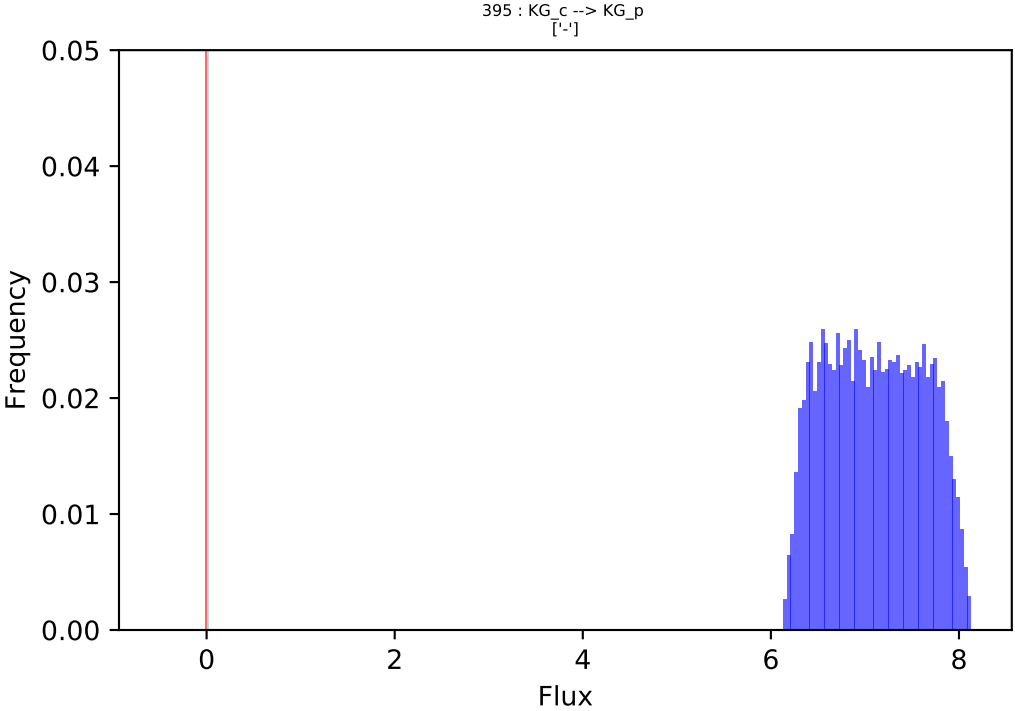

390 : Pyr_c <=> Pyr_p
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−20
−18
−16
−14
−12
−10
−8
−6
Flux

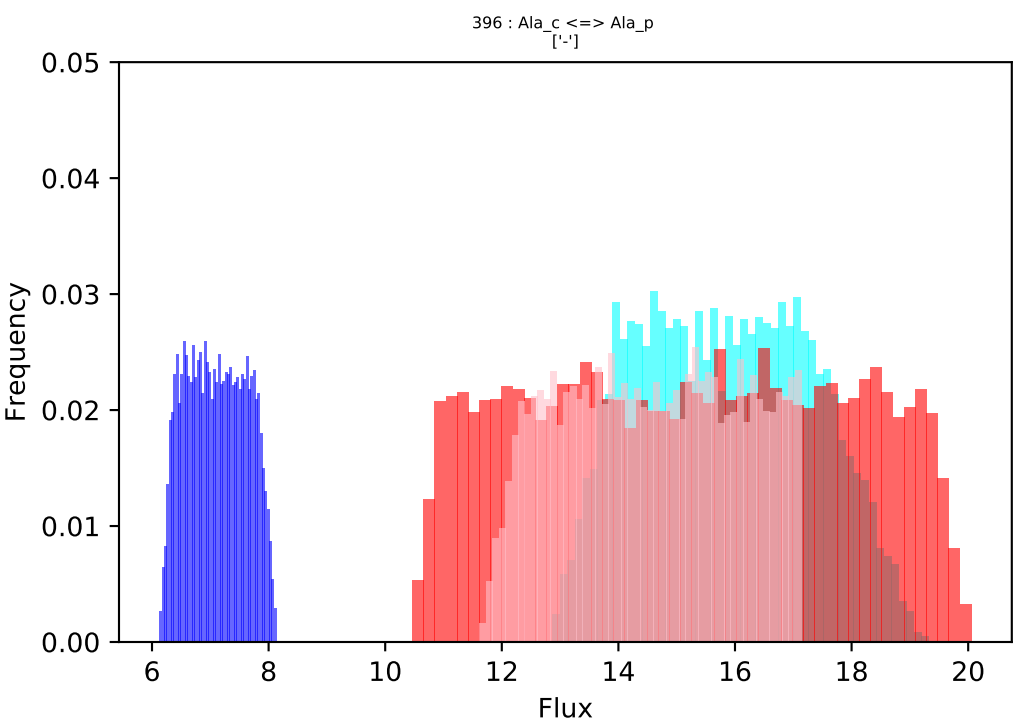

391 : GCA_c --> GCA_p
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

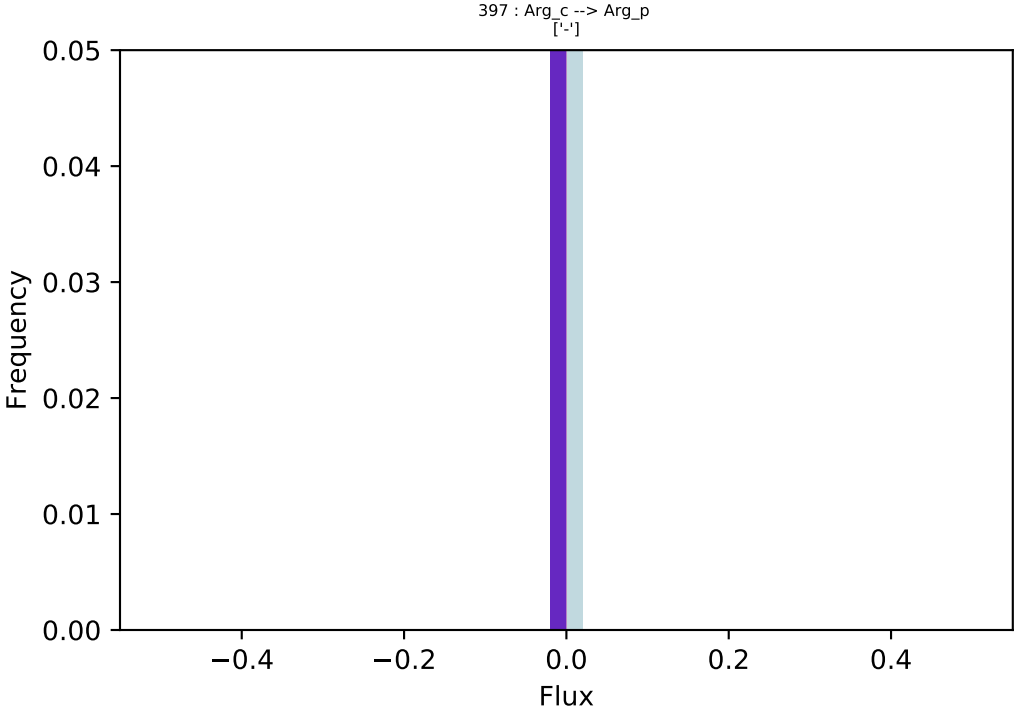

392 : GCEA_c --> GCEA_p
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

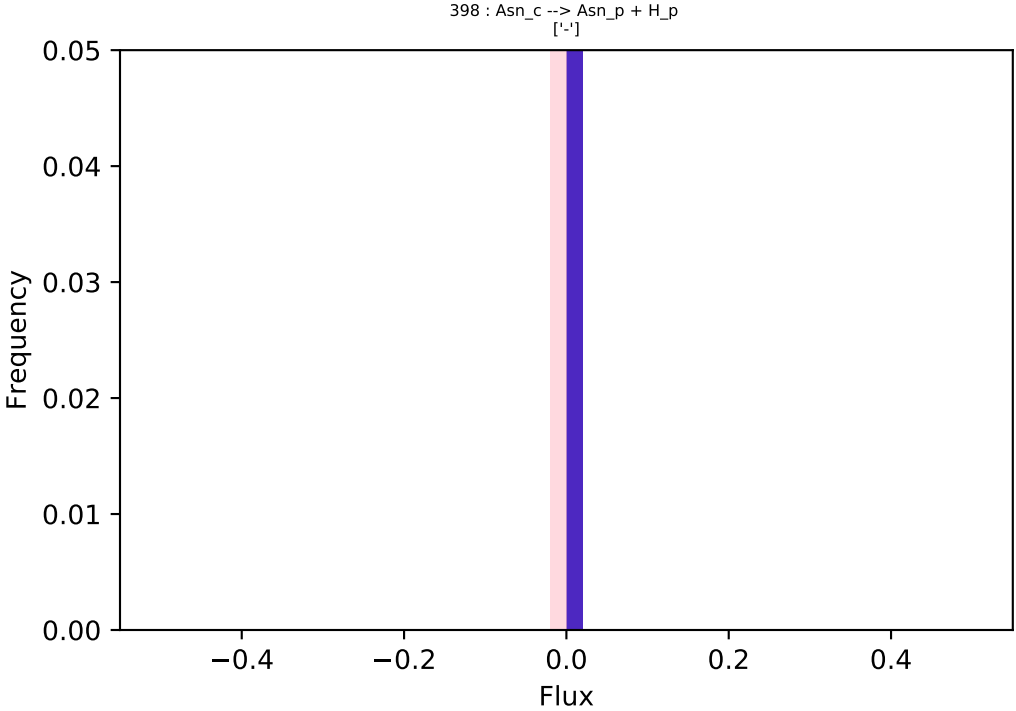

393 : Mal_c --> Mal_p
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

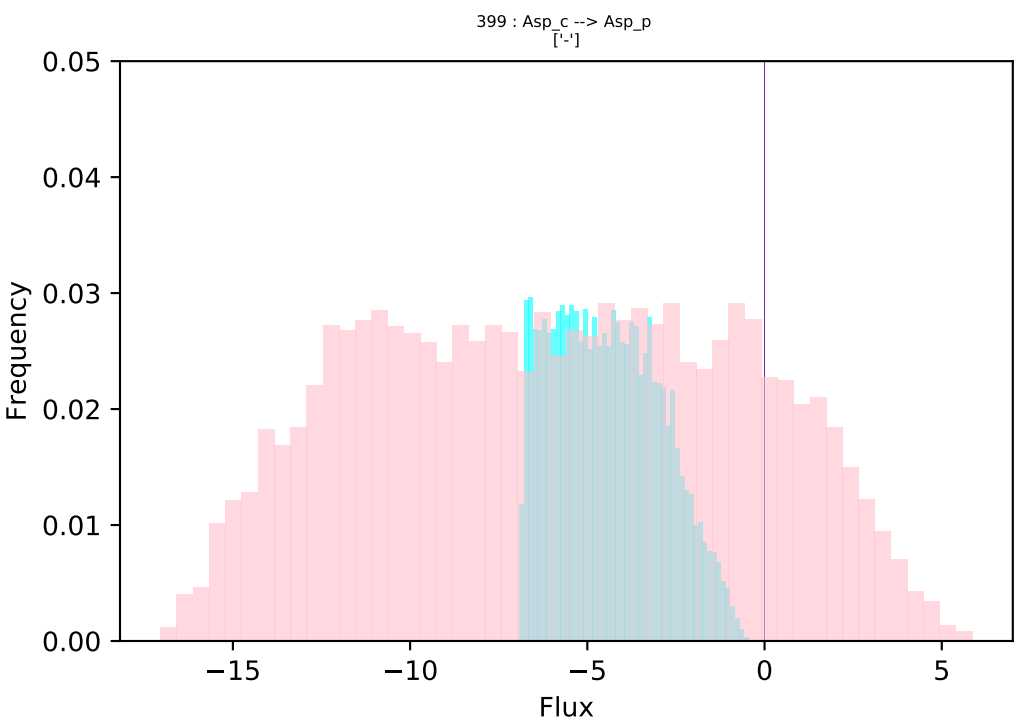

394 : OAA_c <=> OAA_p
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
0
5
10
15
20
Flux

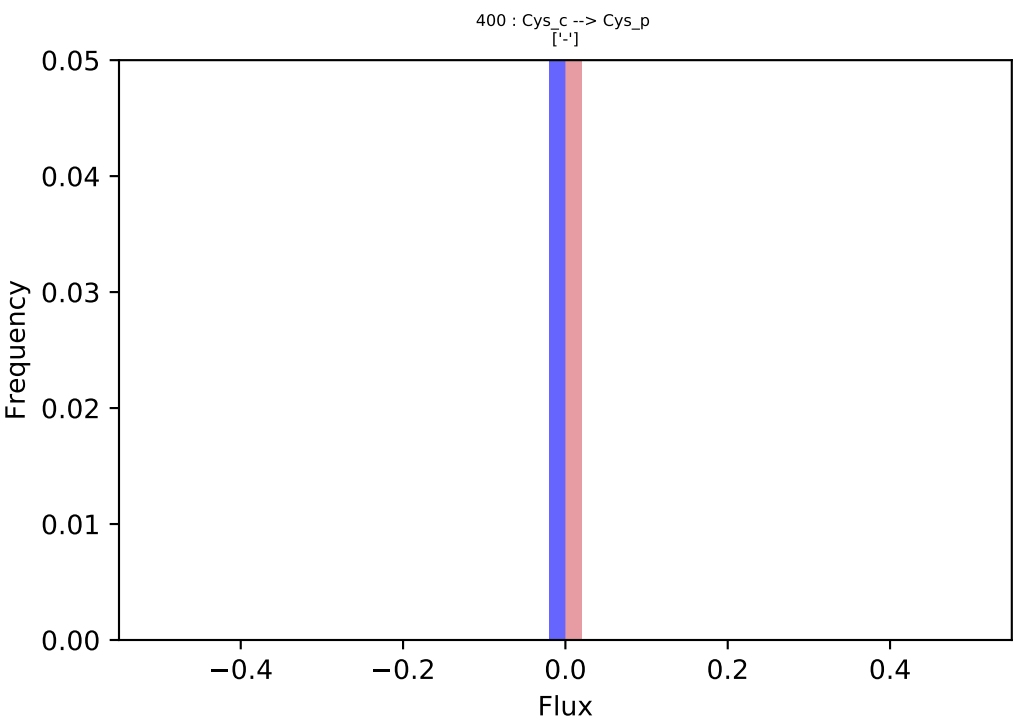

395 : KG_c --> KG_p
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
0
2
4
6
8
Flux

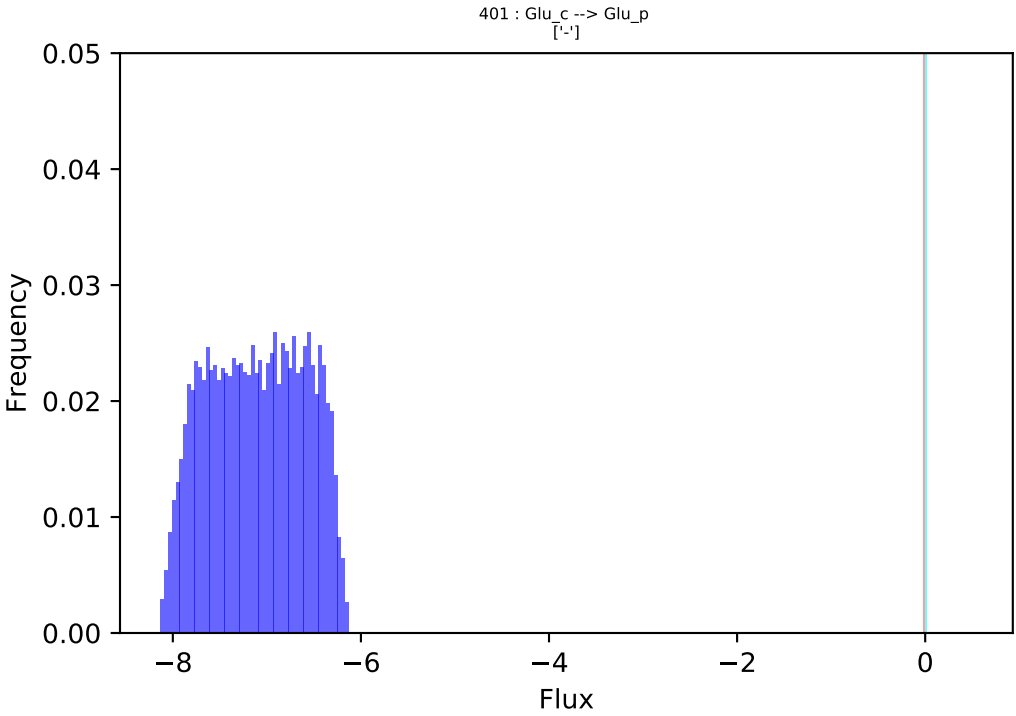

396 : Ala_c <=> Ala_p
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
6
8
10
12
14
16
18
20
Flux

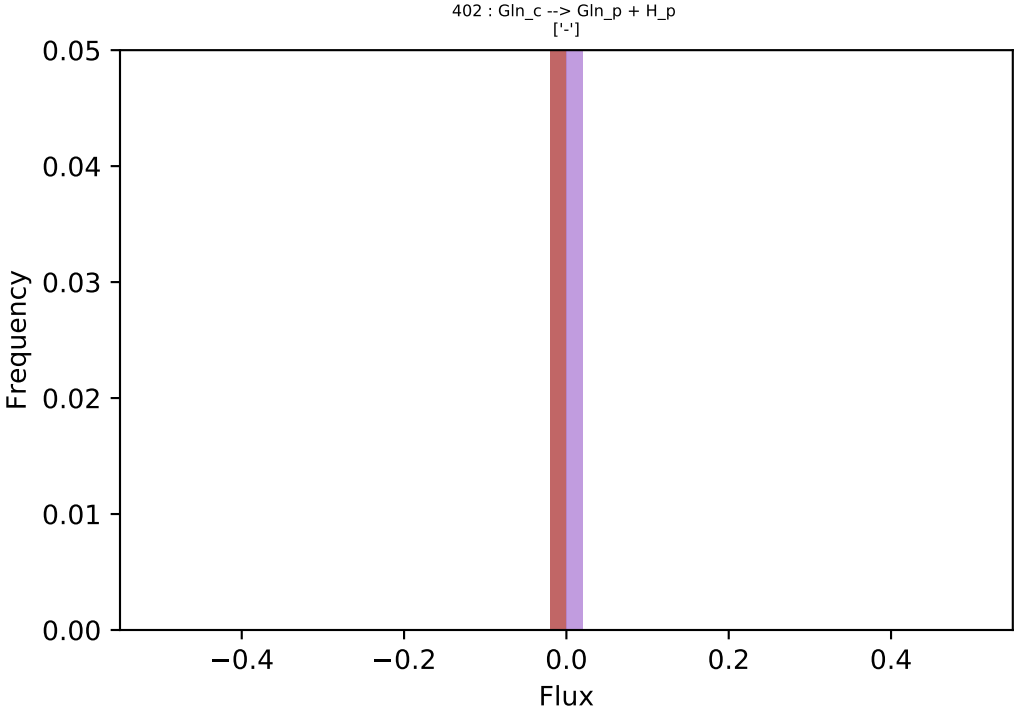

397 : Arg_c --> Arg_p
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

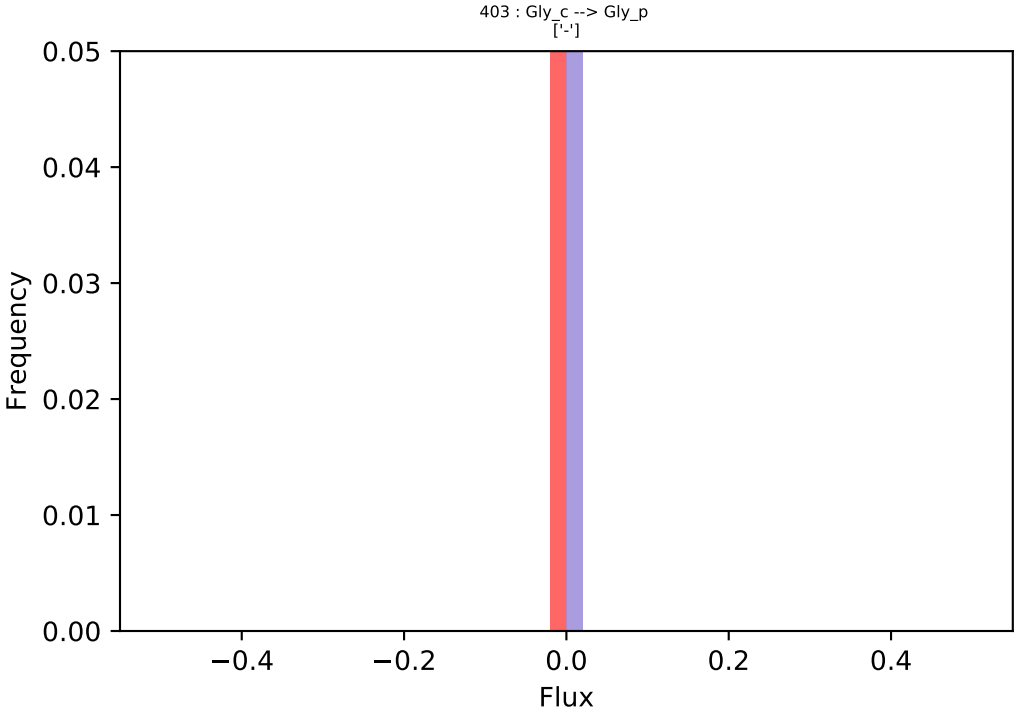

398 : Asn_c --> Asn_p + H_p
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

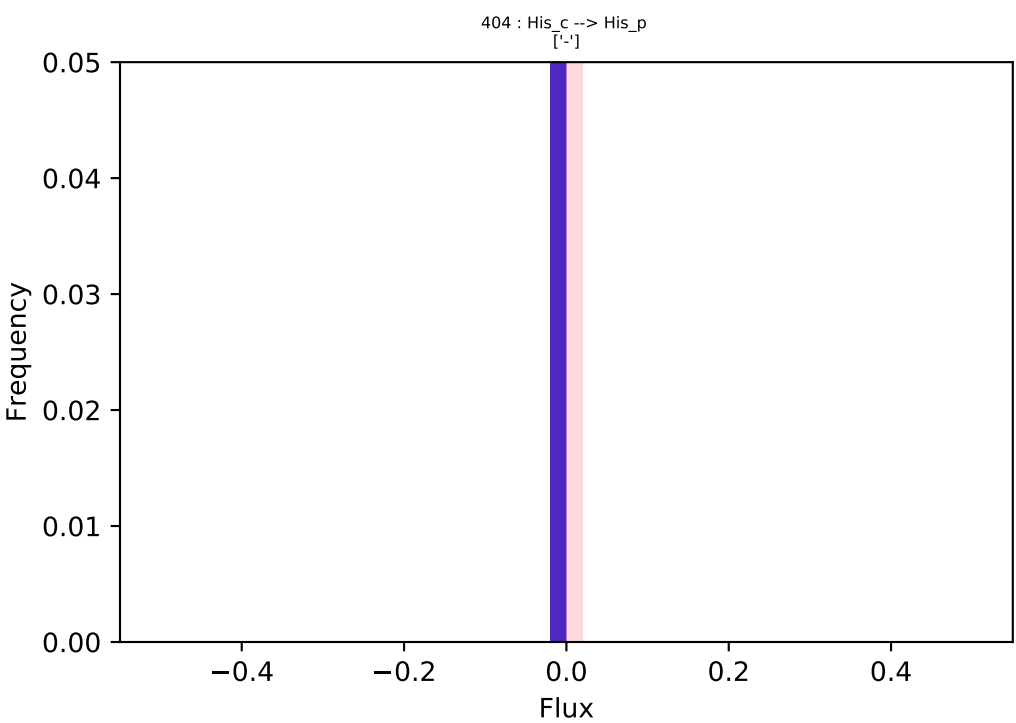

399 : Asp_c --> Asp_p
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−15
−10
−5
0
5
Flux

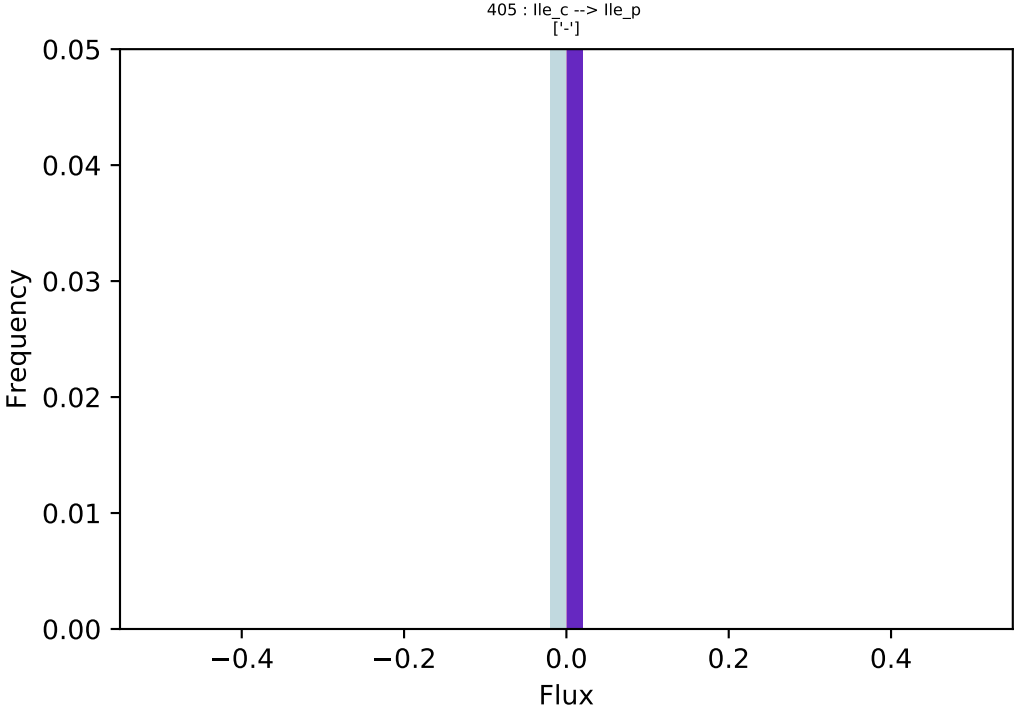

400 : Cys_c --> Cys_p
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

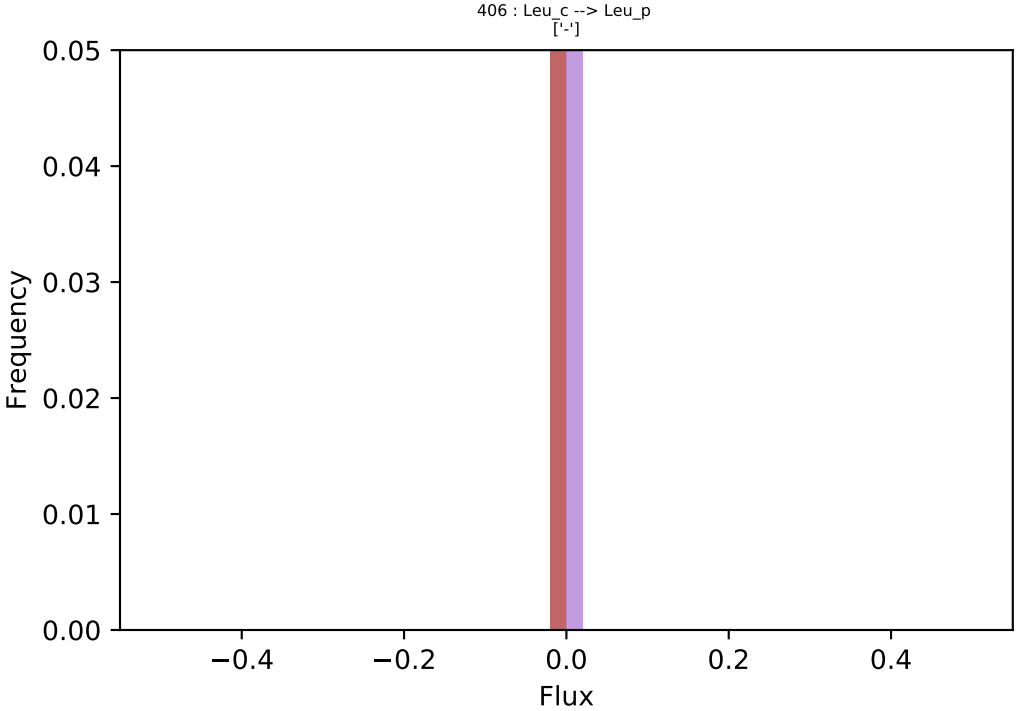

401 : Glu_c --> Glu_p
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−8
−6
−4
−2
0
Flux

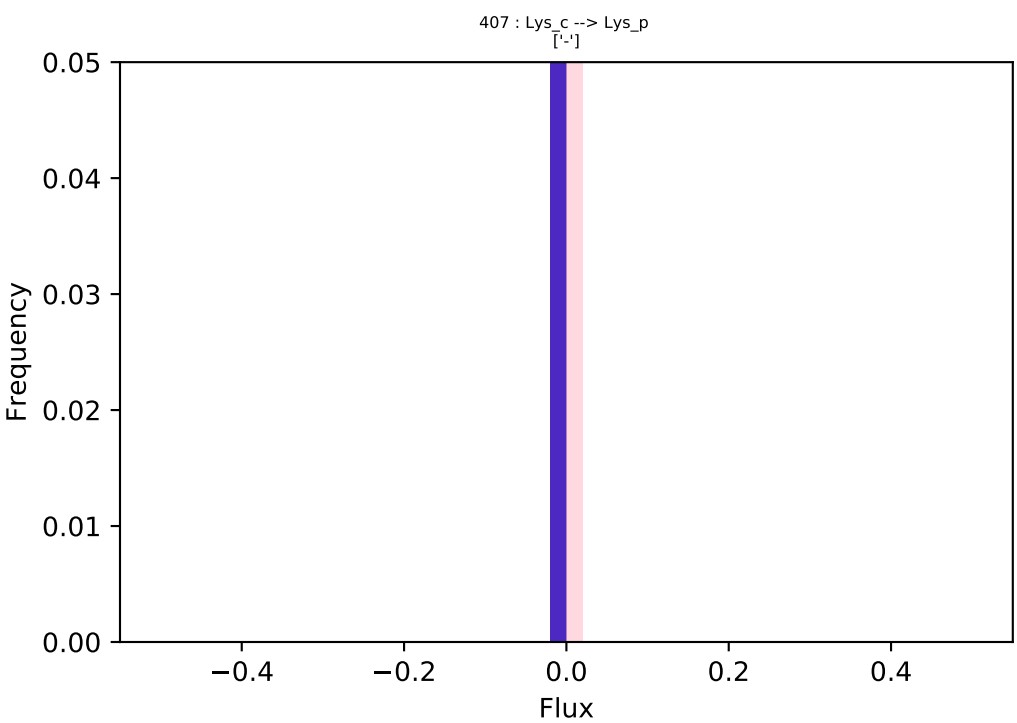

402 : Gln_c --> Gln_p + H_p
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

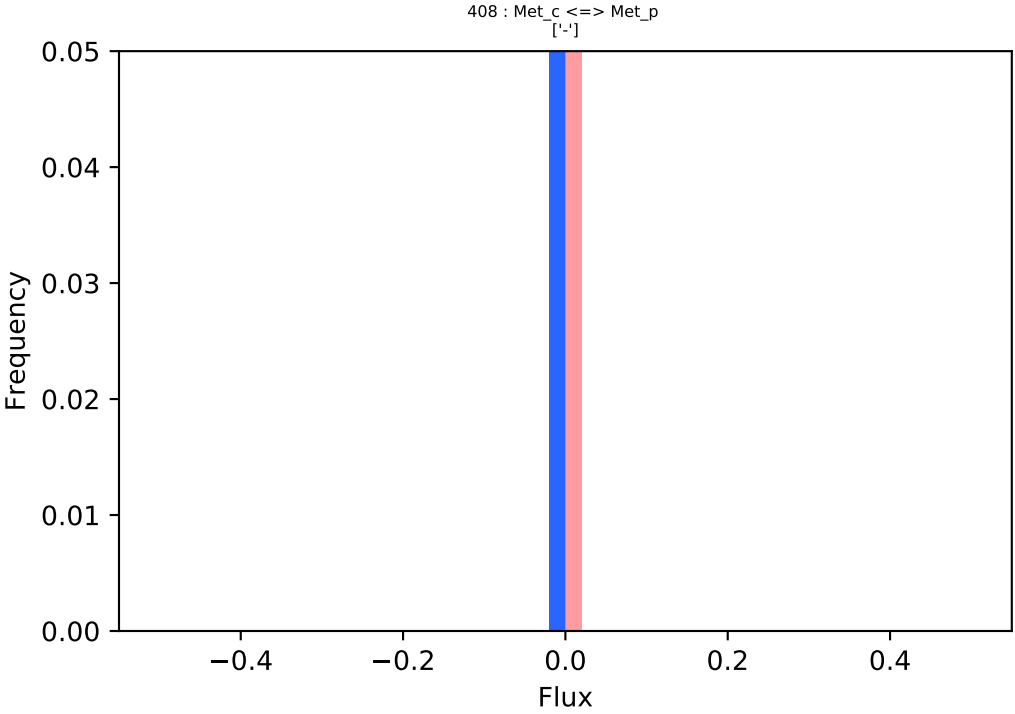

403 : Gly_c --> Gly_p
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

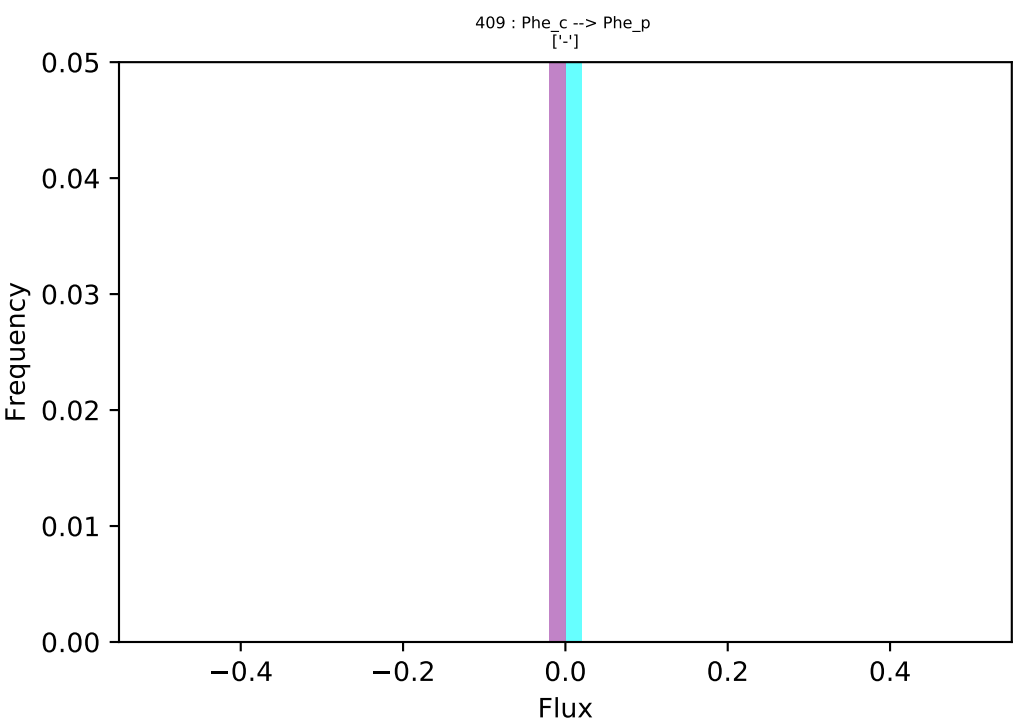

404 : His_c --> His_p
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

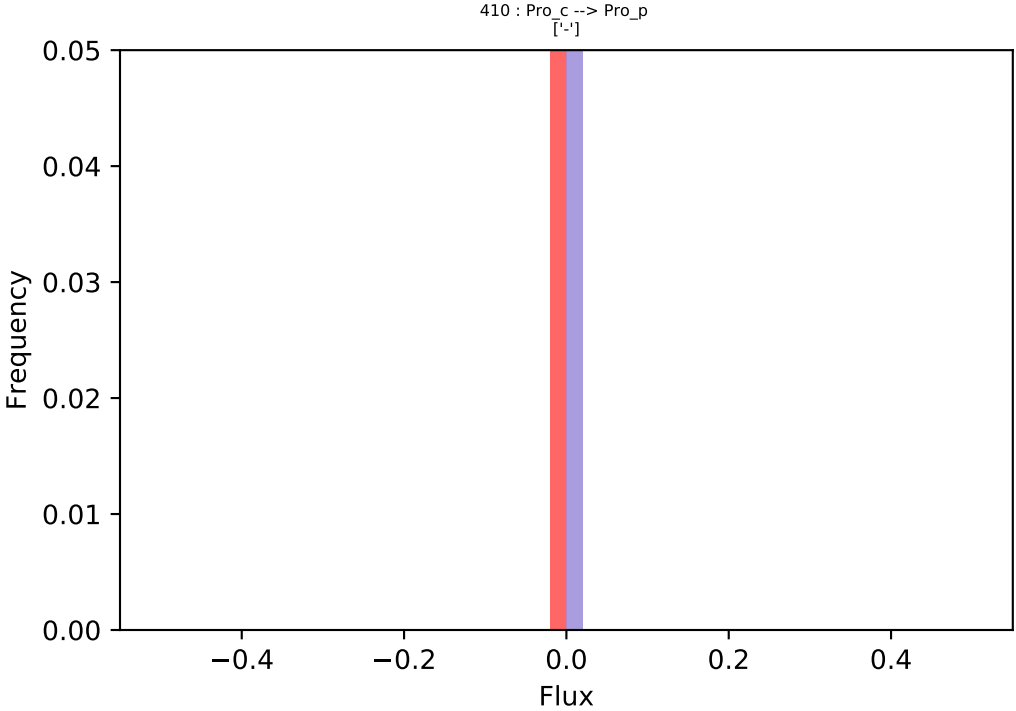

405 : Ile_c --> Ile_p
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

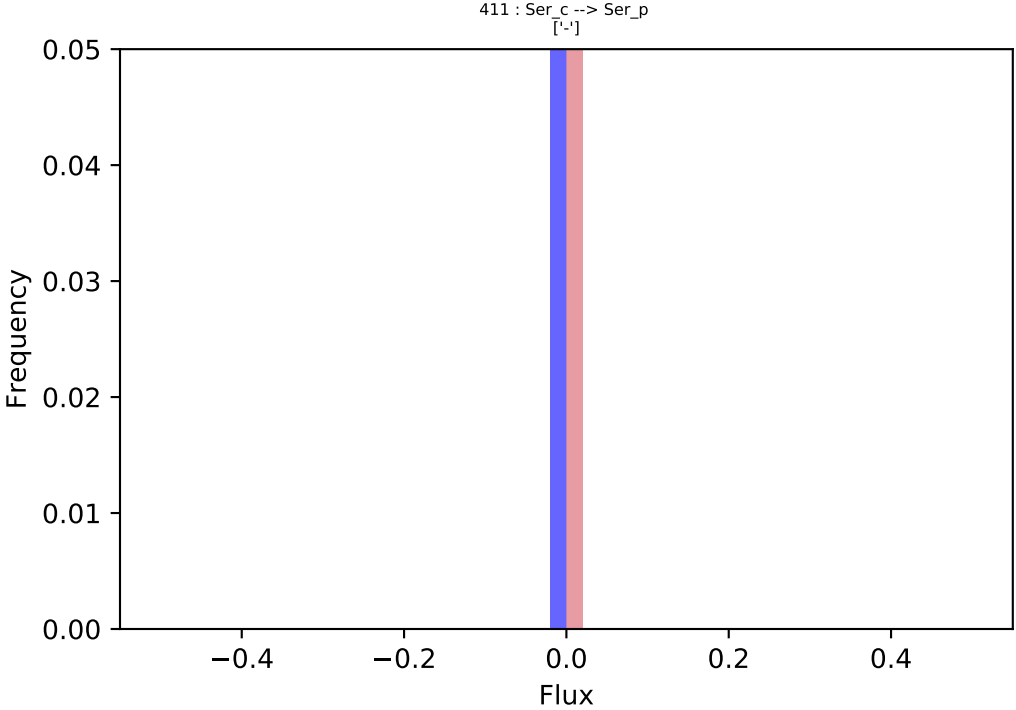

406 : Leu_c --> Leu_p
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

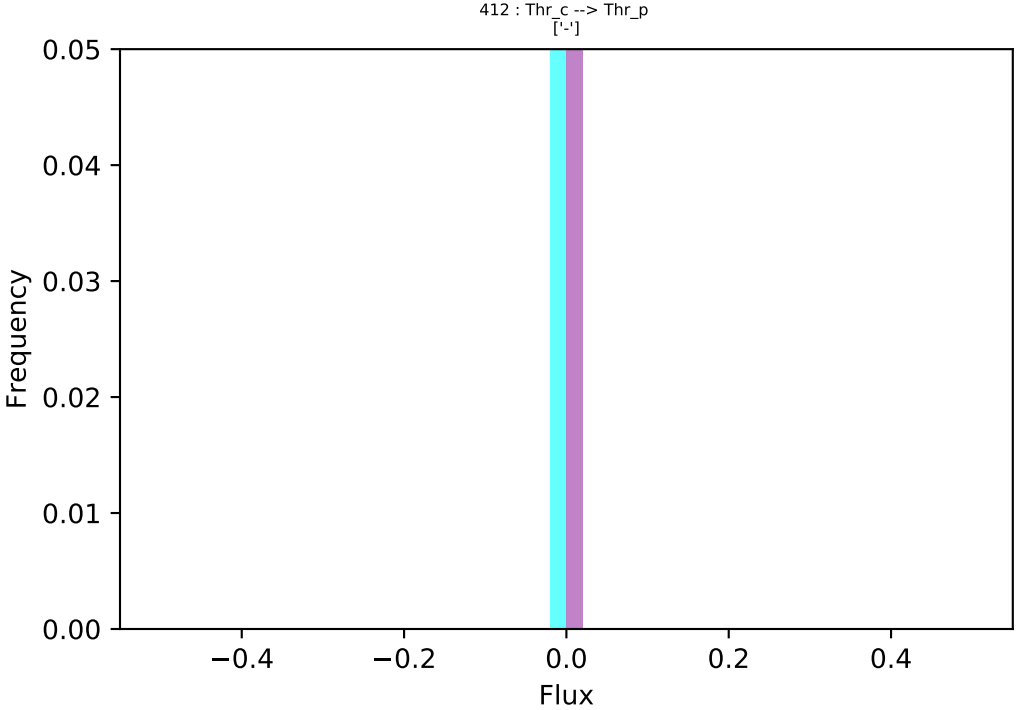

407 : Lys_c --> Lys_p
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

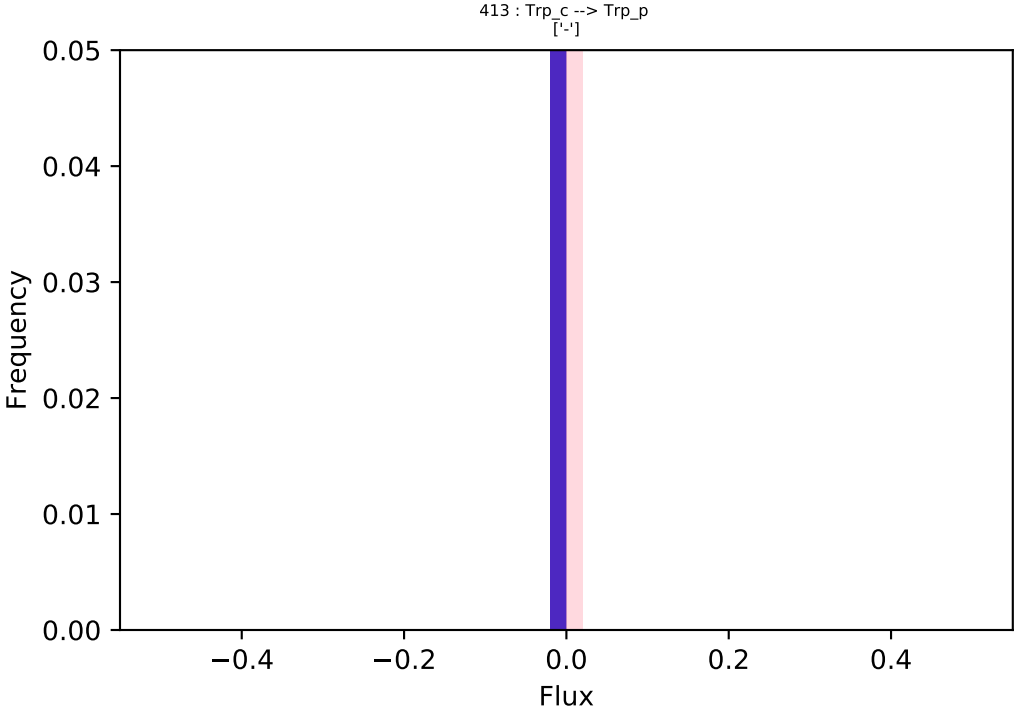

408 : Met_c <=> Met_p
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

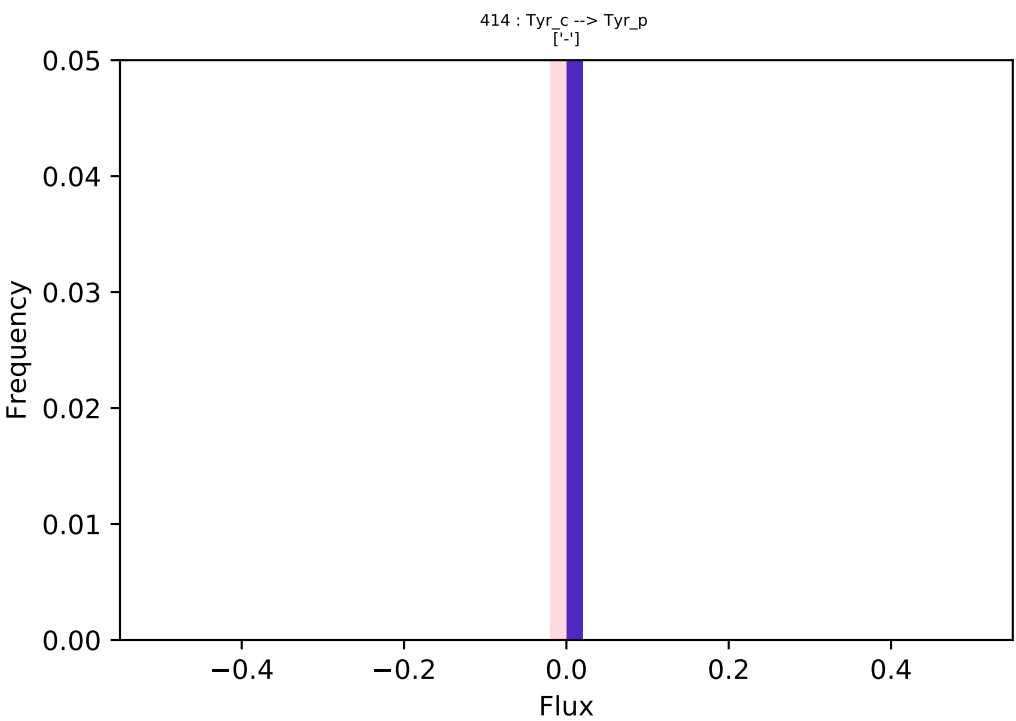

409 : Phe_c --> Phe_p
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

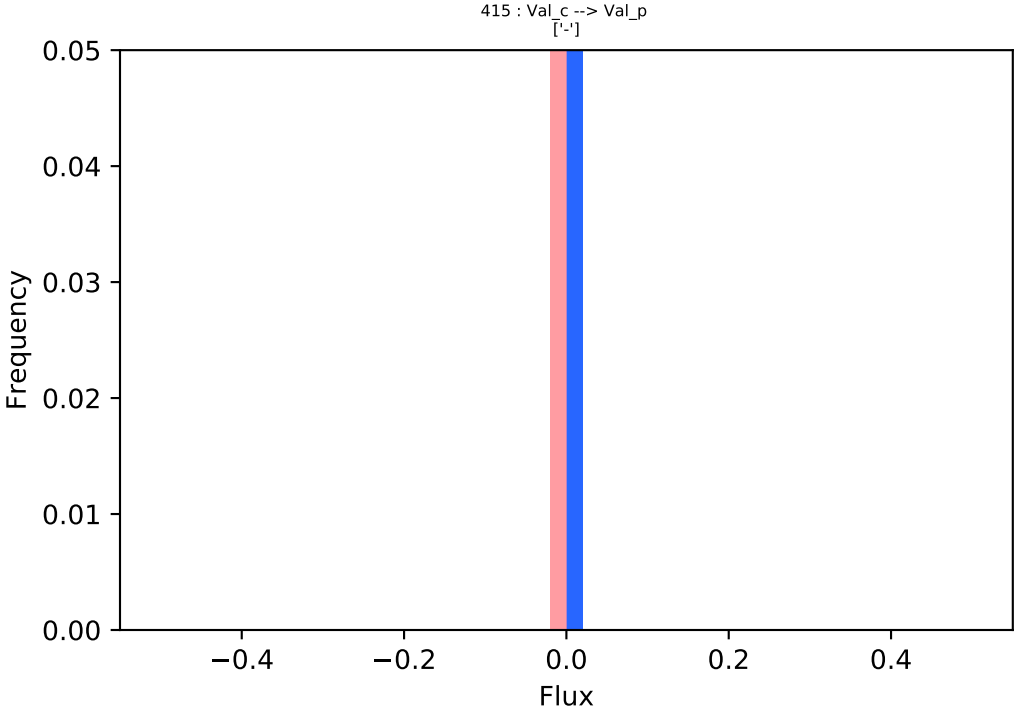

410 : Pro_c --> Pro_p
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

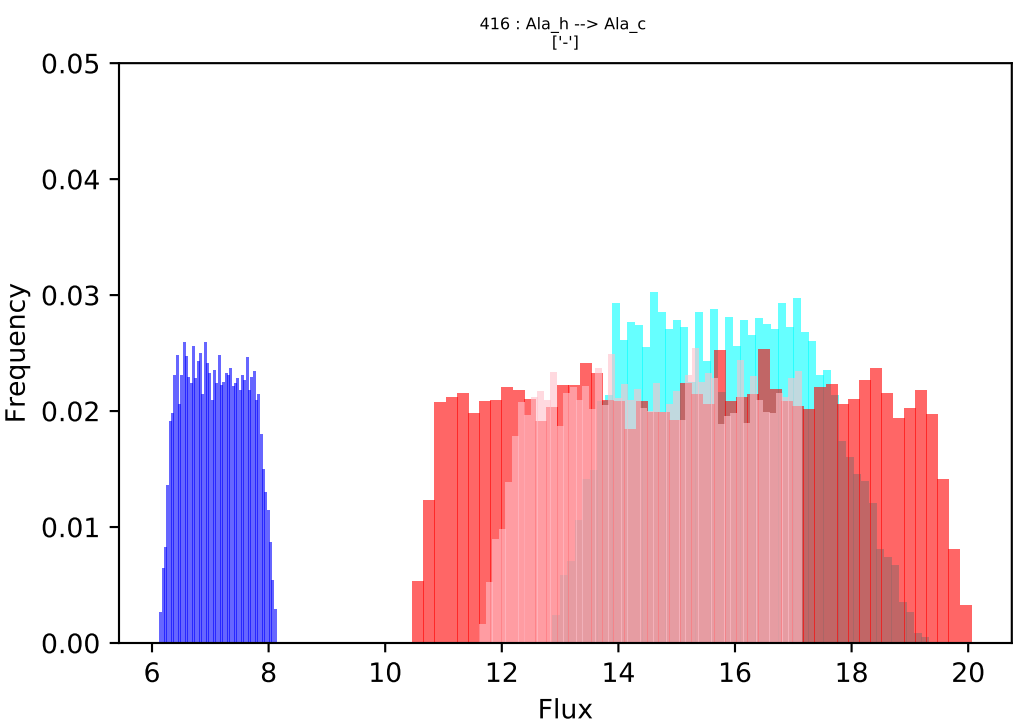

411 : Ser_c --> Ser_p
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

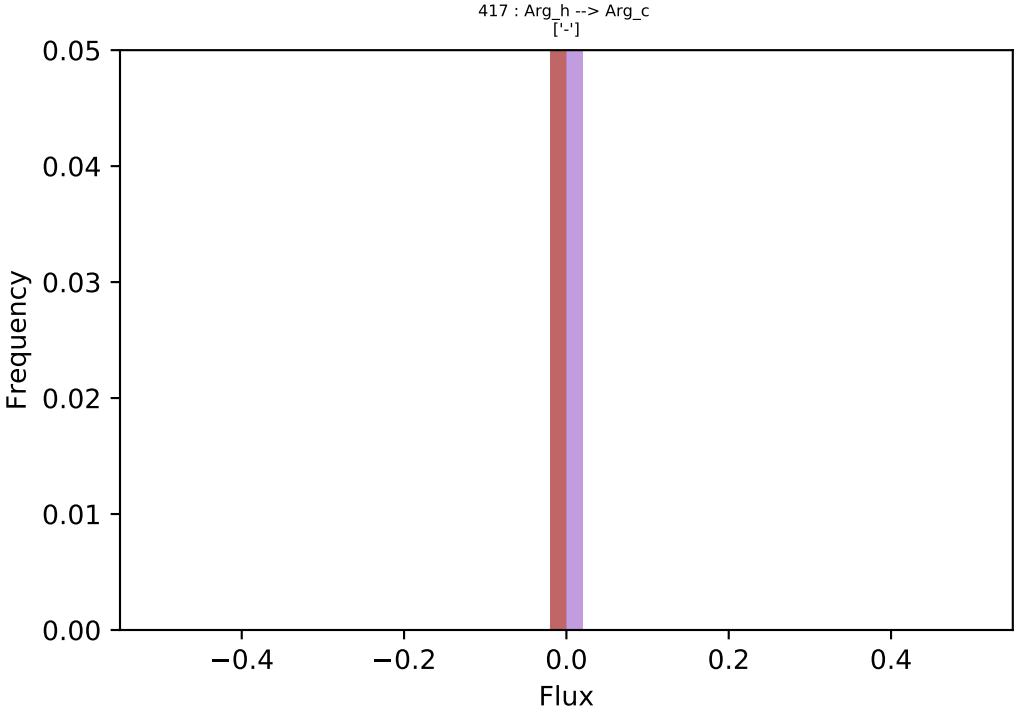

412 : Thr_c --> Thr_p
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

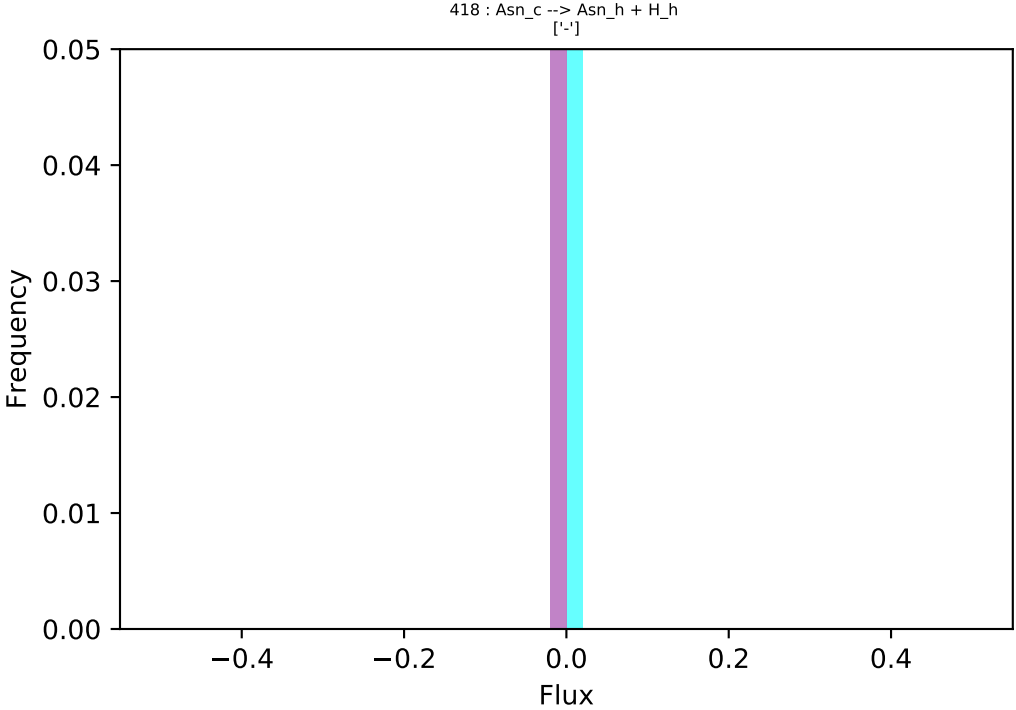

413 : Trp_c --> Trp_p
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

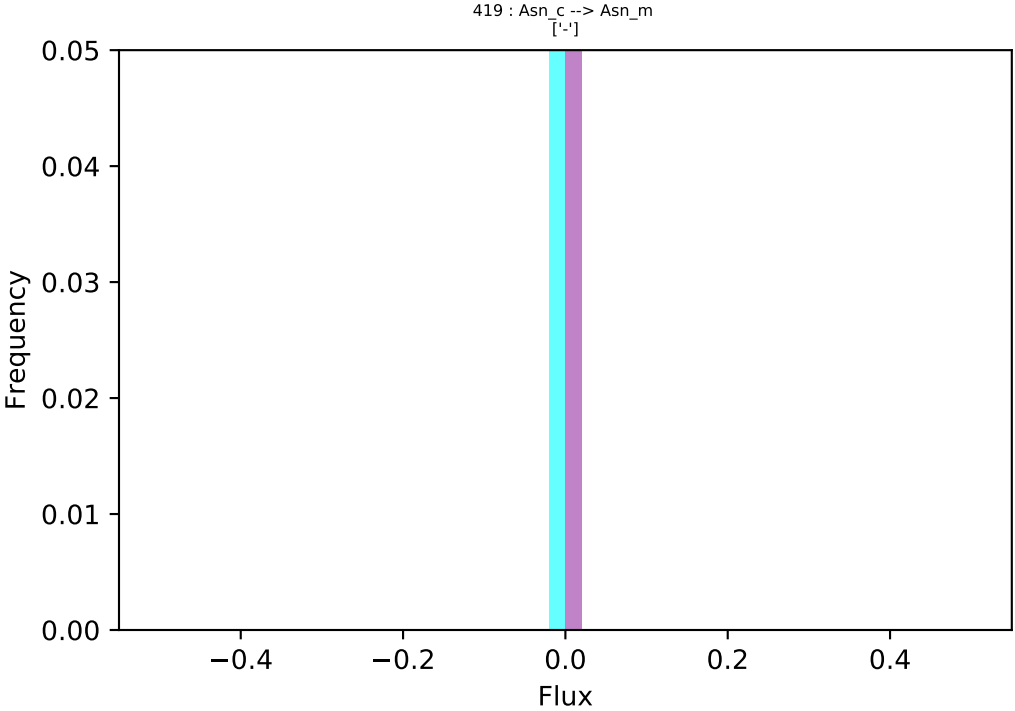

414 : Tyr_c --> Tyr_p
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

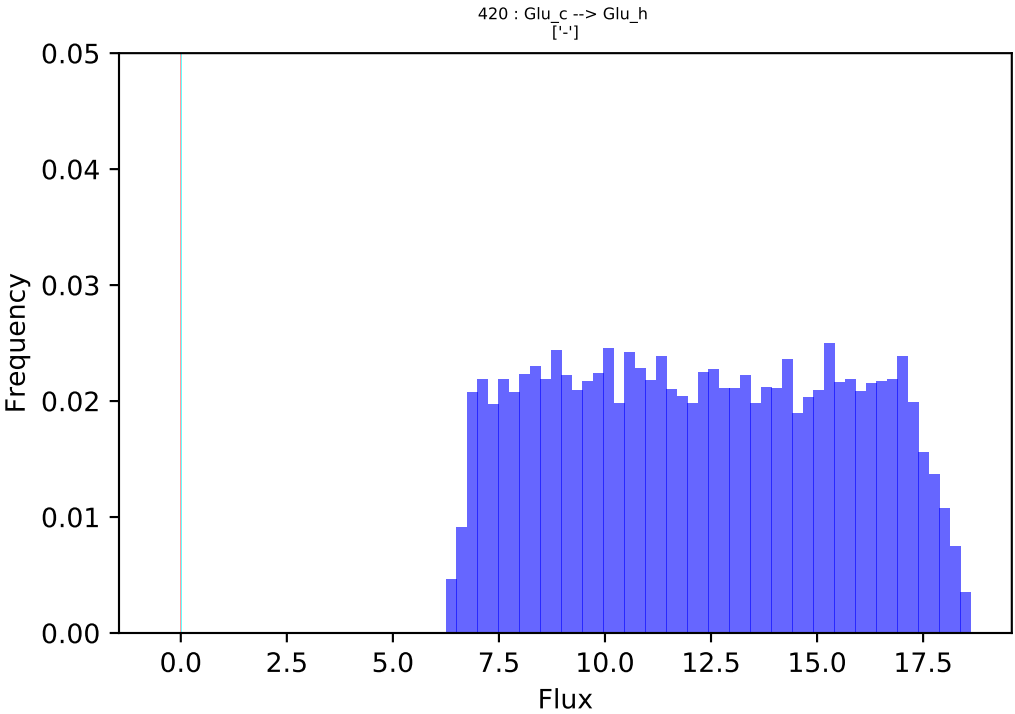

415 : Val_c --> Val_p
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

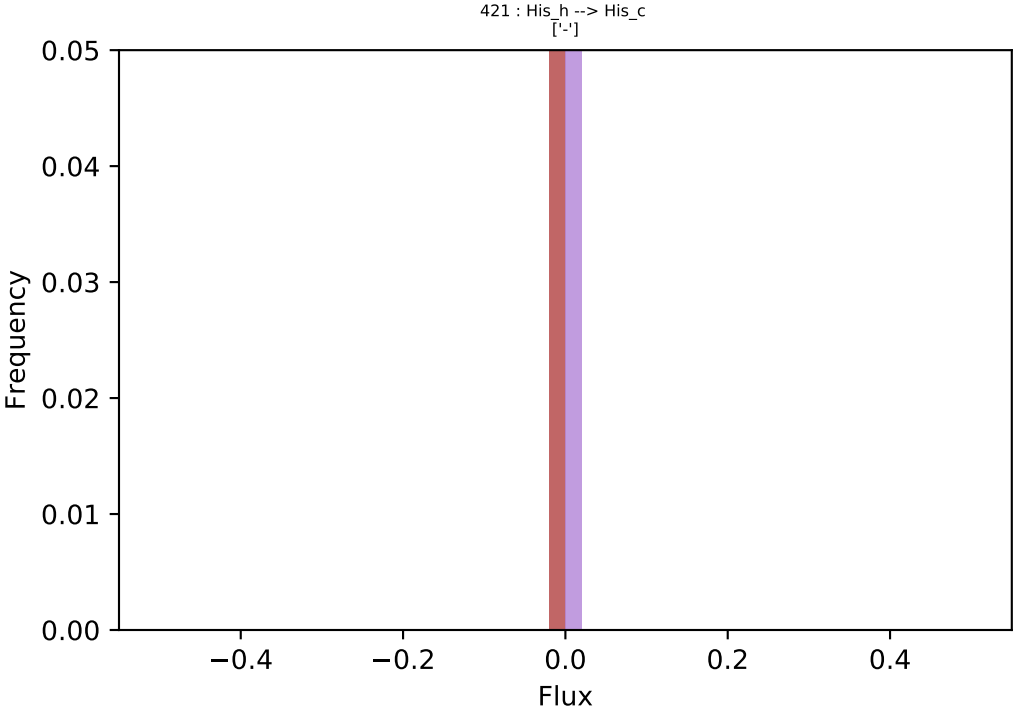

416 : Ala_h --> Ala_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
6
8
10
12
14
16
18
20
Flux

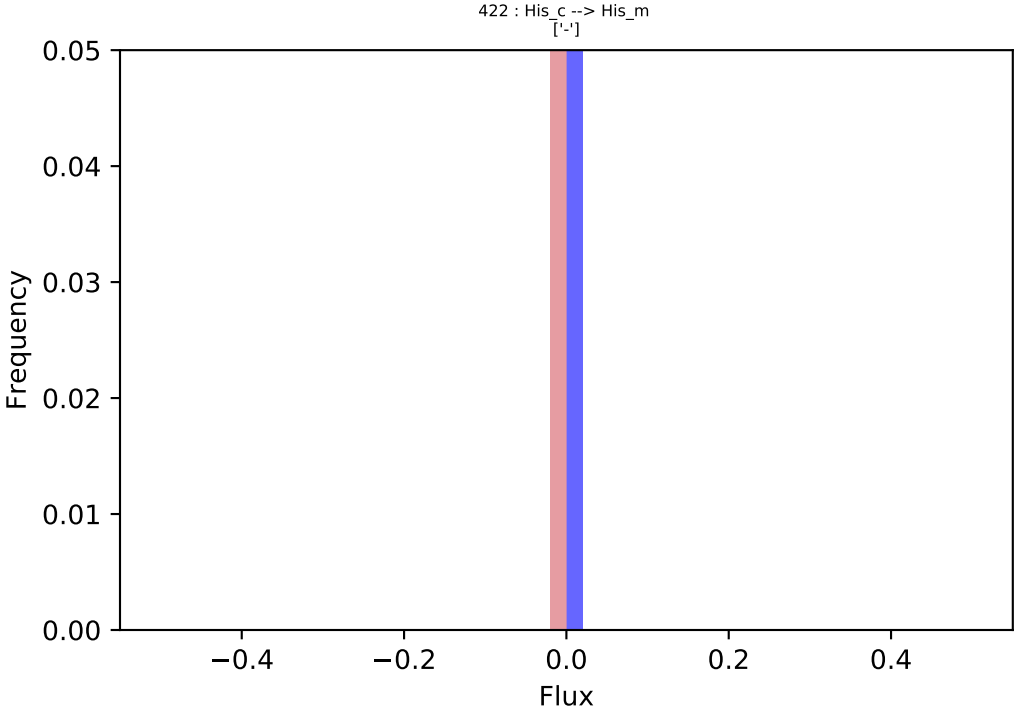

417 : Arg_h --> Arg_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

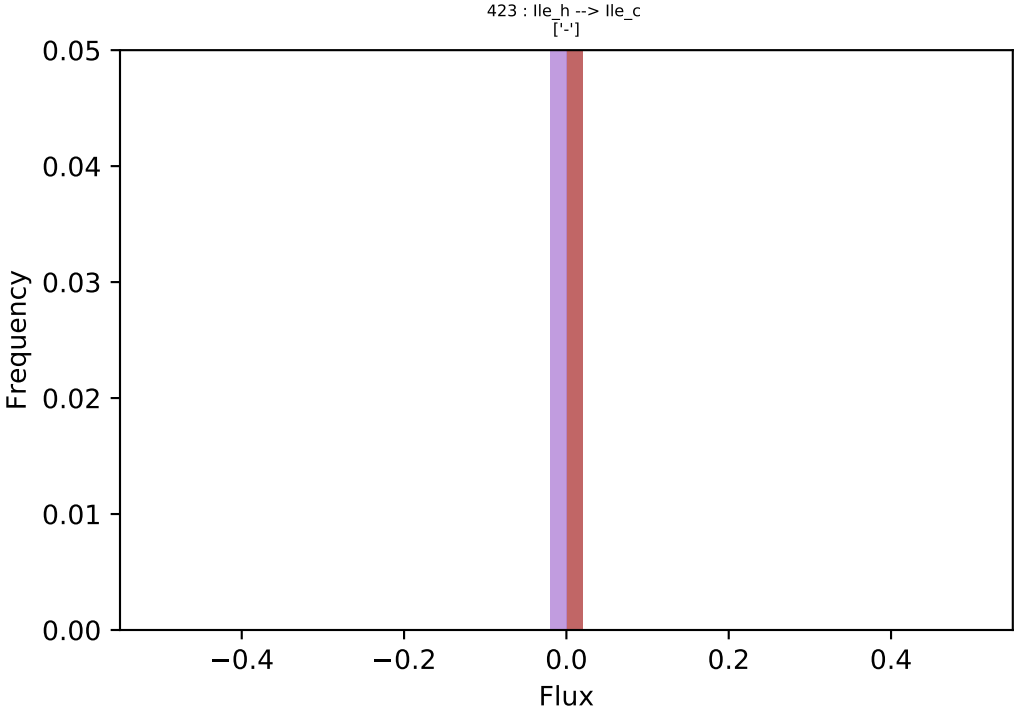

418 : Asn_c --> Asn_h + H_h
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

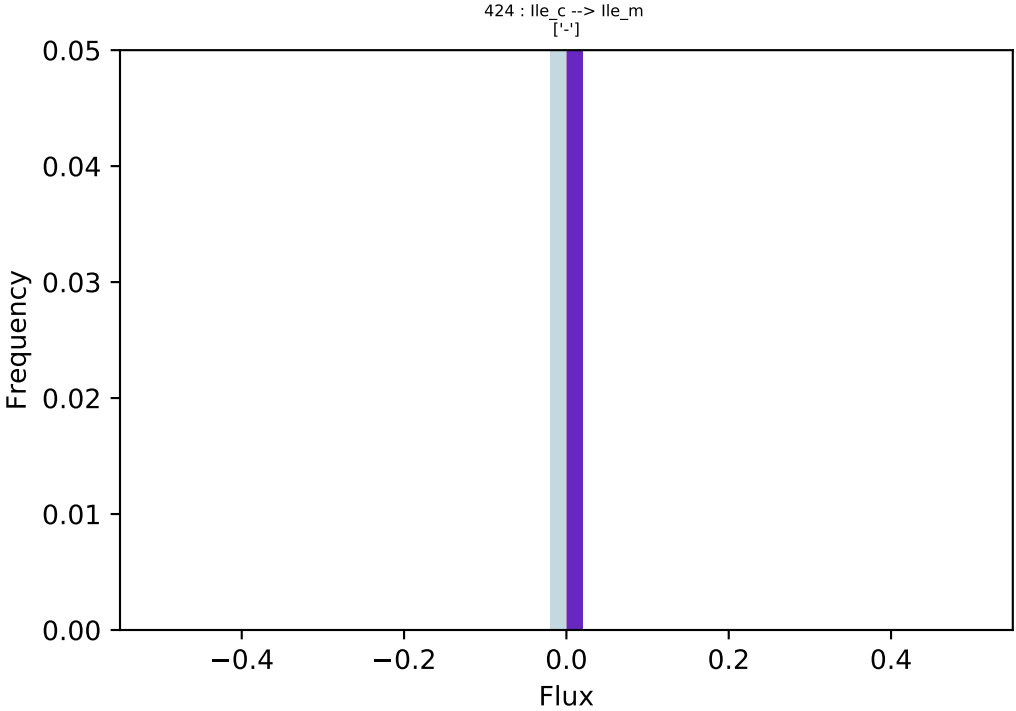

419 : Asn_c --> Asn_m
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

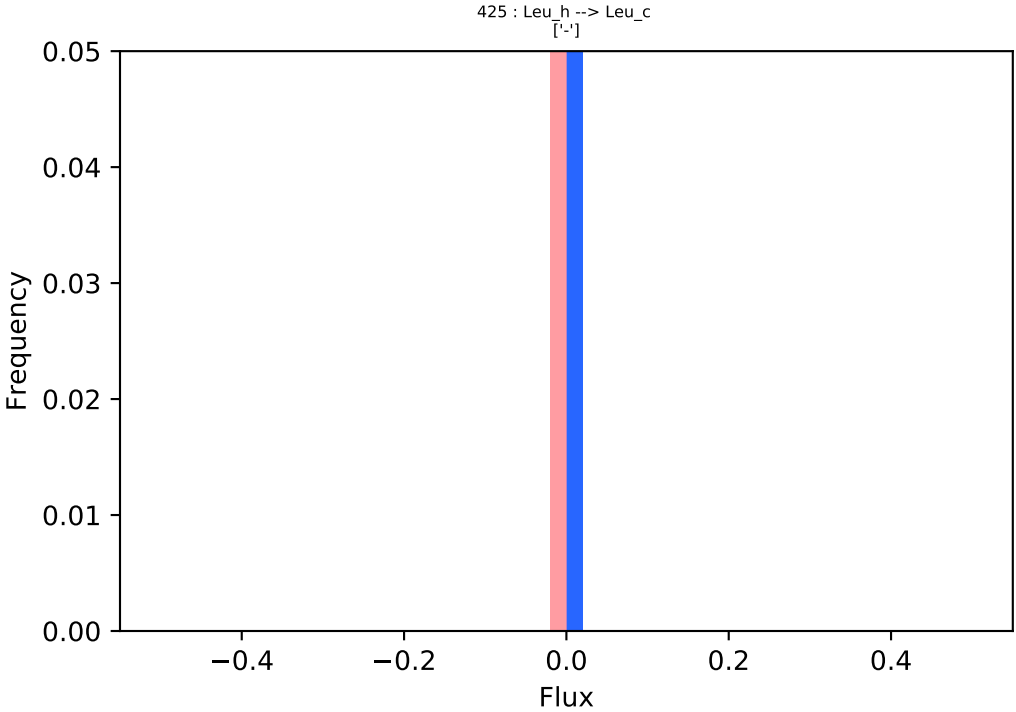

420 : Glu_c --> Glu_h
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
Flux

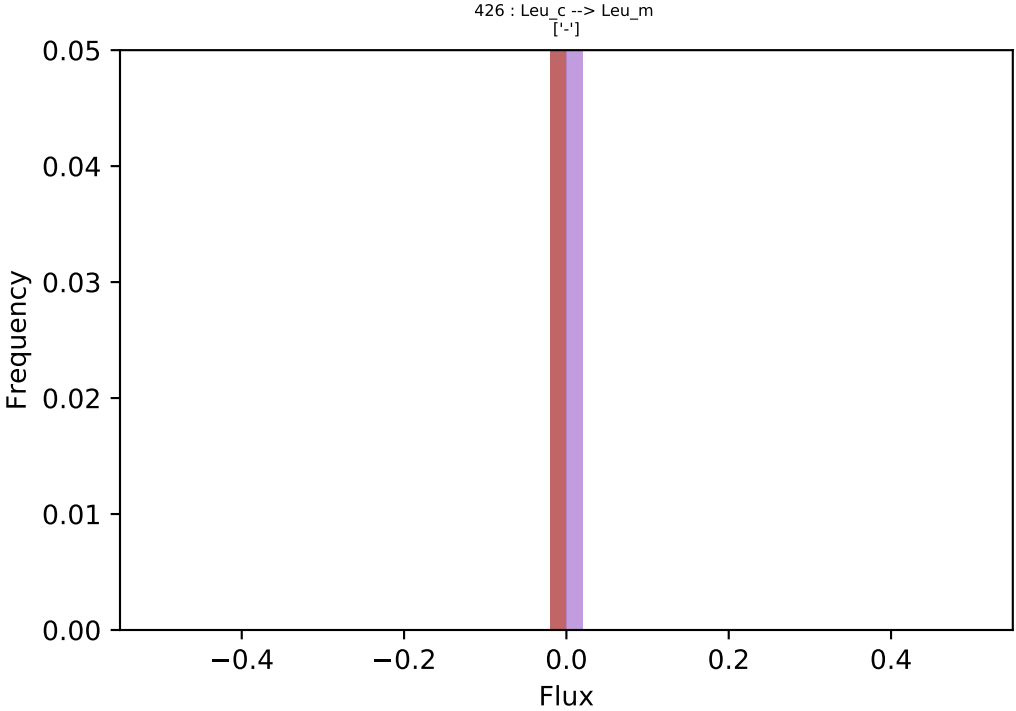

421 : His_h --> His_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

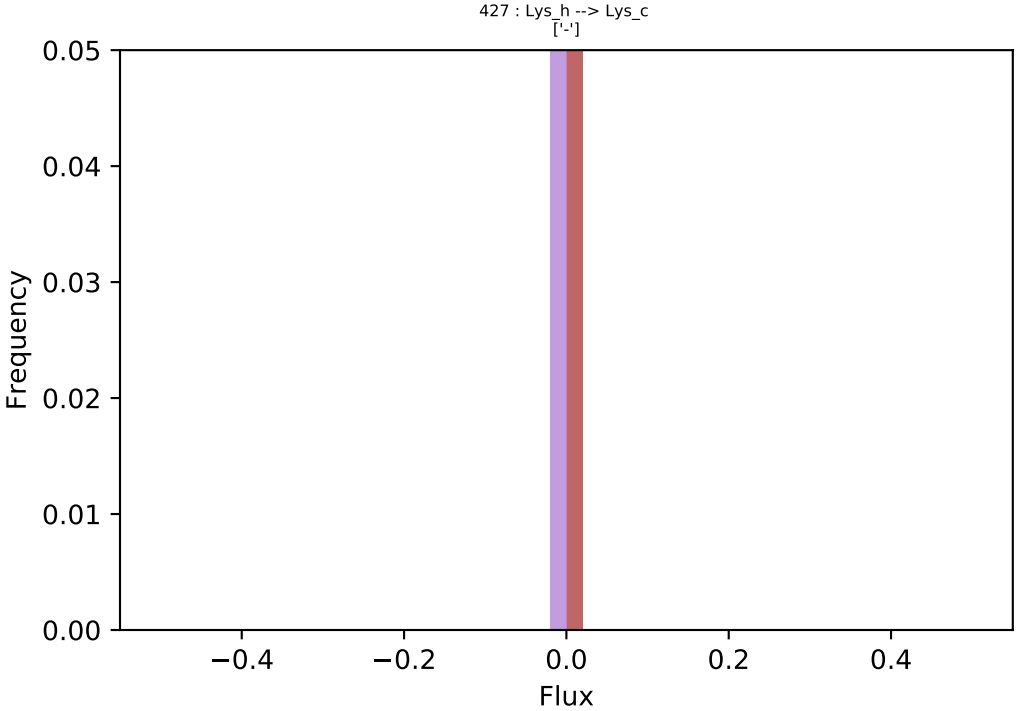

422 : His_c --> His_m
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

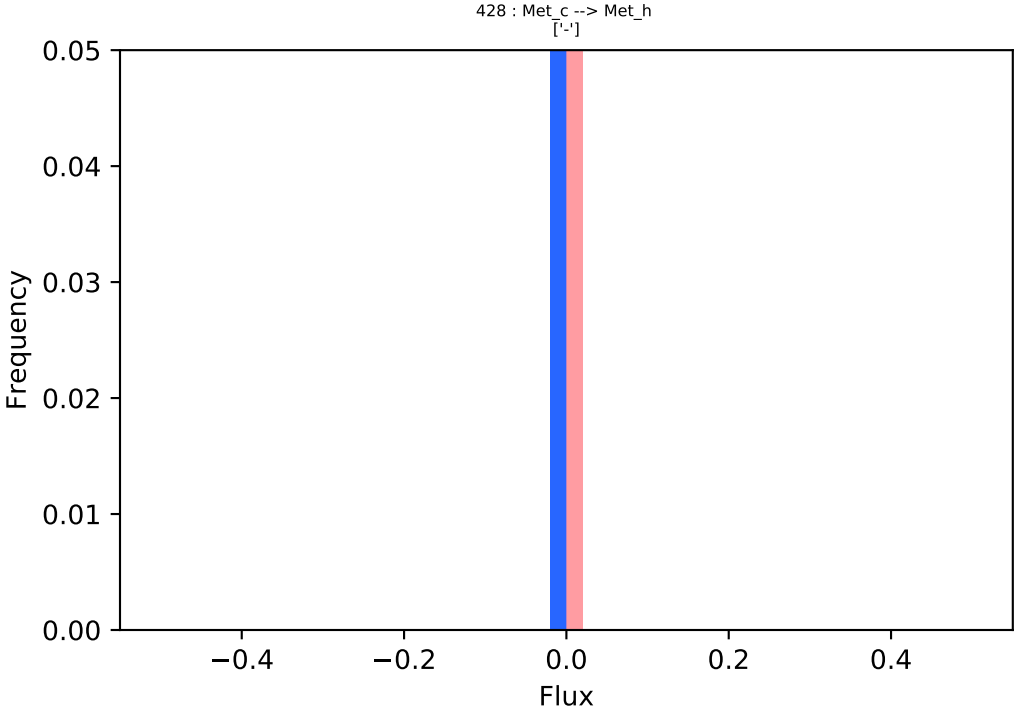

423 : Ile_h --> Ile_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

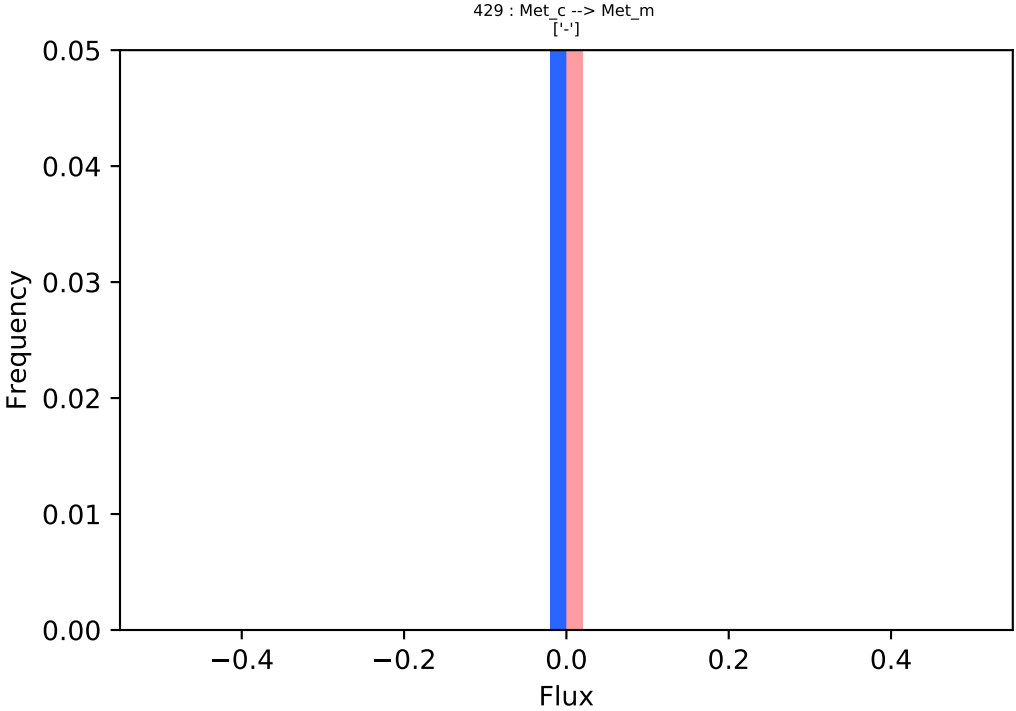

424 : Ile_c --> Ile_m
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

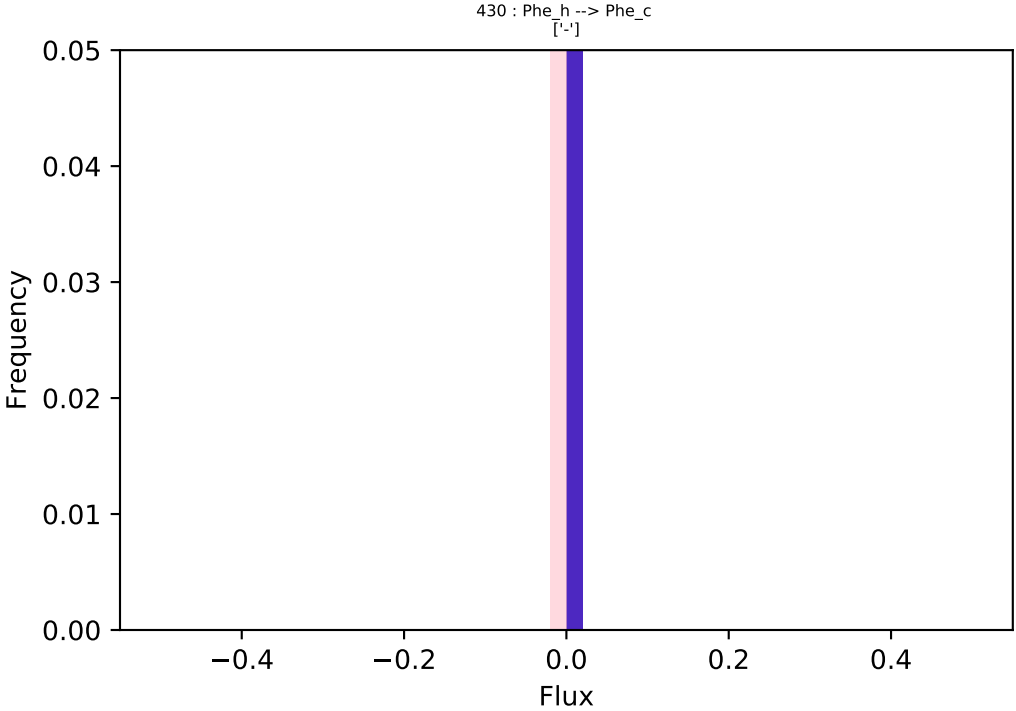

425 : Leu_h --> Leu_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

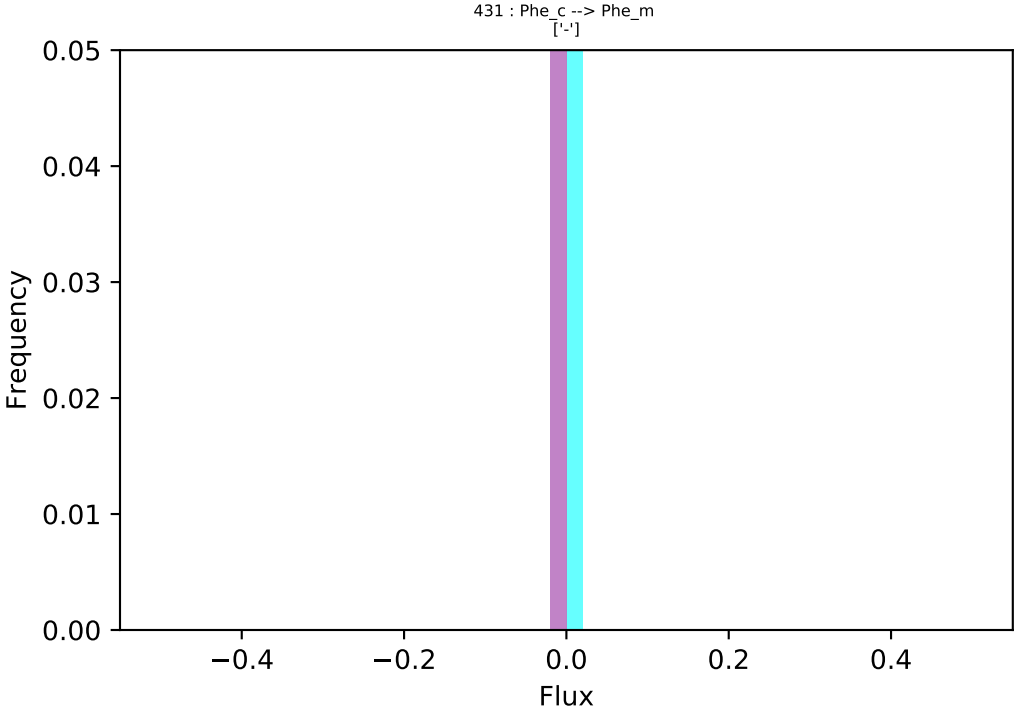

426 : Leu_c --> Leu_m
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

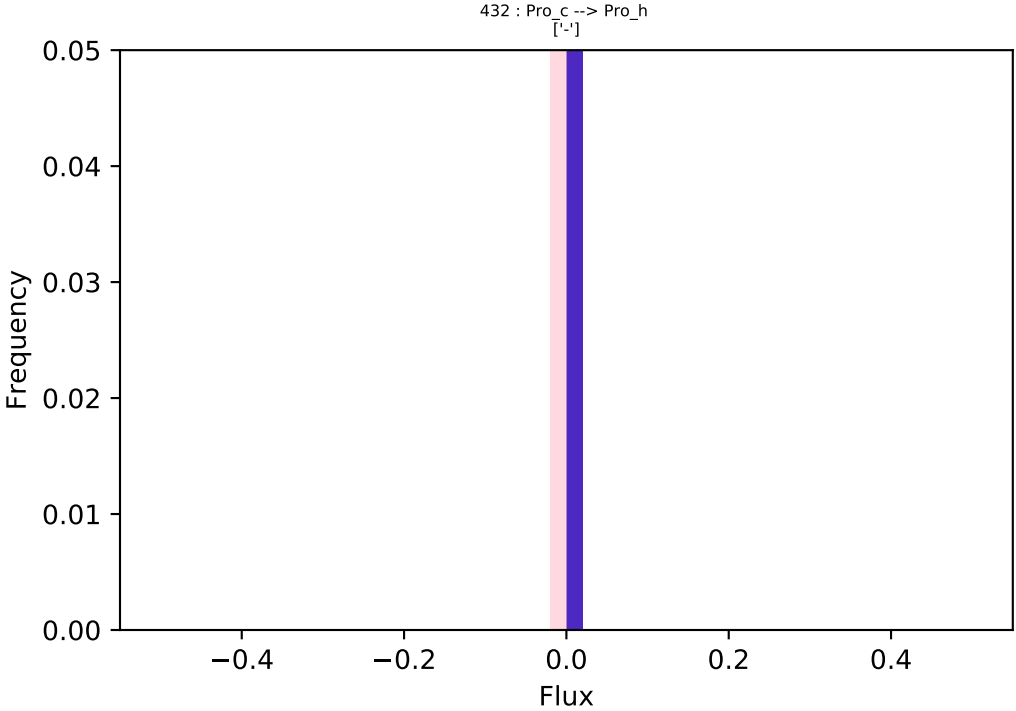

427 : Lys_h --> Lys_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

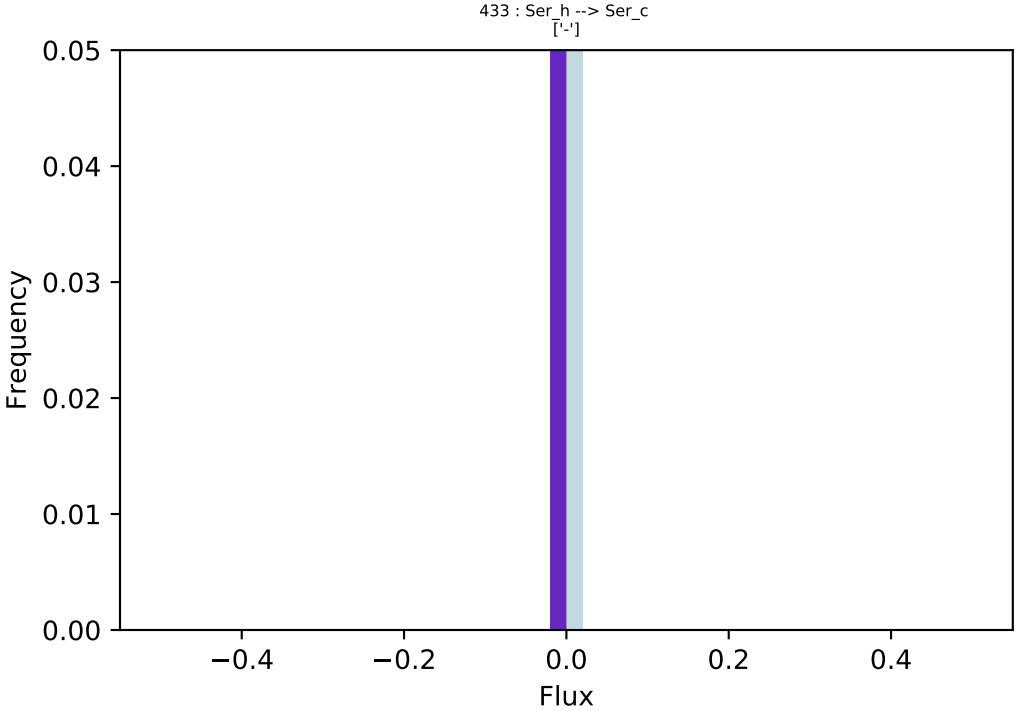

428 : Met_c --> Met_h
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

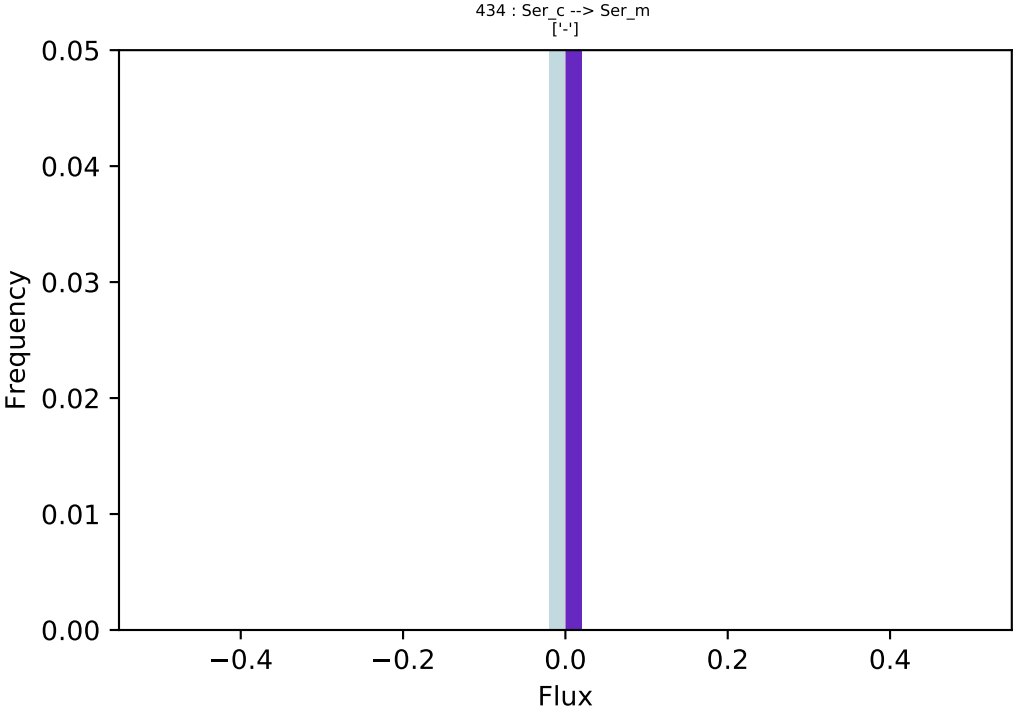

429 : Met_c --> Met_m
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

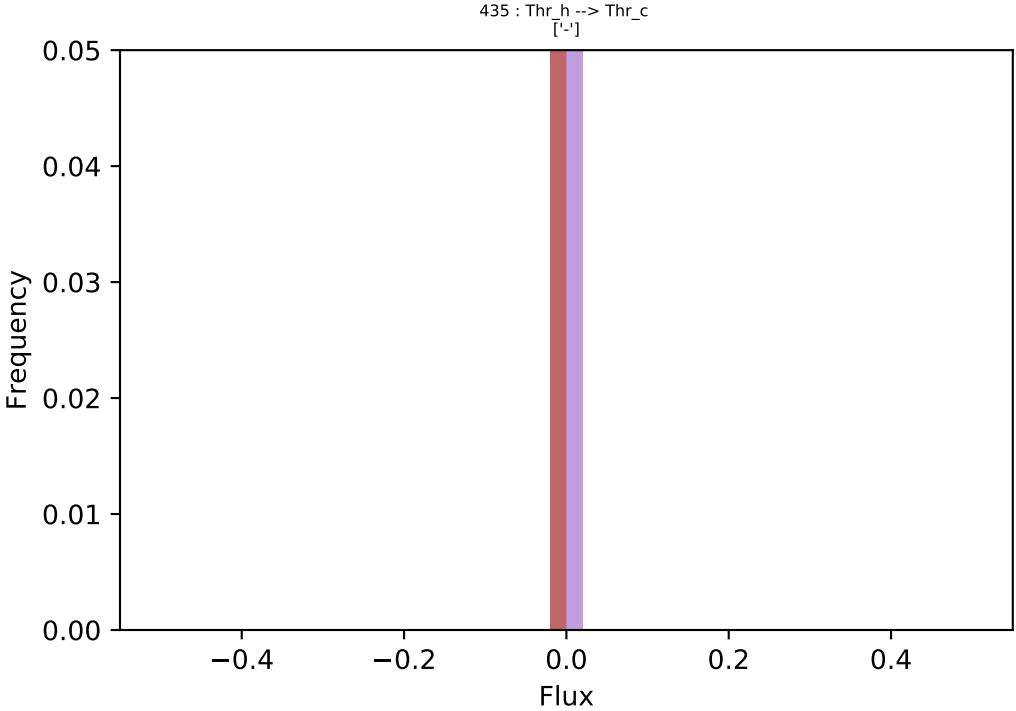

430 : Phe_h --> Phe_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

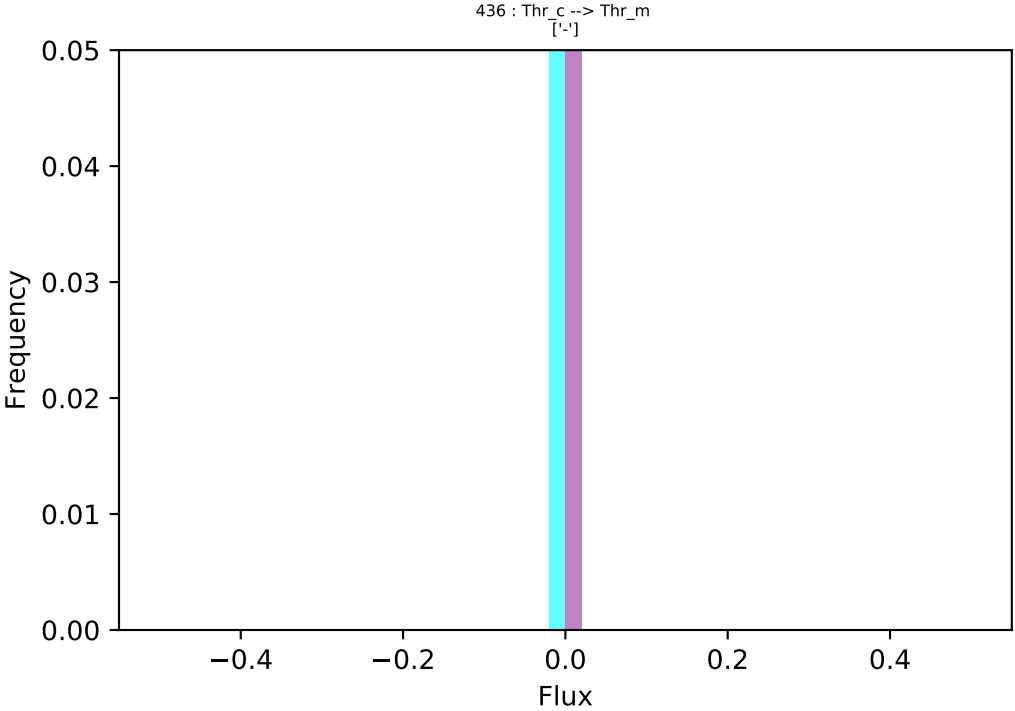

431 : Phe_c --> Phe_m
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

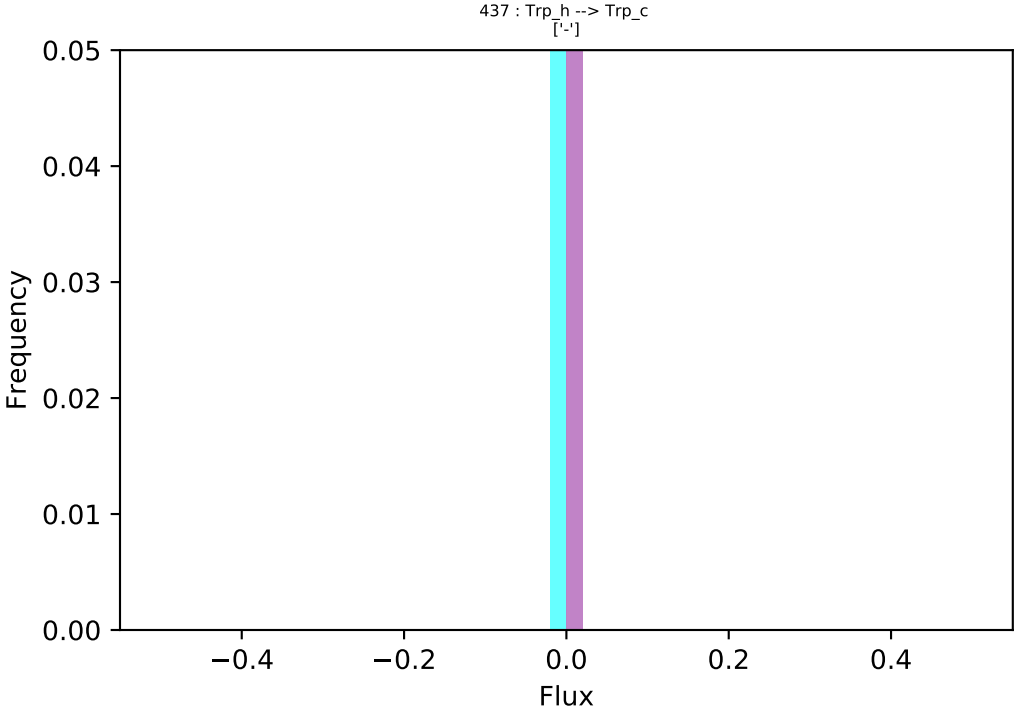

432 : Pro_c --> Pro_h
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

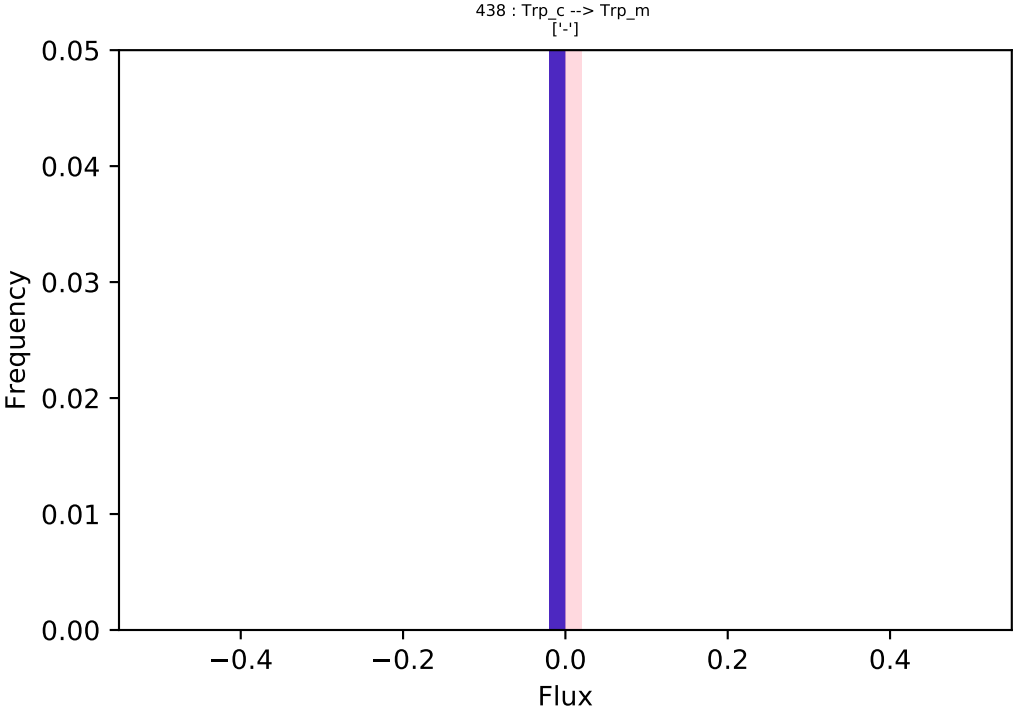

433 : Ser_h --> Ser_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

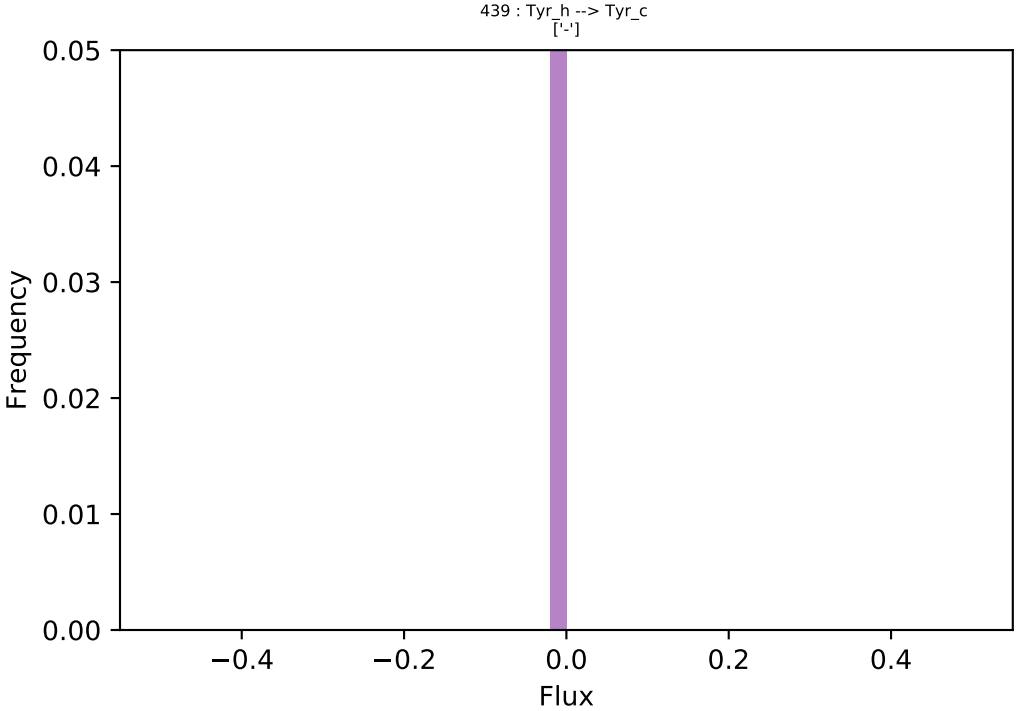

434 : Ser_c --> Ser_m
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

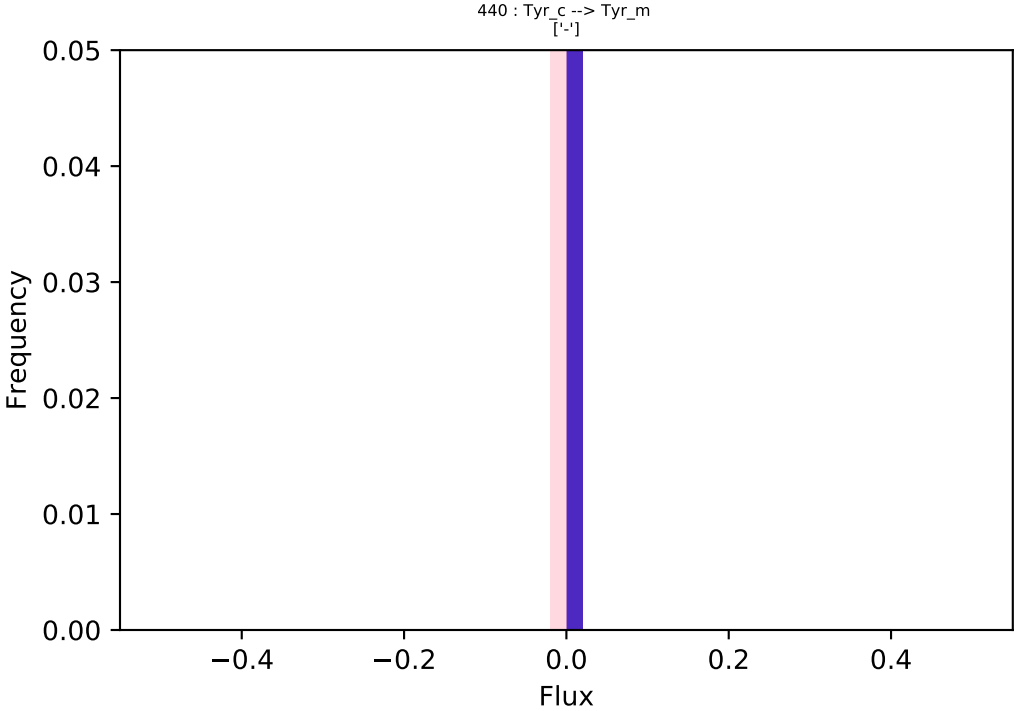

435 : Thr_h --> Thr_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

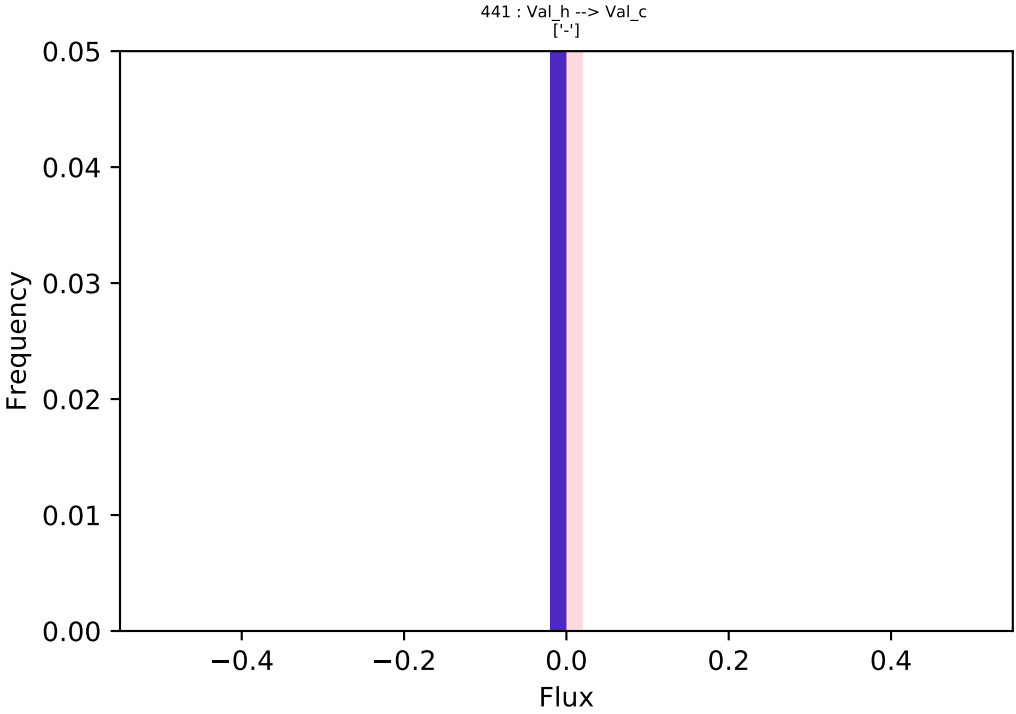

436 : Thr_c --> Thr_m
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

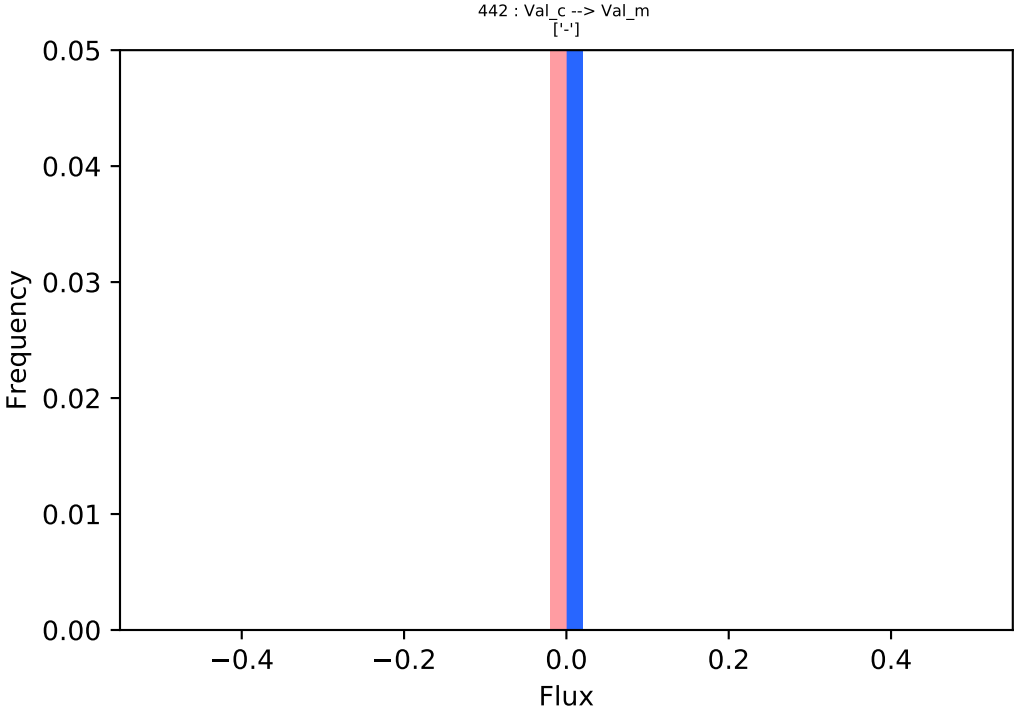

437 : Trp_h --> Trp_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

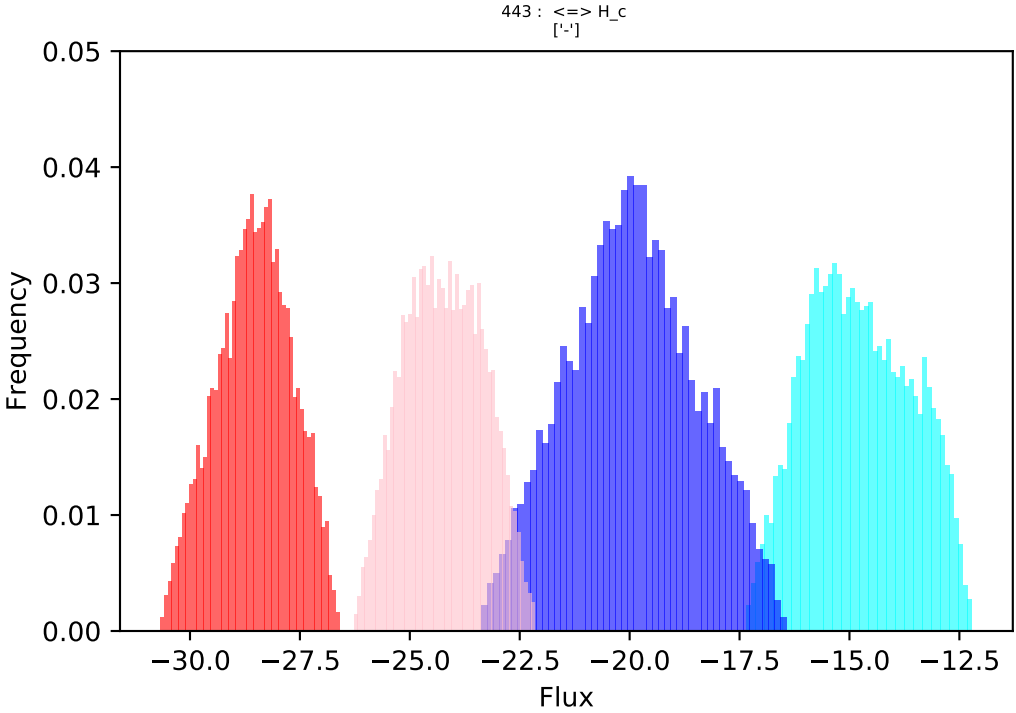

438 : Trp_c --> Trp_m
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

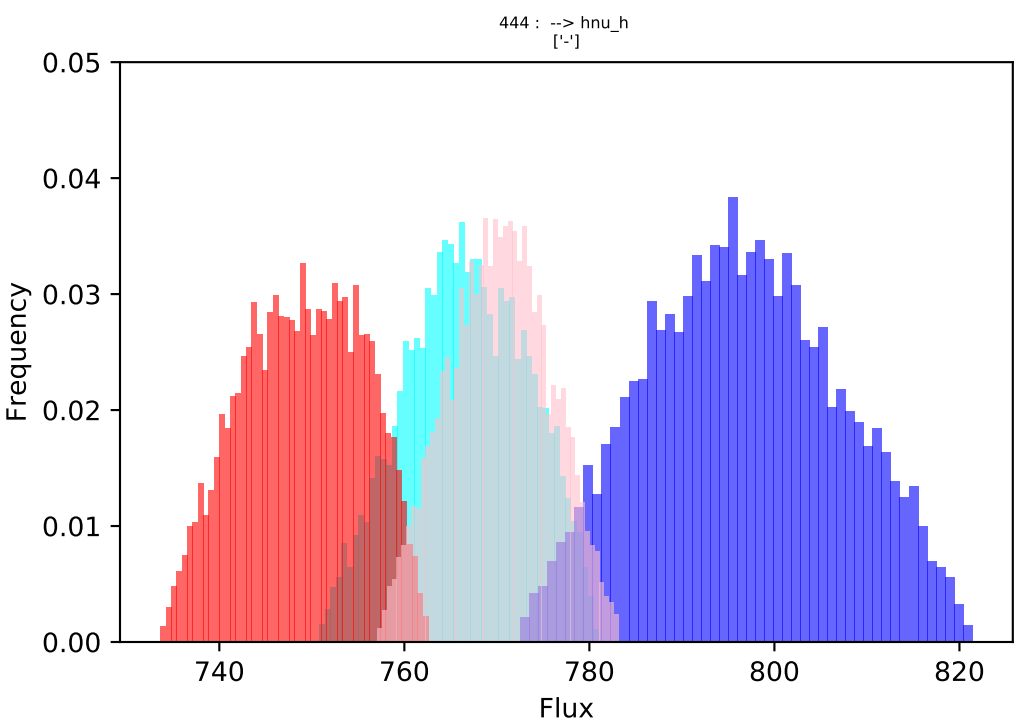

439 : Tyr_h --> Tyr_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

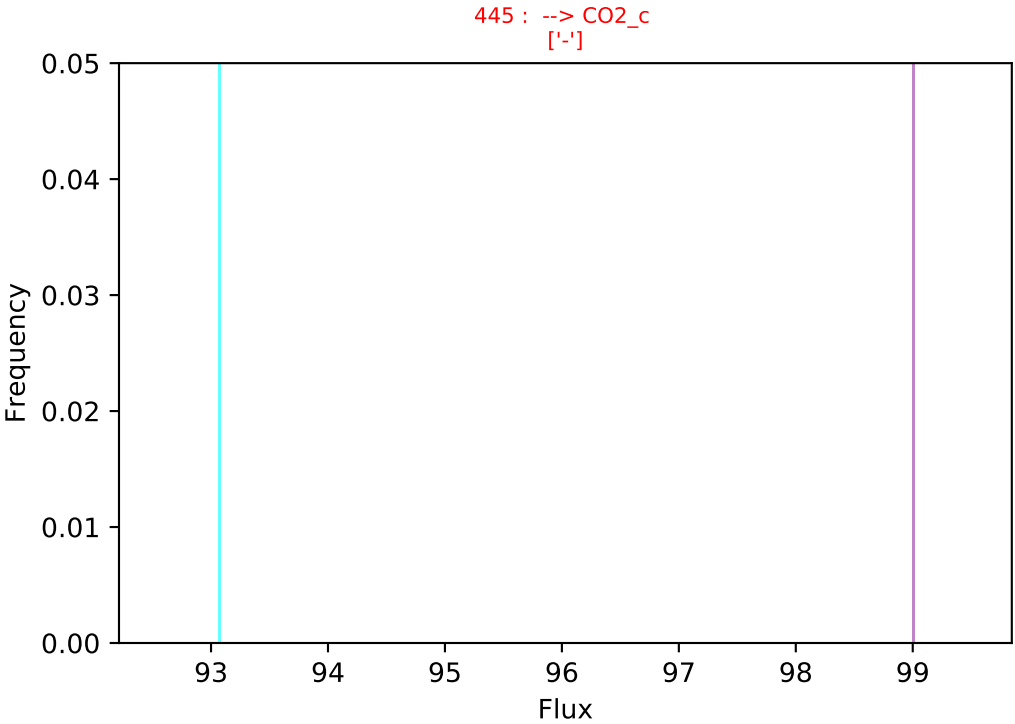

440 : Tyr_c --> Tyr_m
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

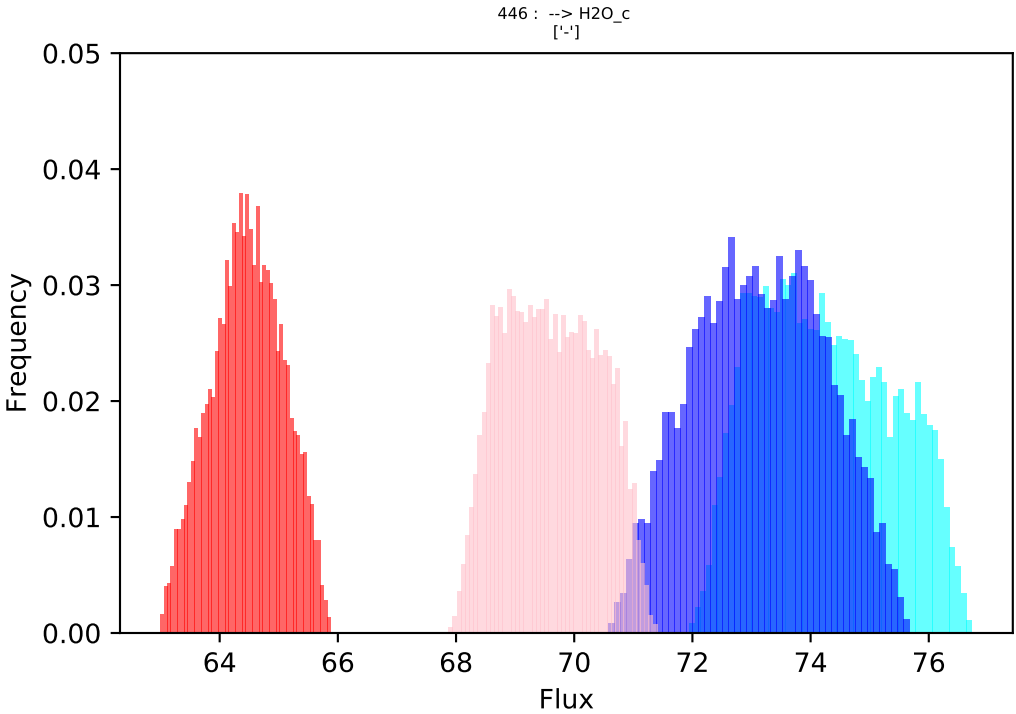

441 : Val_h --> Val_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

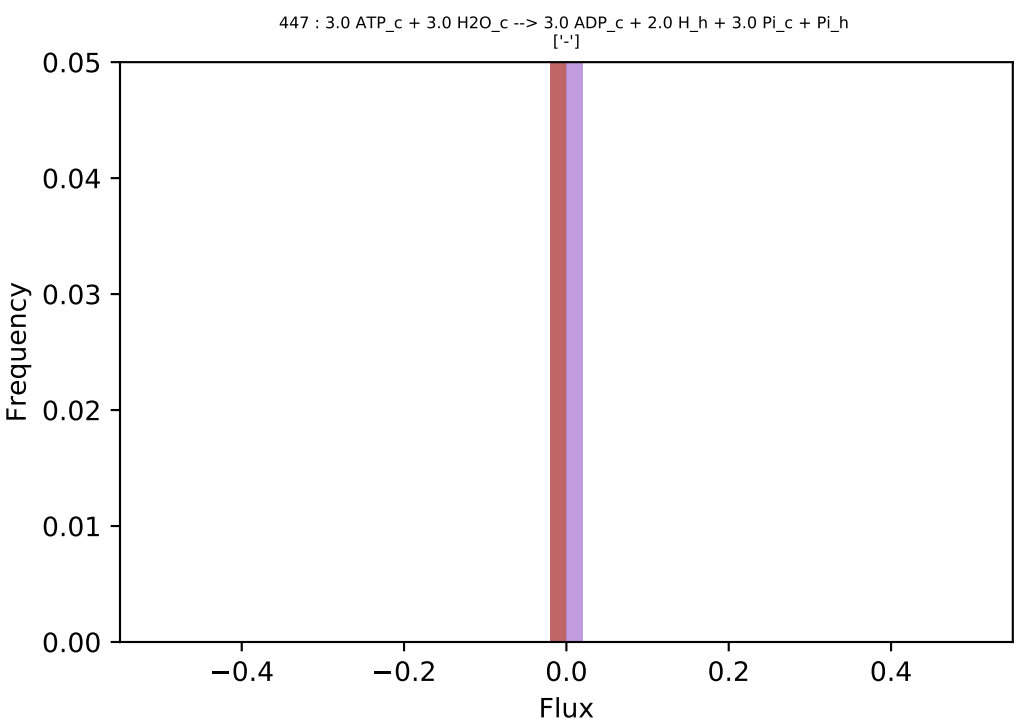

442 : Val_c --> Val_m
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

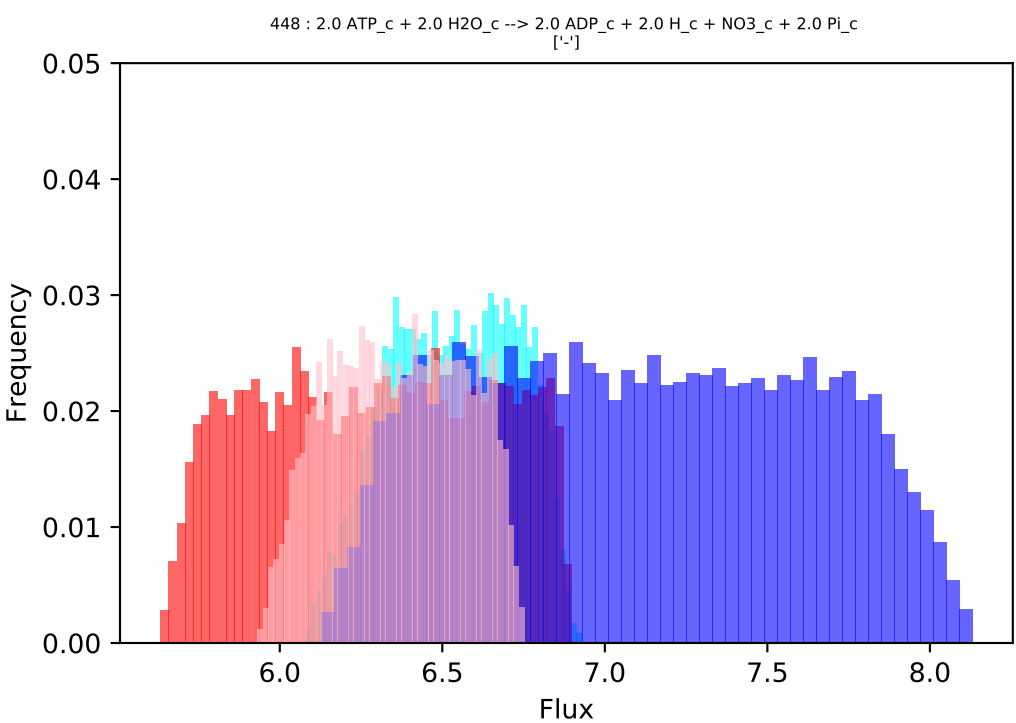

443 : <=> H_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−30.0
−27.5
−25.0
−22.5
−20.0
−17.5
−15.0
−12.5
Flux

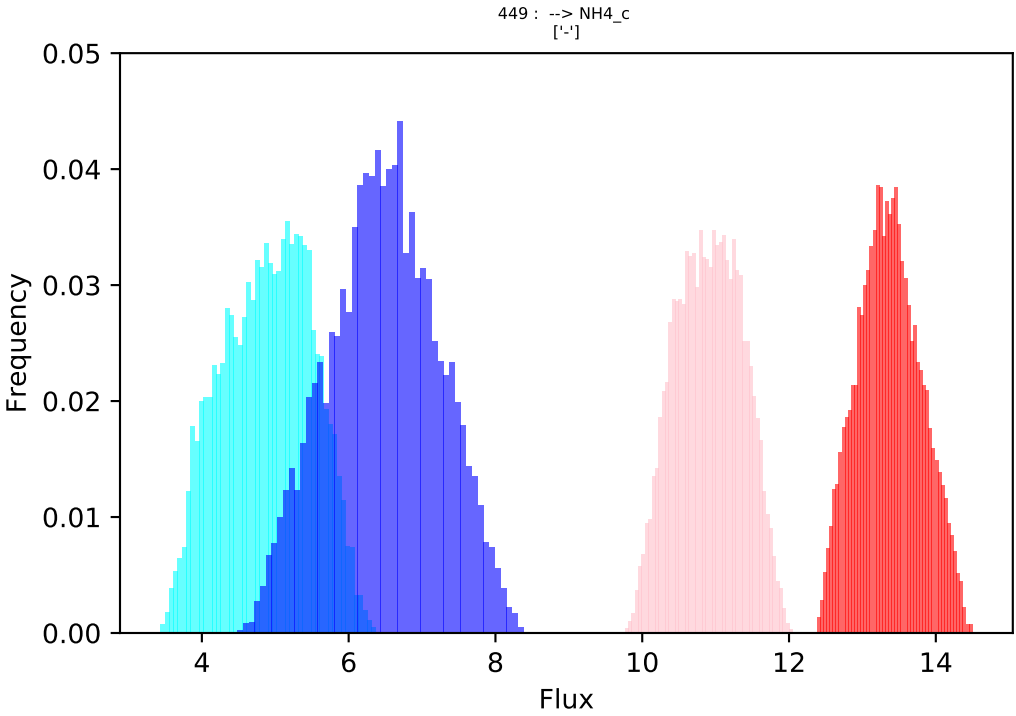

444 : --> hnu_h
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
740
760
780
800
820
Flux

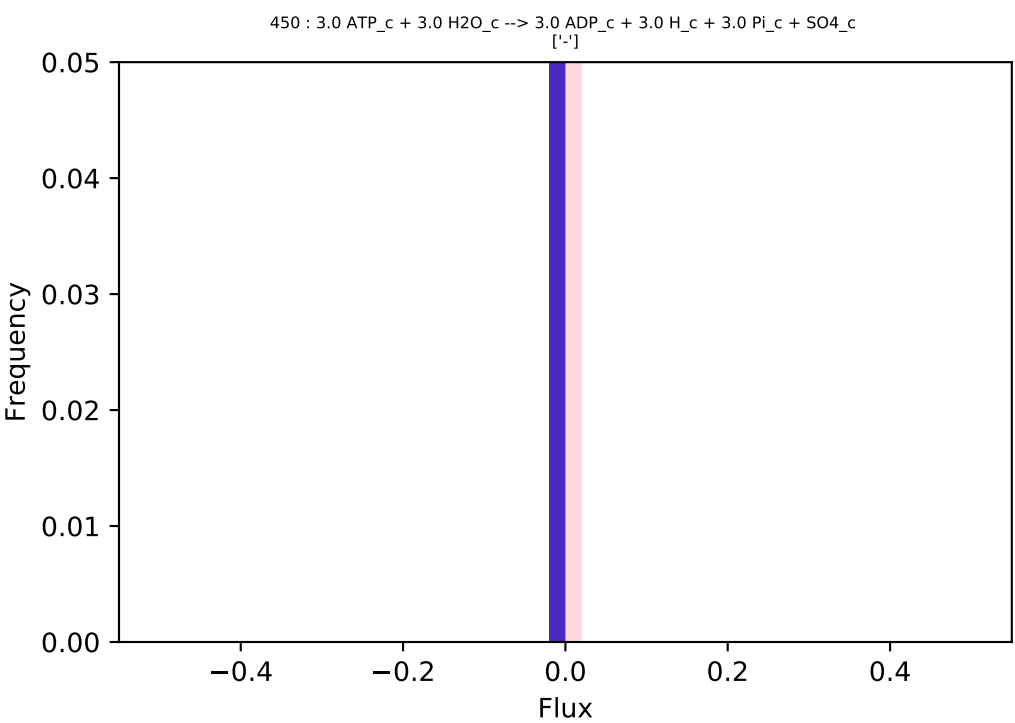

445 : --> CO2_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
93
94
95
96
97
98
99
Flux

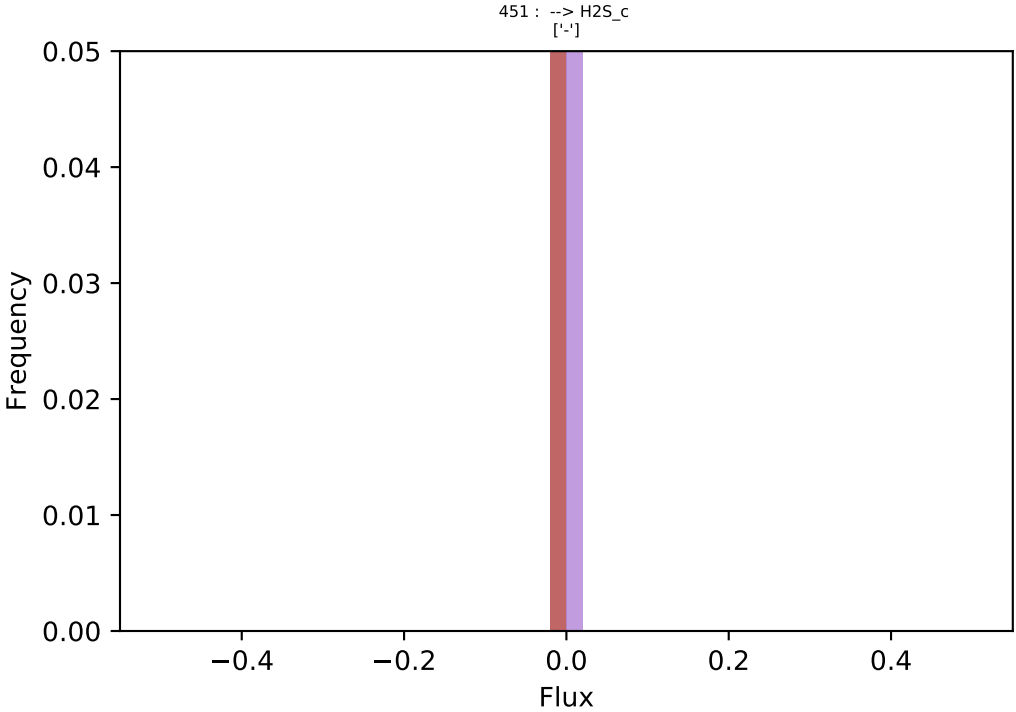

446 : --> H2O_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
64
66
68
70
72
74
76
Flux

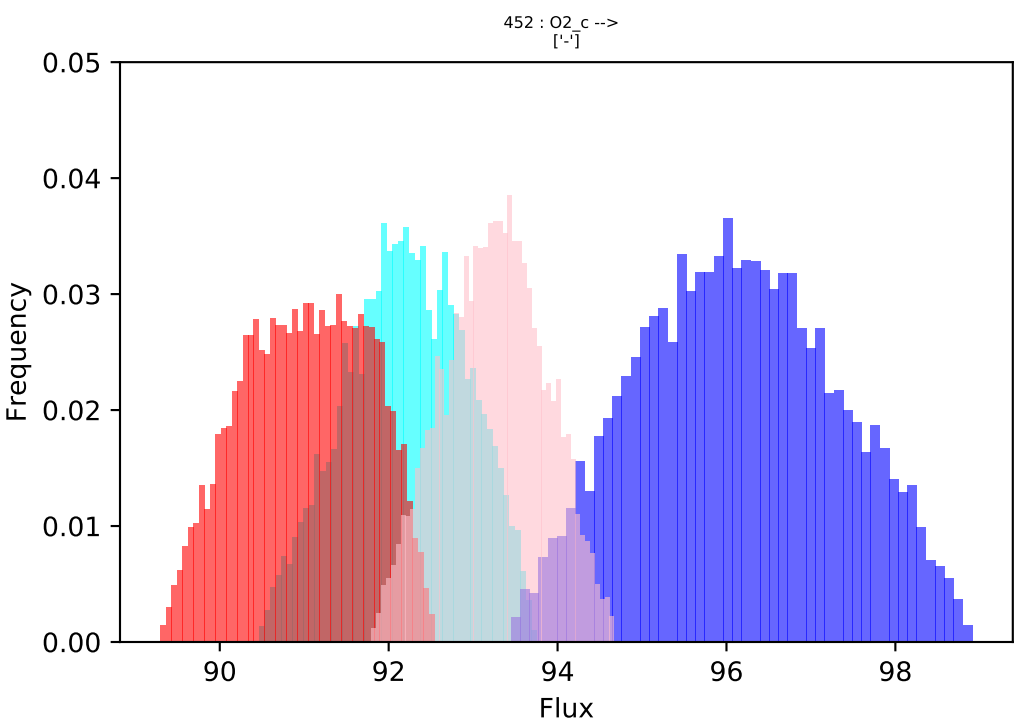

447 : 3.0 ATP_c + 3.0 H2O_c --> 3.0 ADP_c + 2.0 H_h + 3.0 Pi_c + Pi_h
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

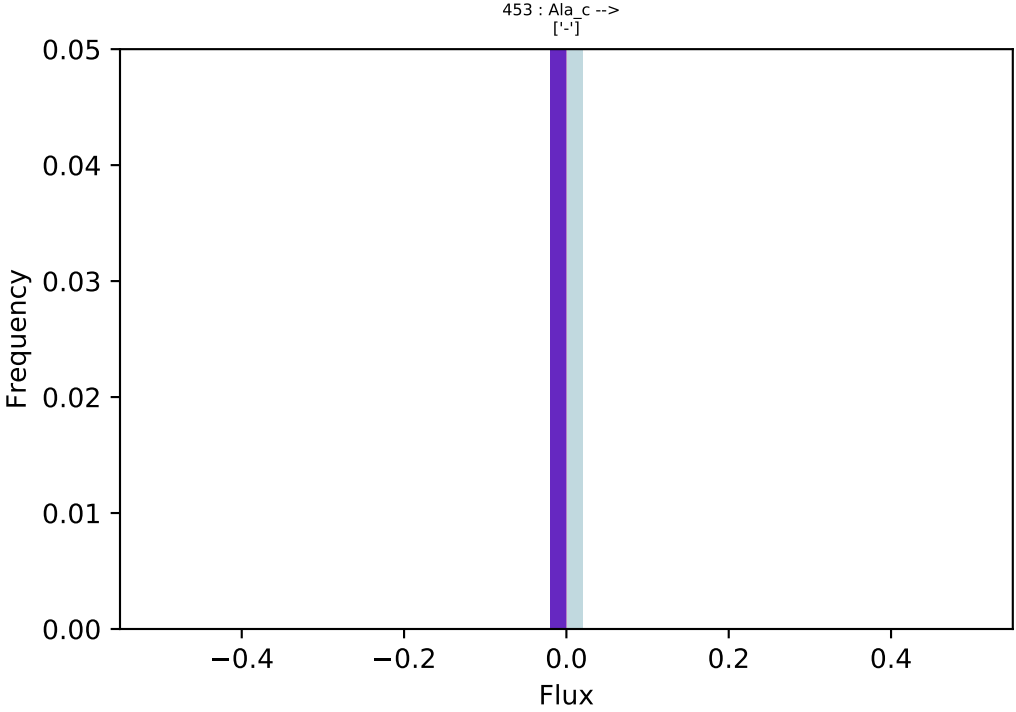

448 : 2.0 ATP_c + 2.0 H2O_c --> 2.0 ADP_c + 2.0 H_c + NO3_c + 2.0 Pi_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
6.0
6.5
7.0
7.5
8.0
Flux

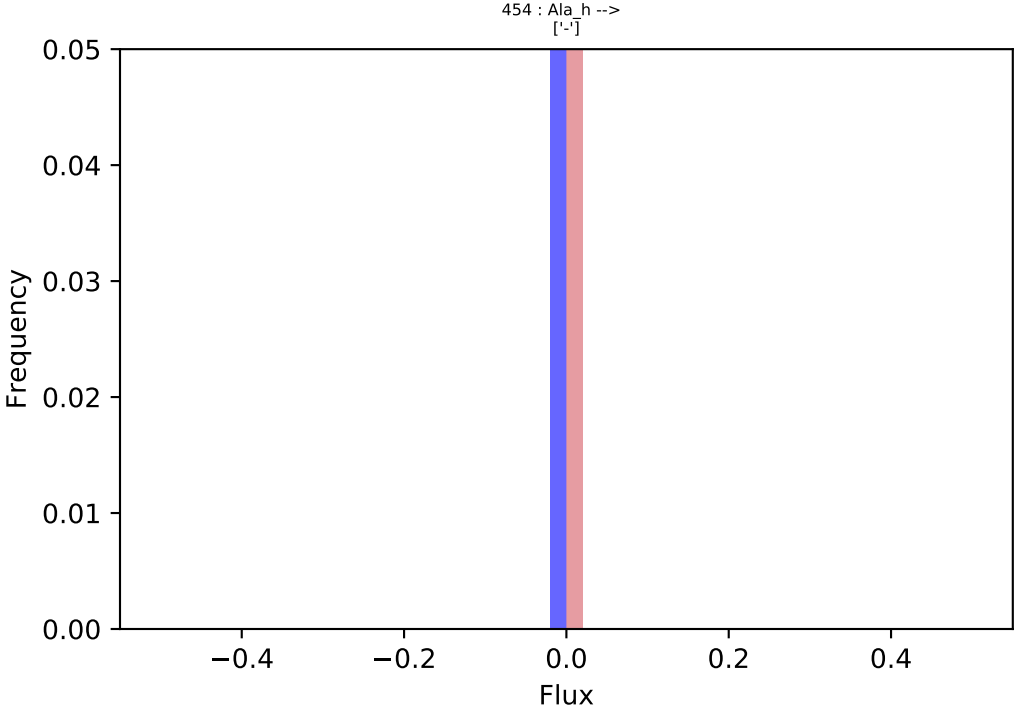

449 : --> NH4_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
4
6
8
10
12
14
Flux

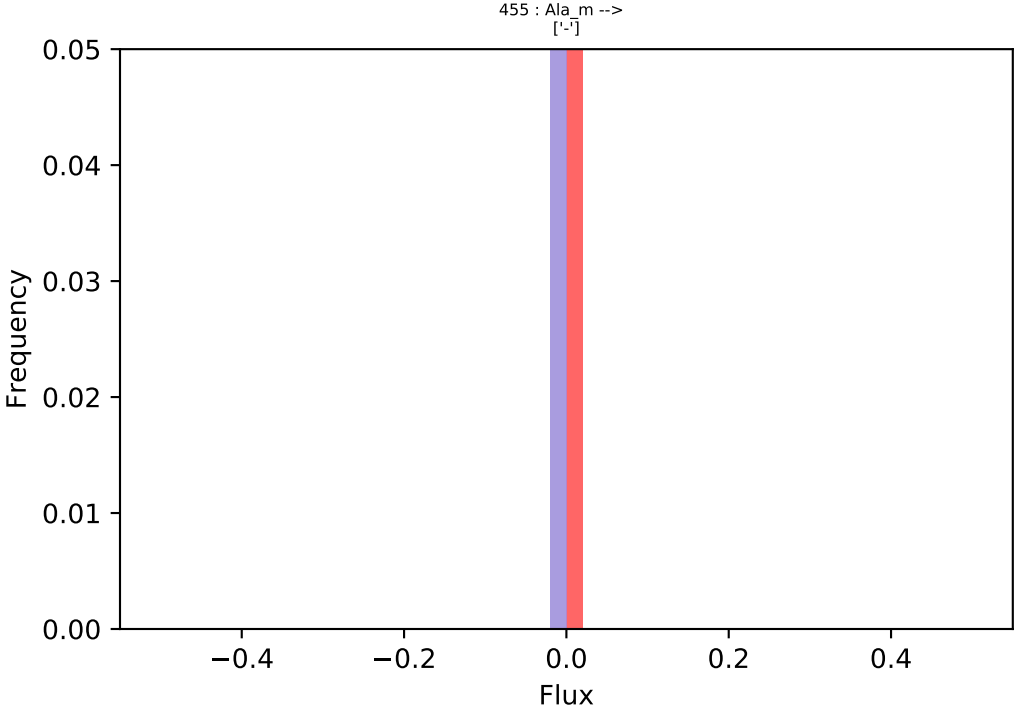

450 : 3.0 ATP_c + 3.0 H2O_c --> 3.0 ADP_c + 3.0 H_c + 3.0 Pi_c + SO4_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

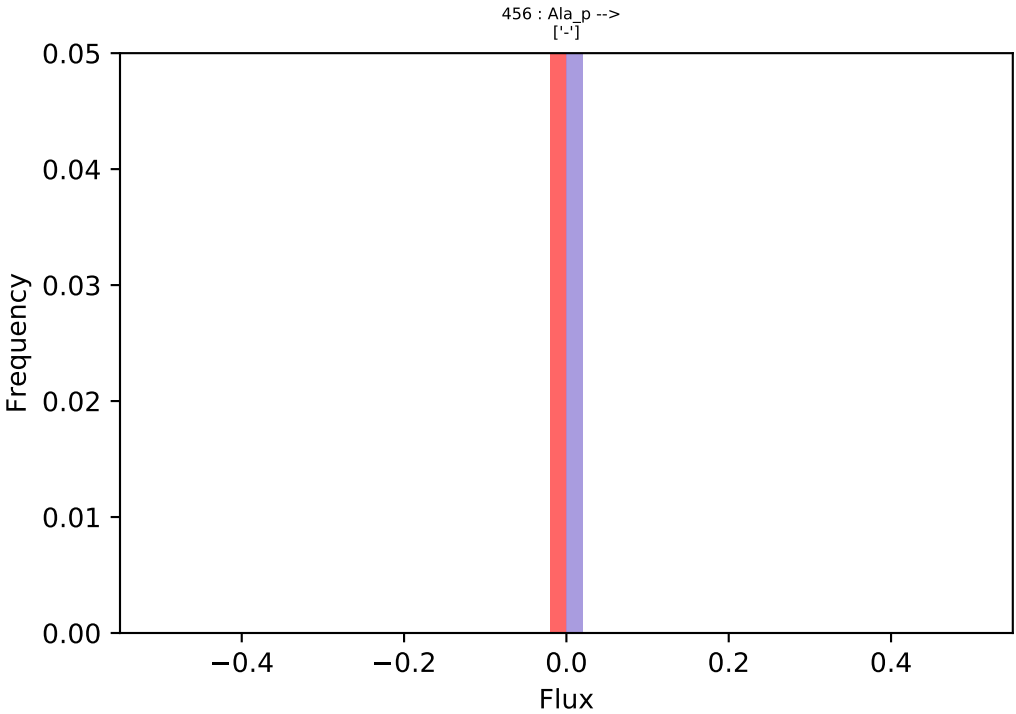

451 : --> H2S_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

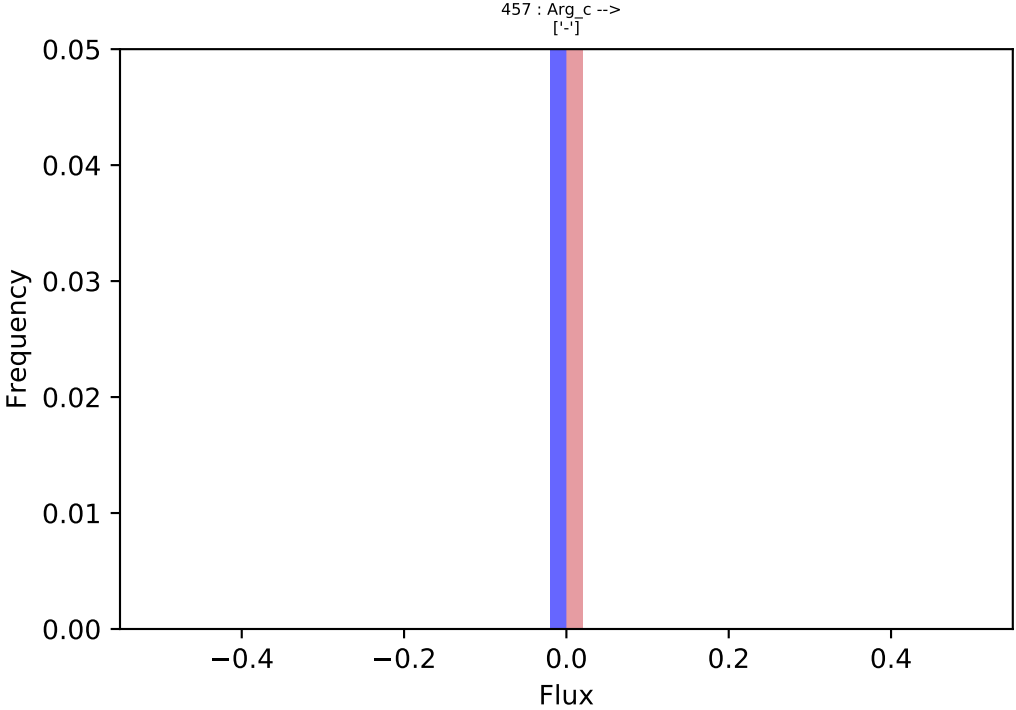

452 : O2_c -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
90
92
94
96
98
Flux

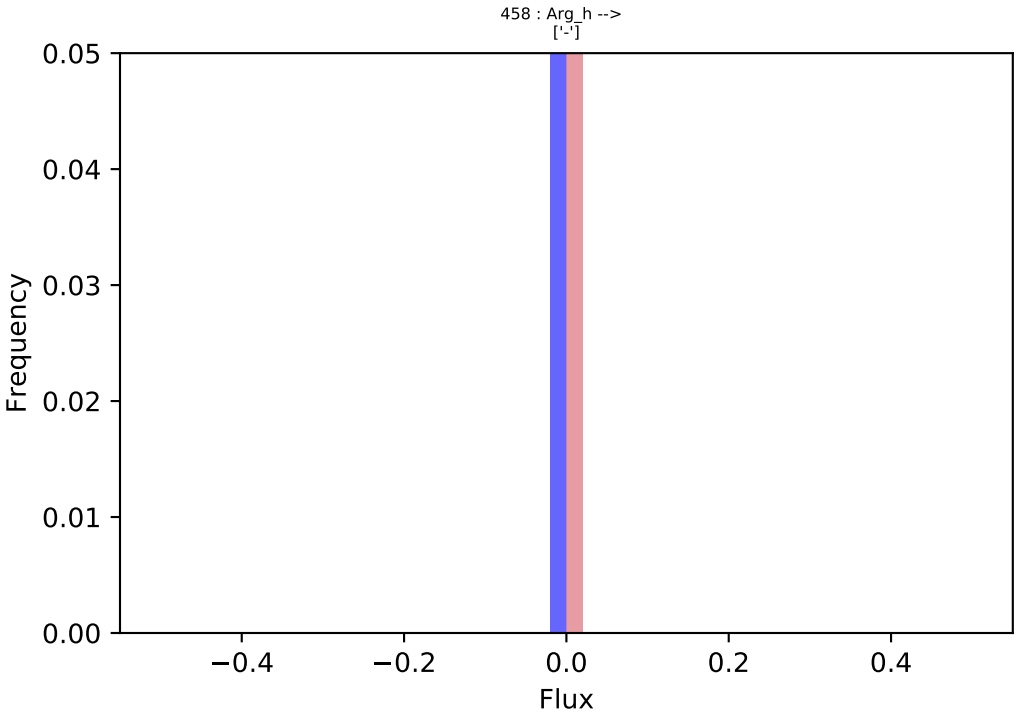

453 : Ala_c -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

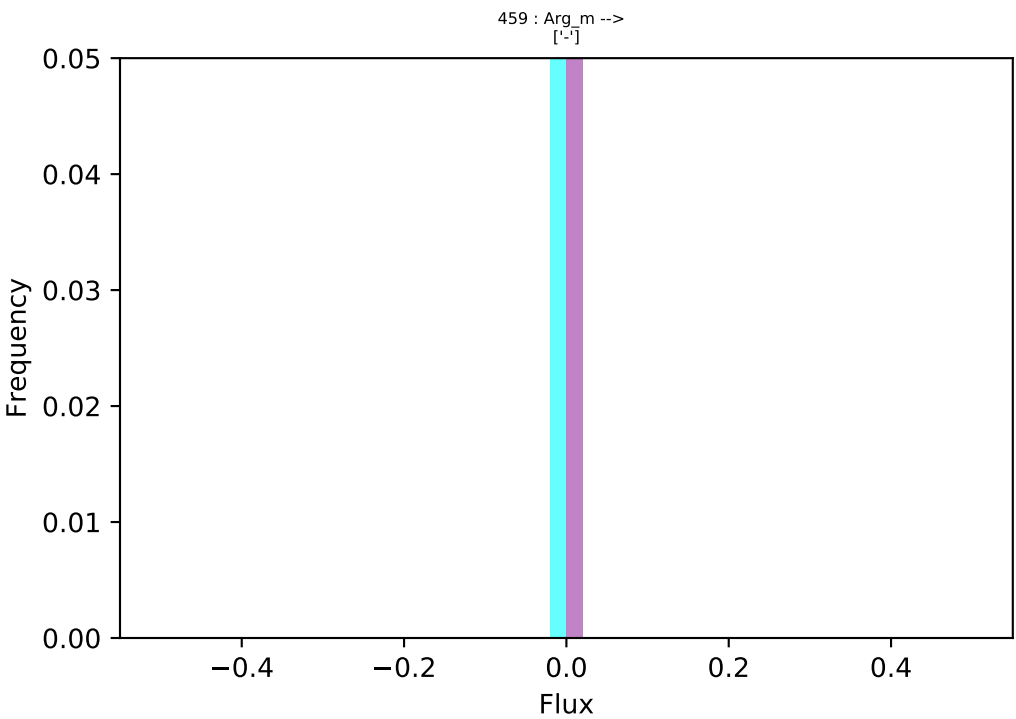

454 : Ala_h -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

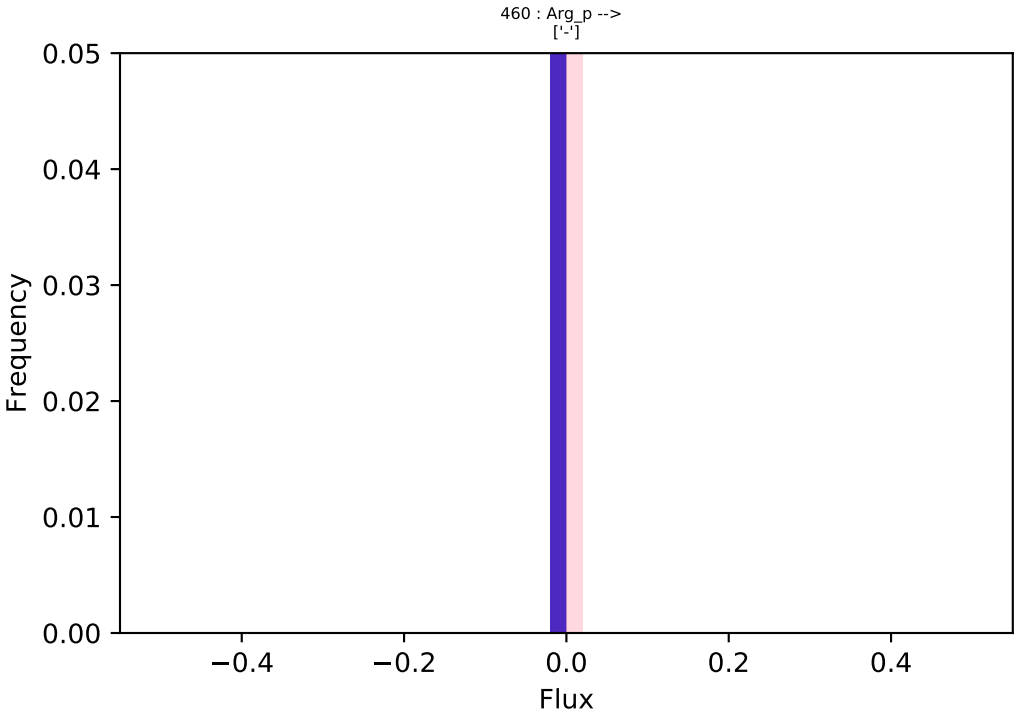

455 : Ala_m -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

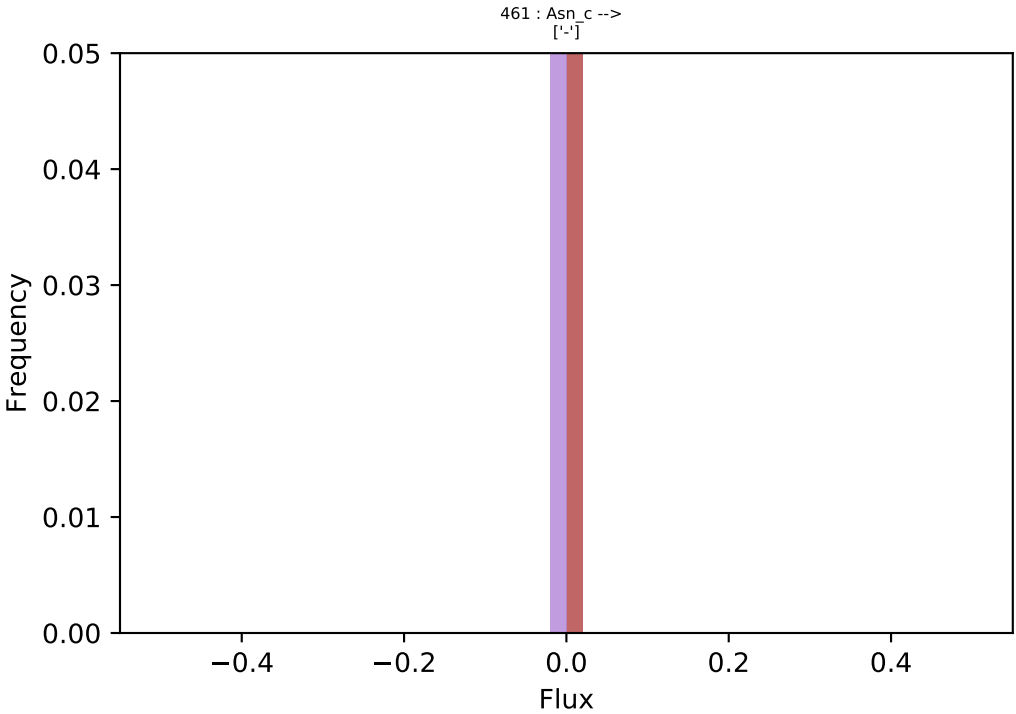

456 : Ala_p -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

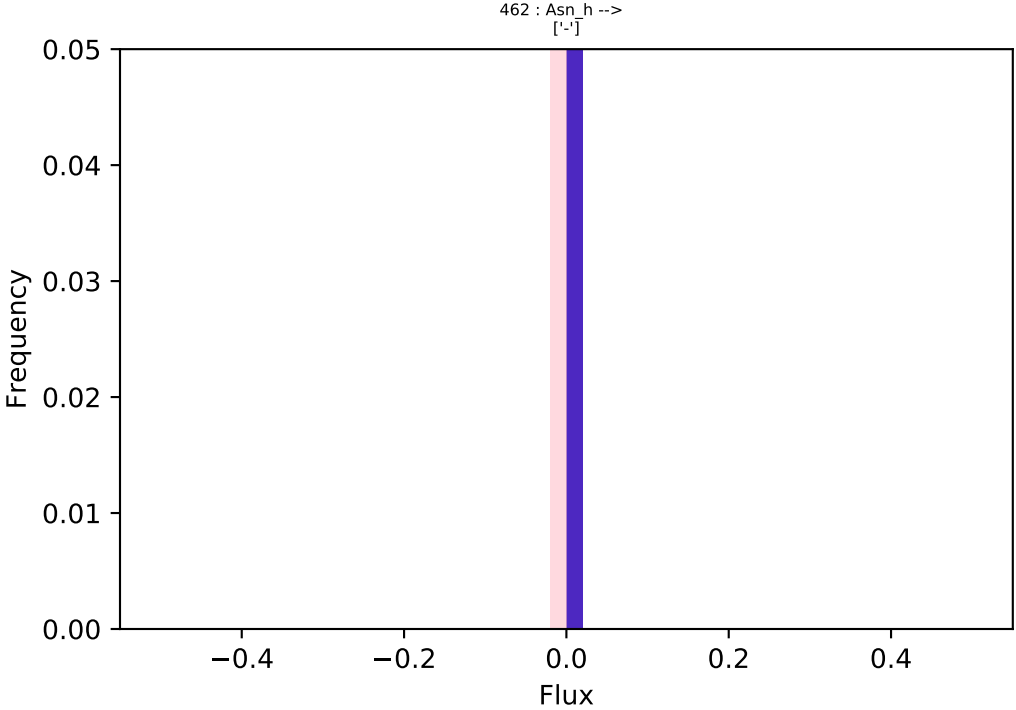

457 : Arg_c -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

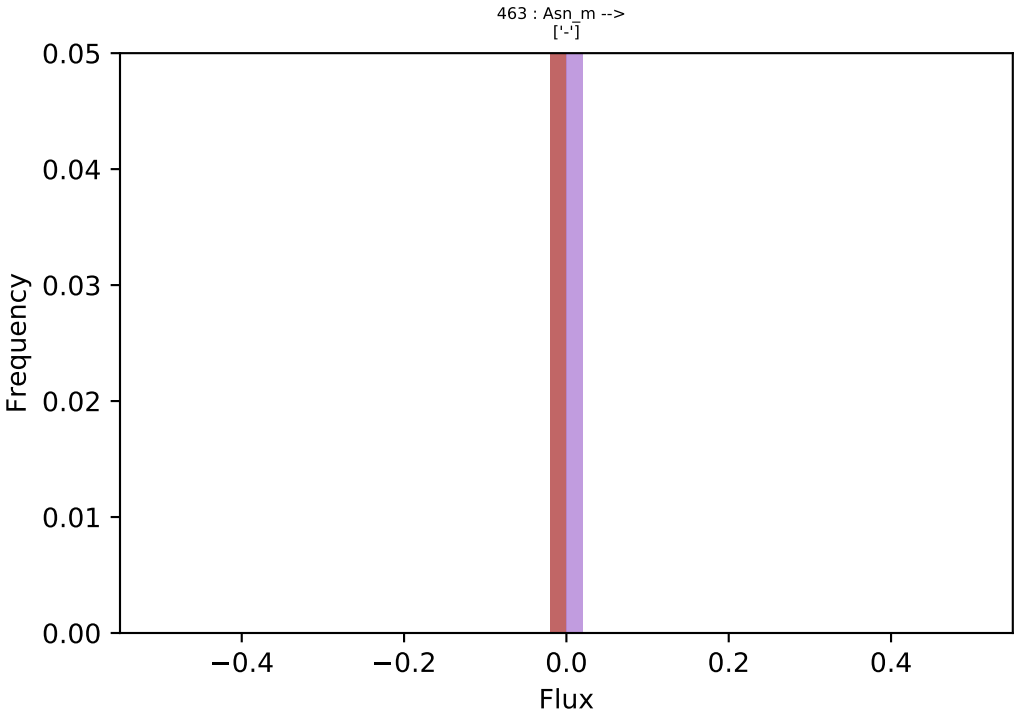

458 : Arg_h -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

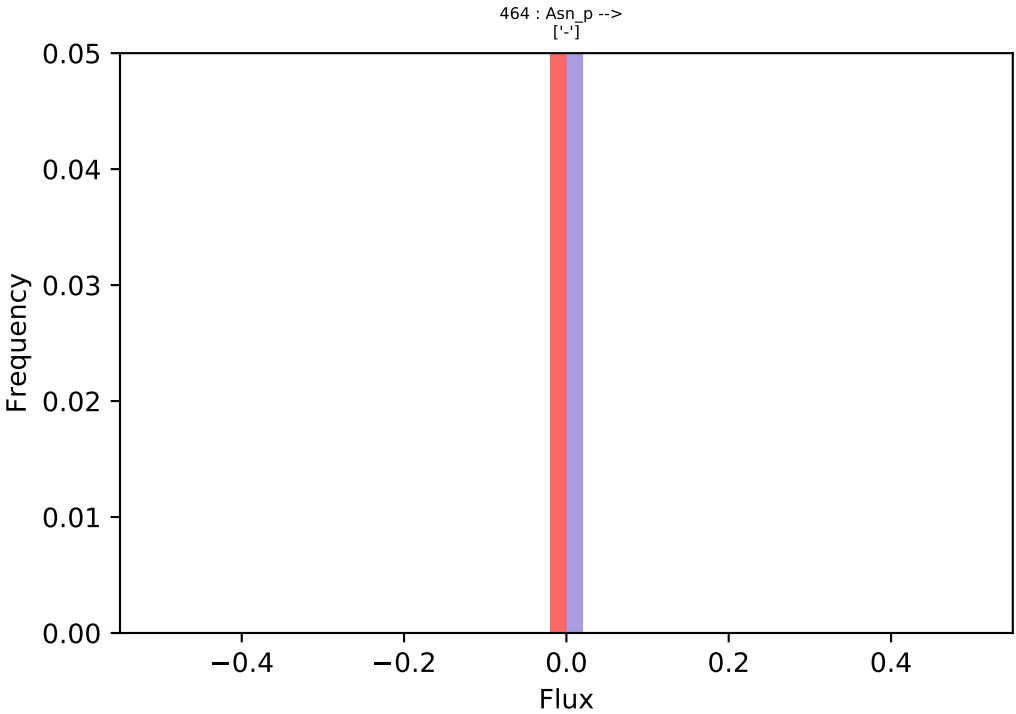

459 : Arg_m -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

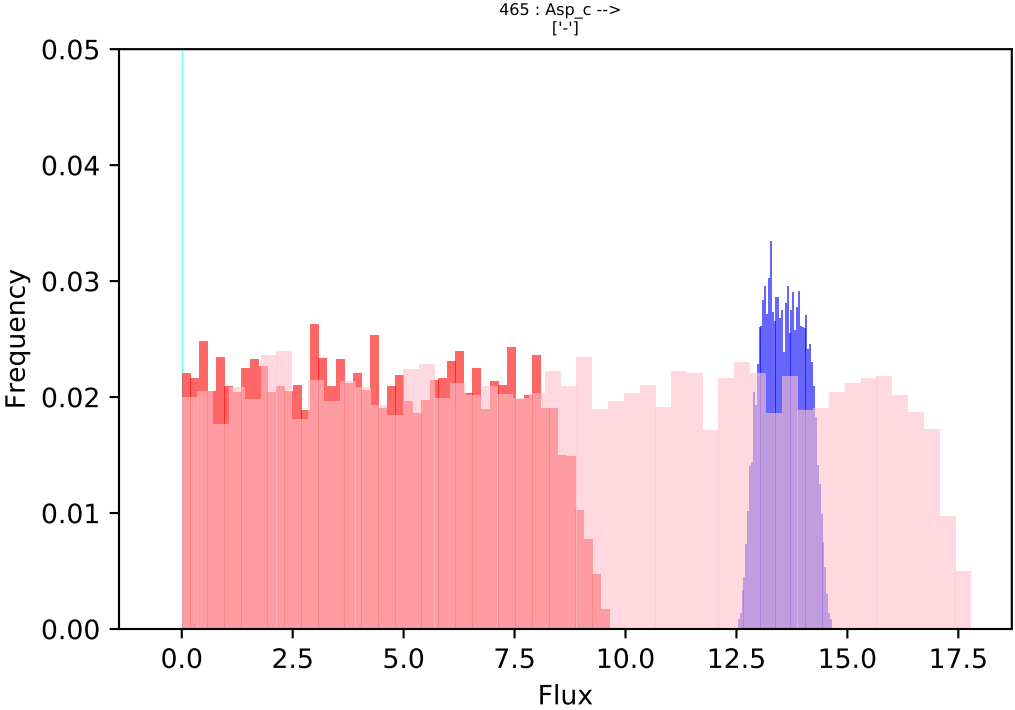

460 : Arg_p -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

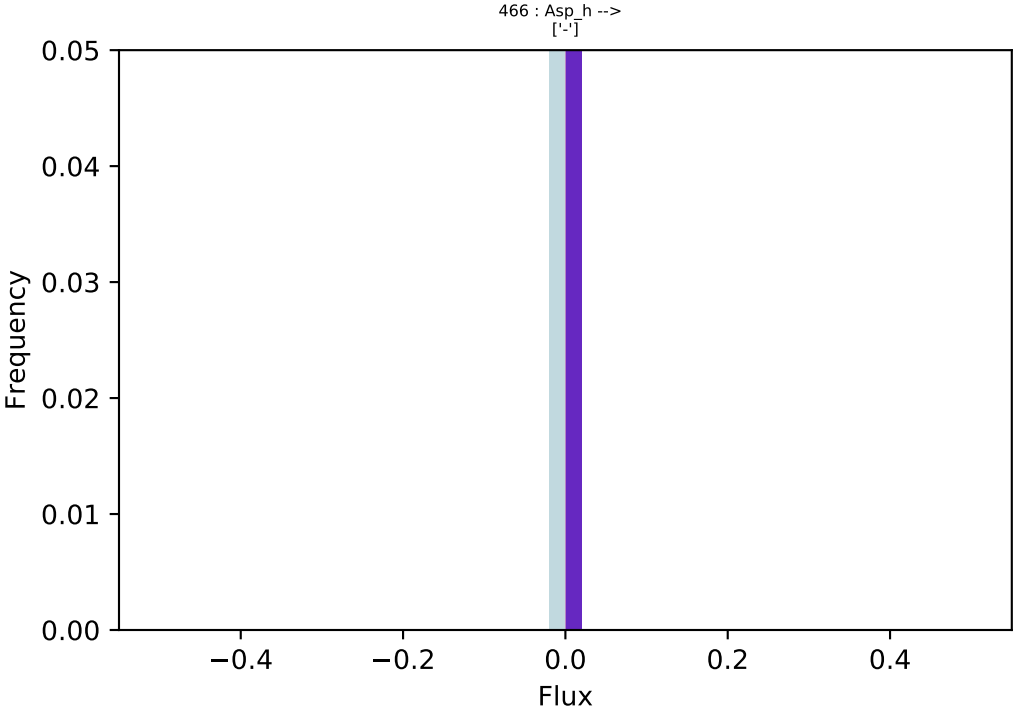

461 : Asn_c -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

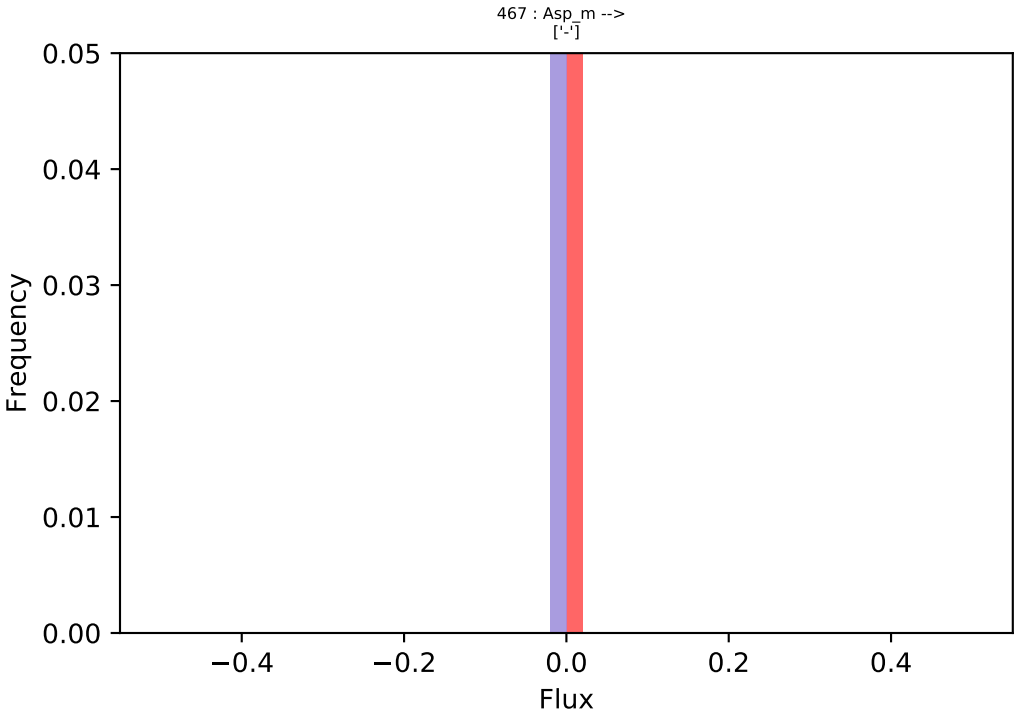

462 : Asn_h -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


463 : Asn_m -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


464 : Asn_p -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


465 : Asp_c -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
Flux


466 : Asp_h -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


467 : Asp_m -->
['-']
0.05
0.04
0.03
0.02
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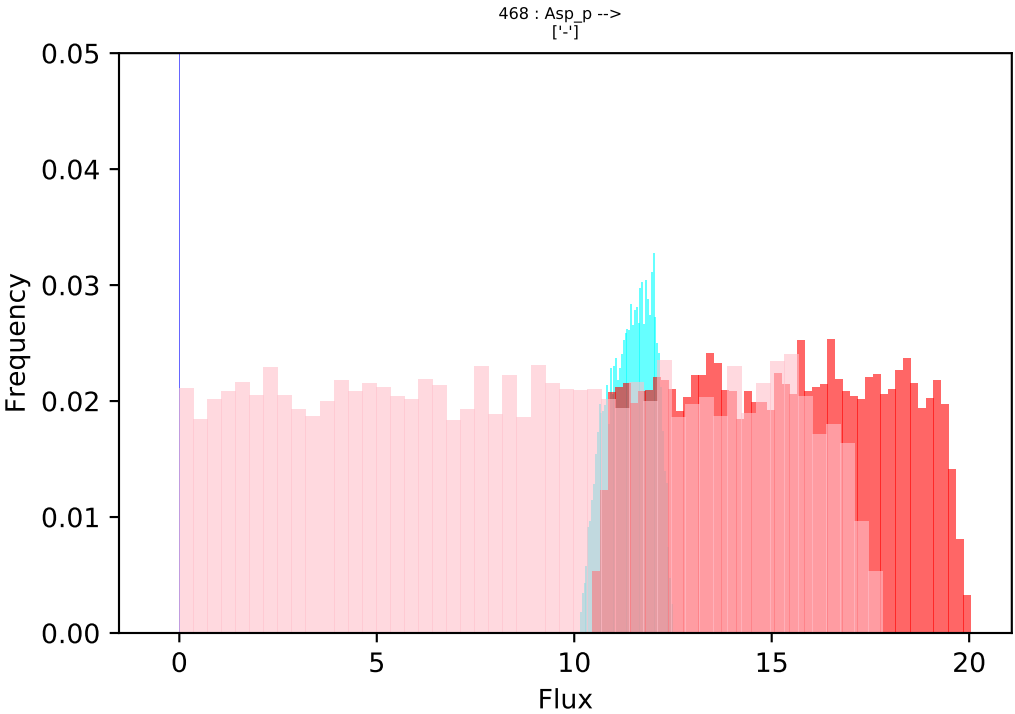
468 : Asp_p -->
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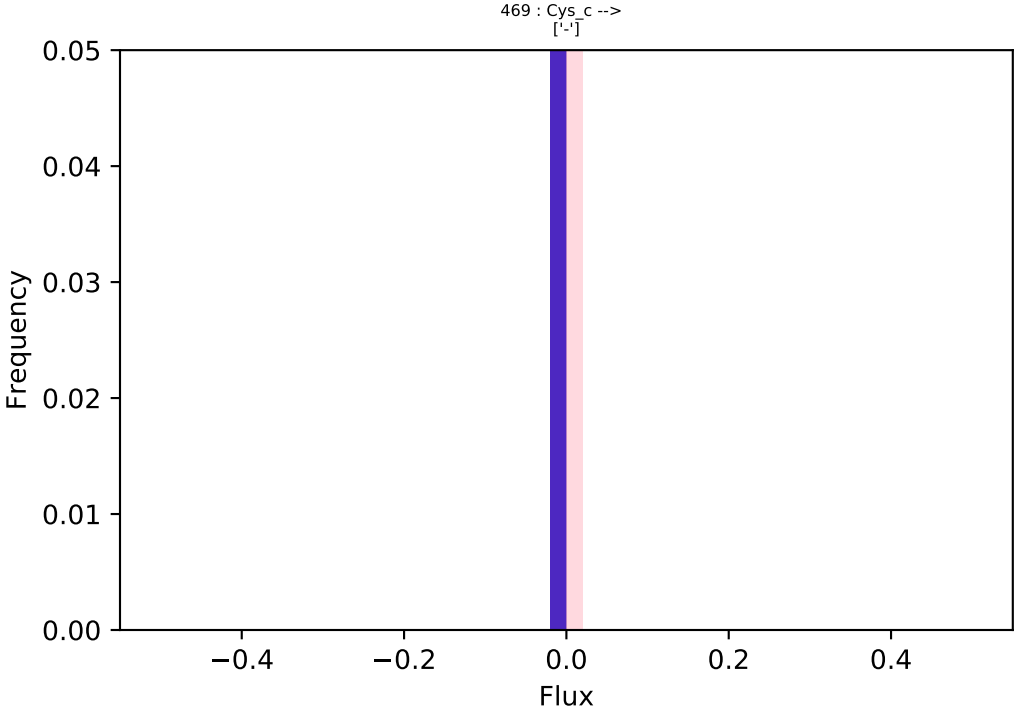
469 : Cys_c -->
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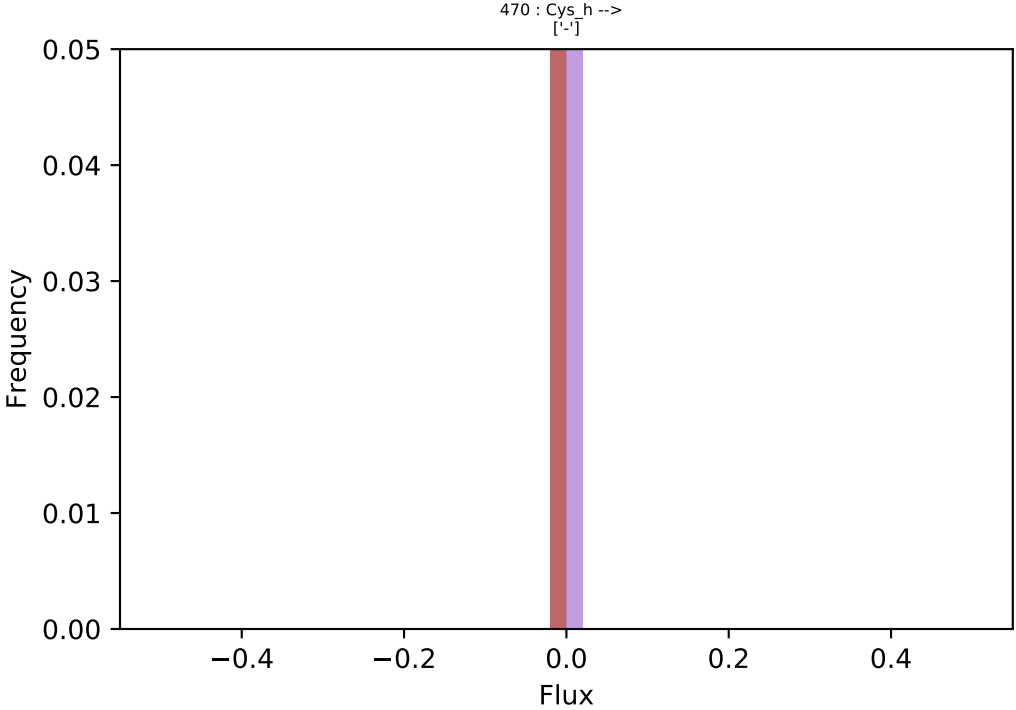
470 : Cys_h -->
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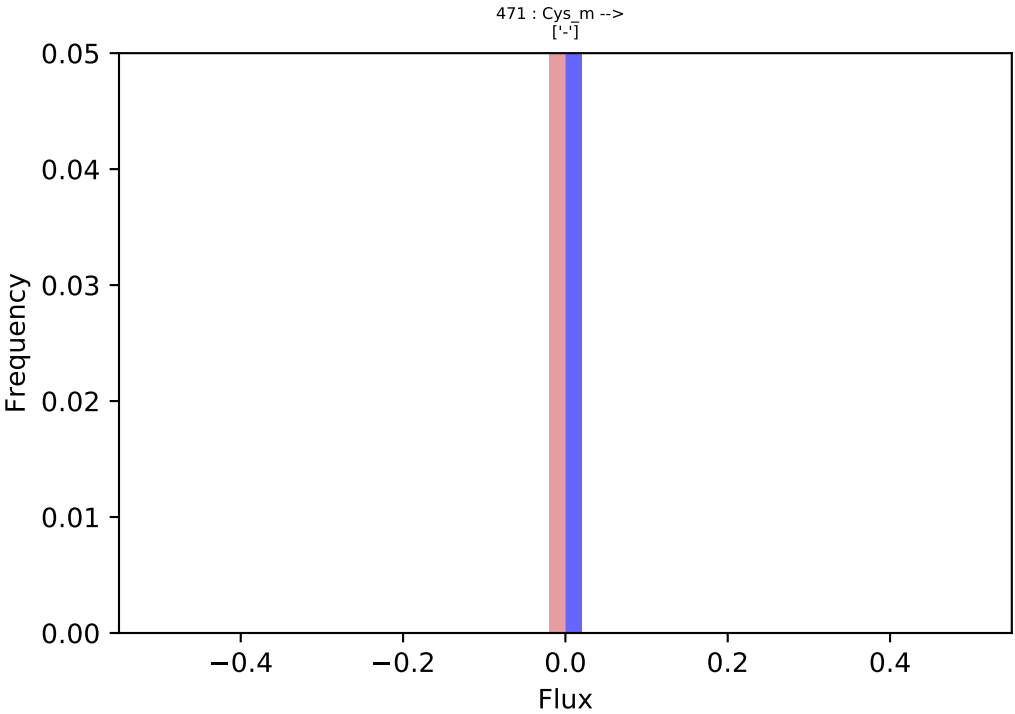
471 : Cys_m -->
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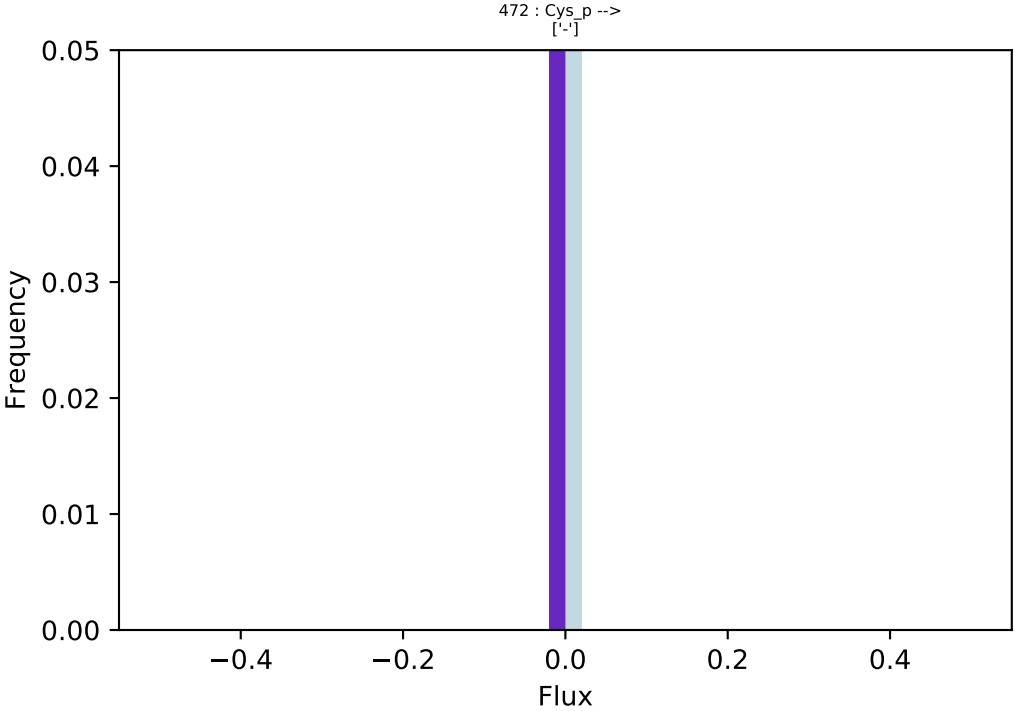
472 : Cys_p -->
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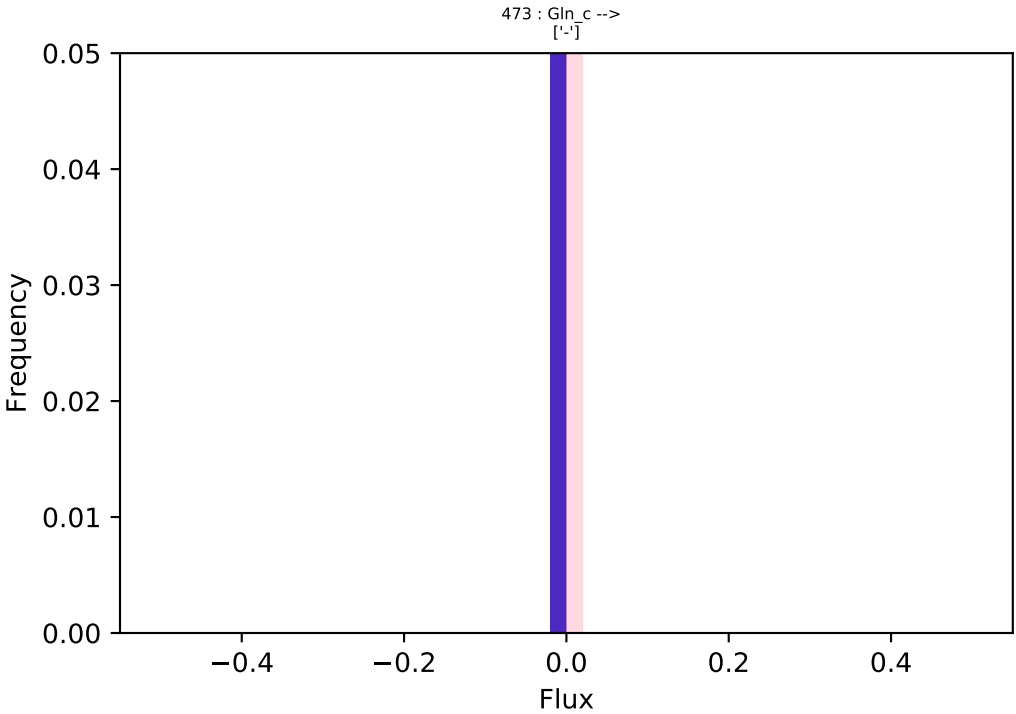
473 : Gln_c -->
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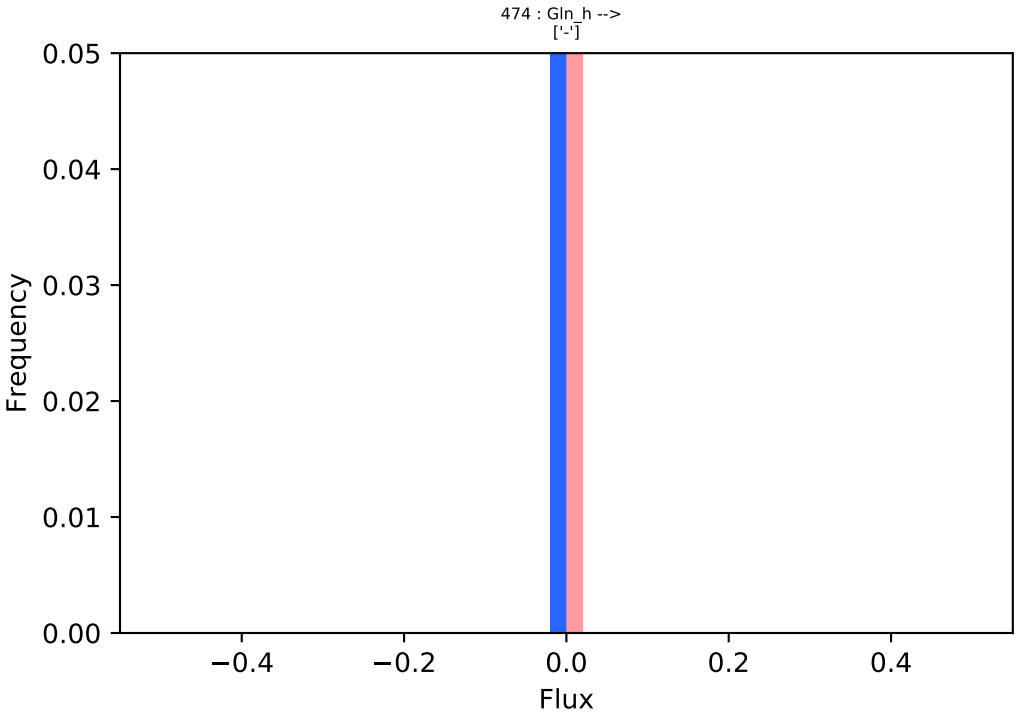
474 : Gln_h -->
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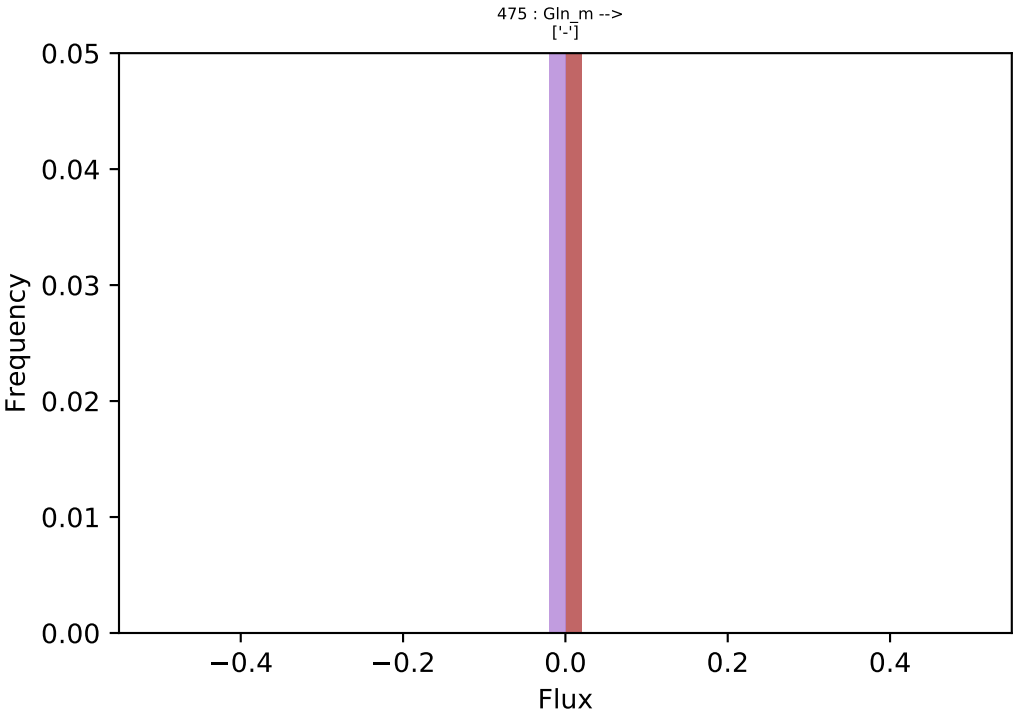
475 : Gln_m -->
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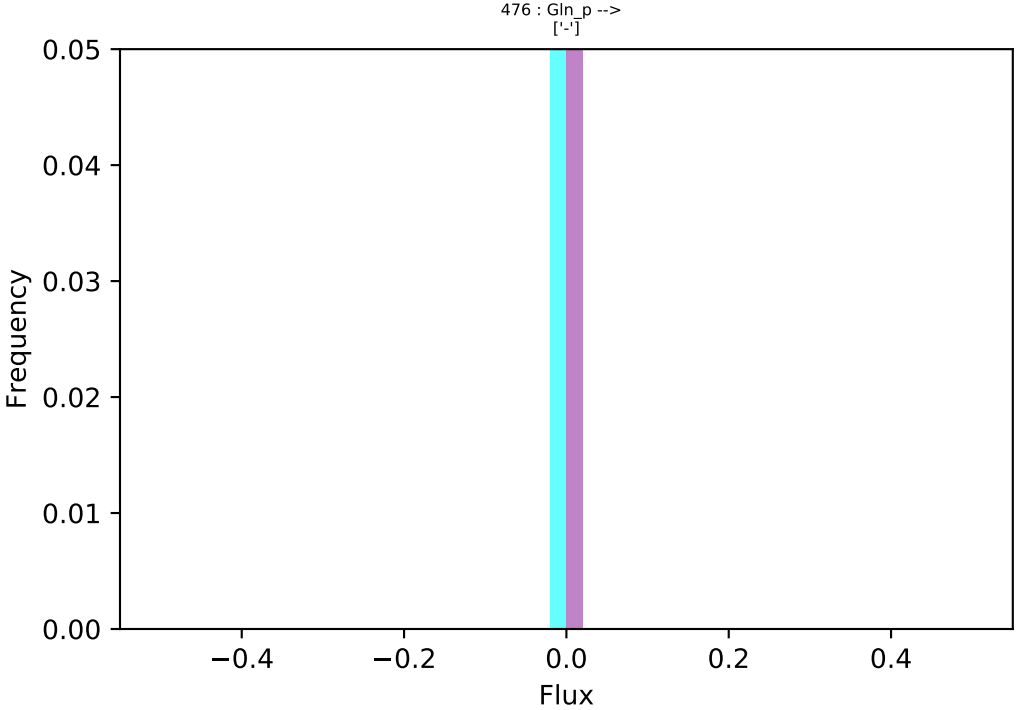
476 : Gln_p -->
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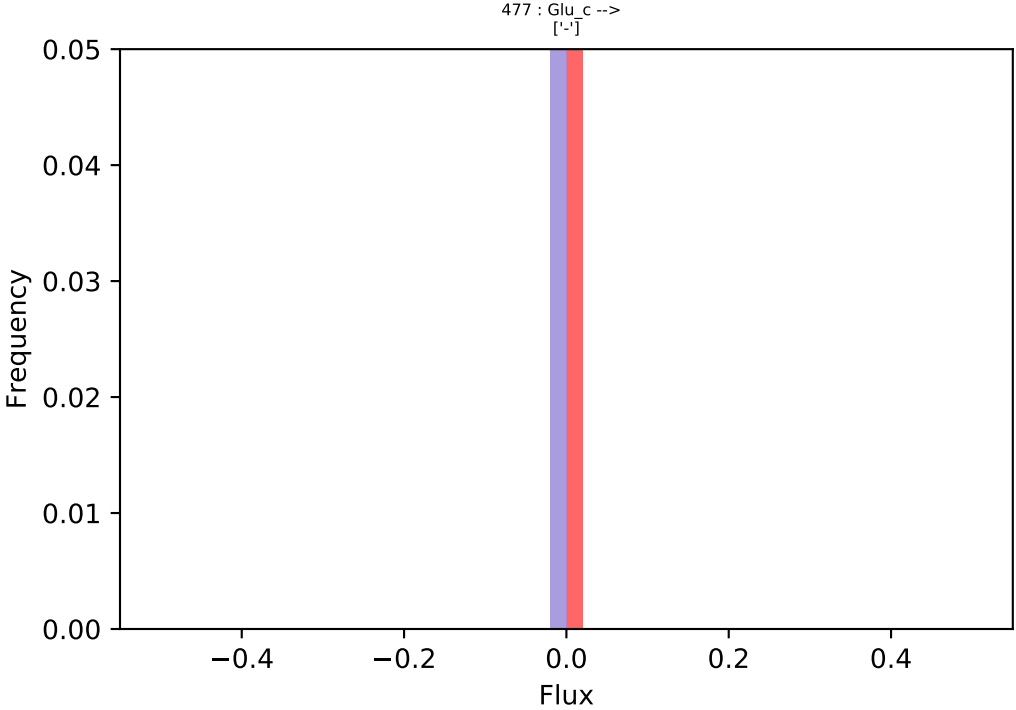
477 : Glu_c -->
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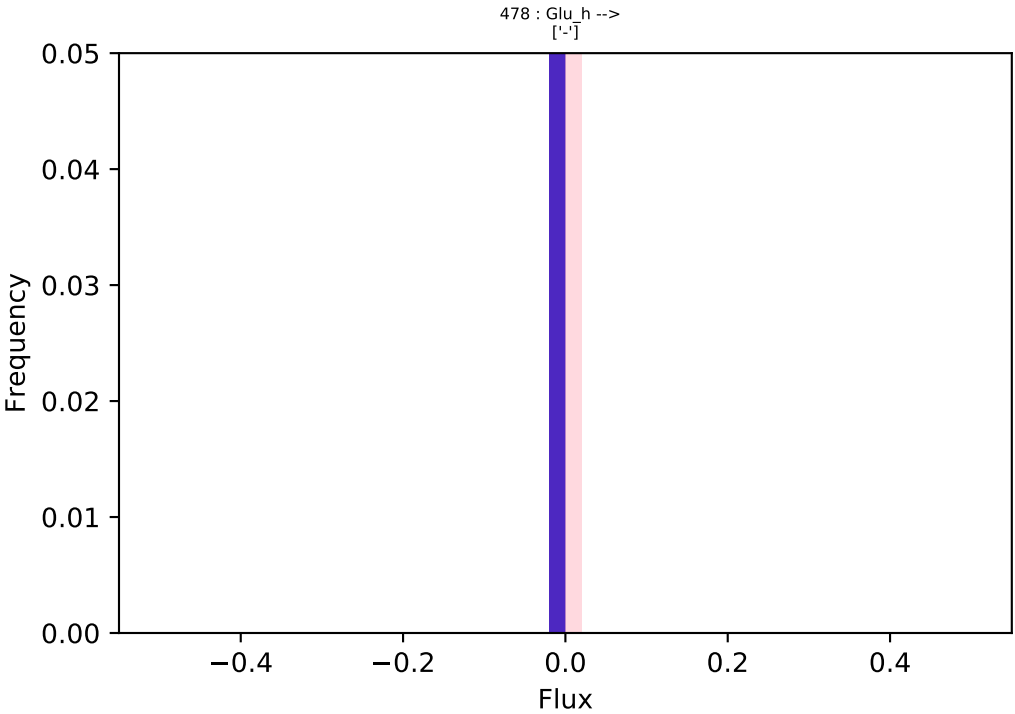
478 : Glu_h -->
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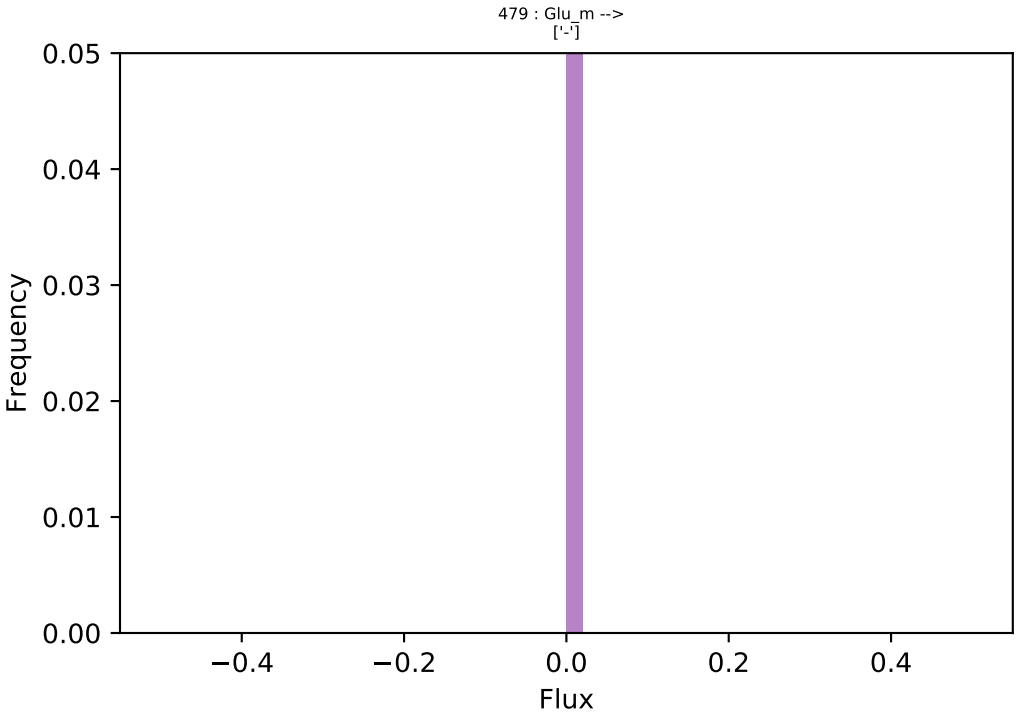
479 : Glu_m -->
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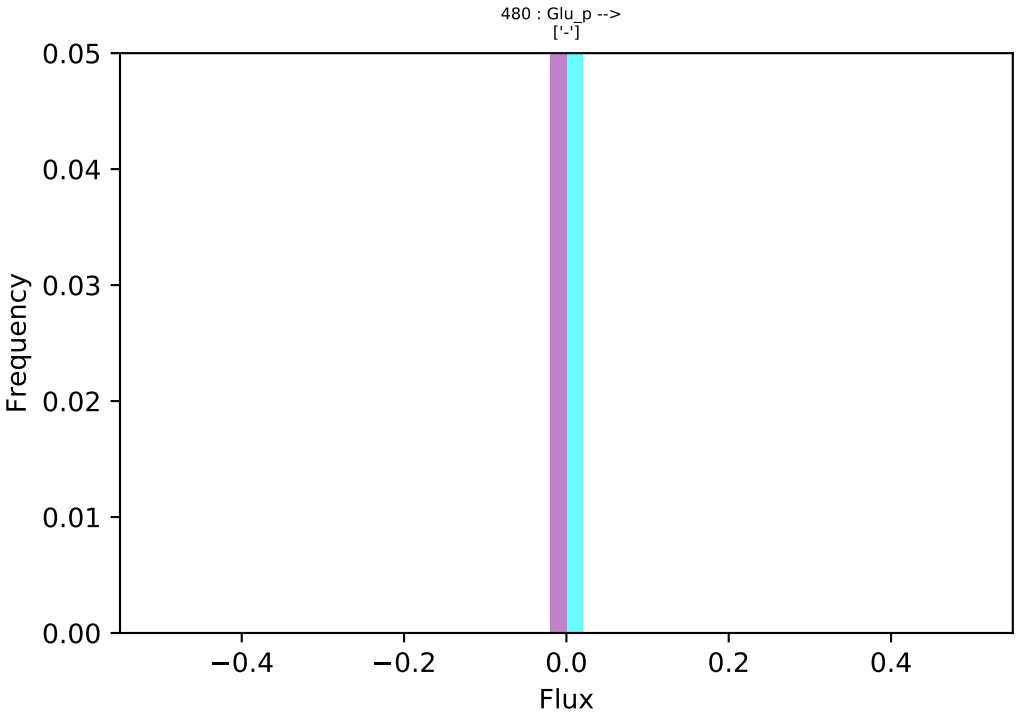
480 : Glu_p -->
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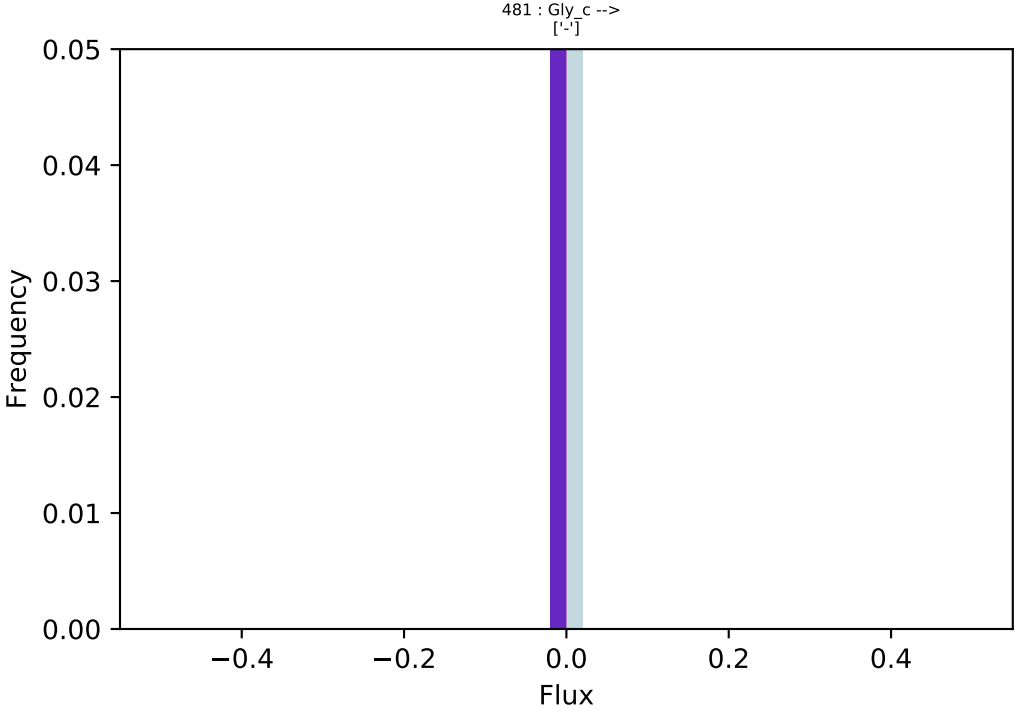
481 : Gly_c -->
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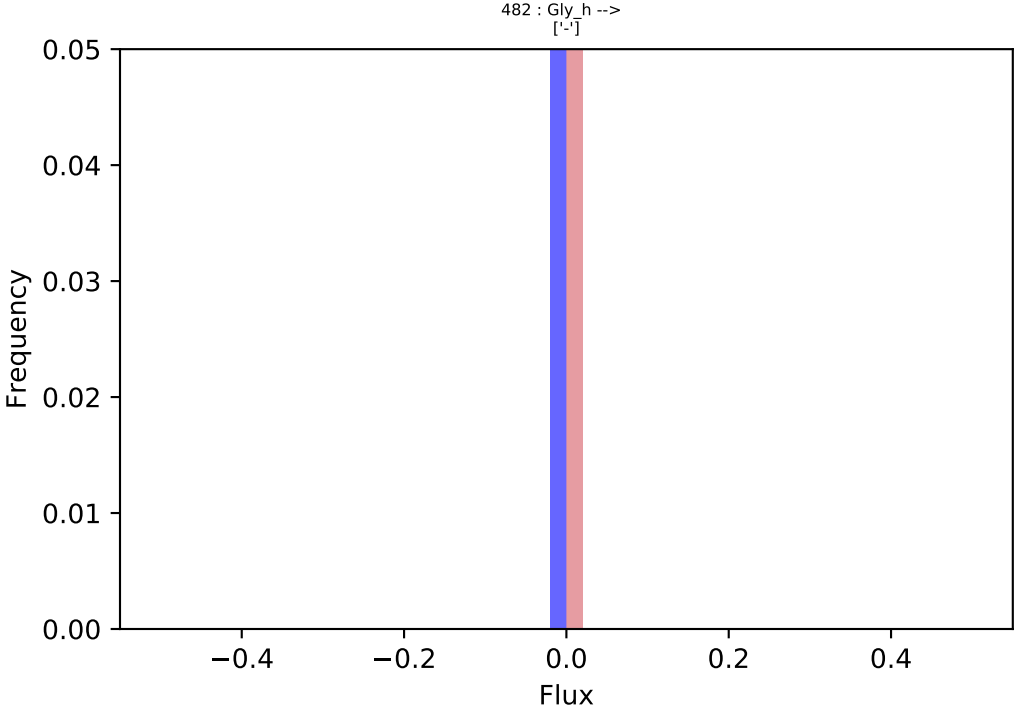
482 : Gly_h -->
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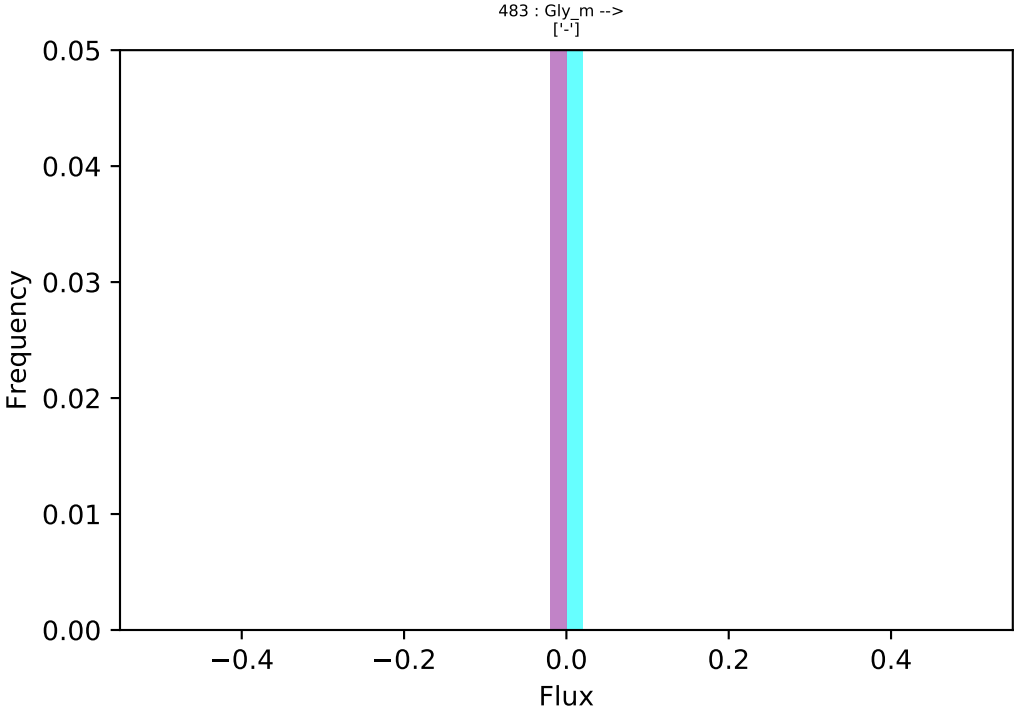
483 : Gly_m -->
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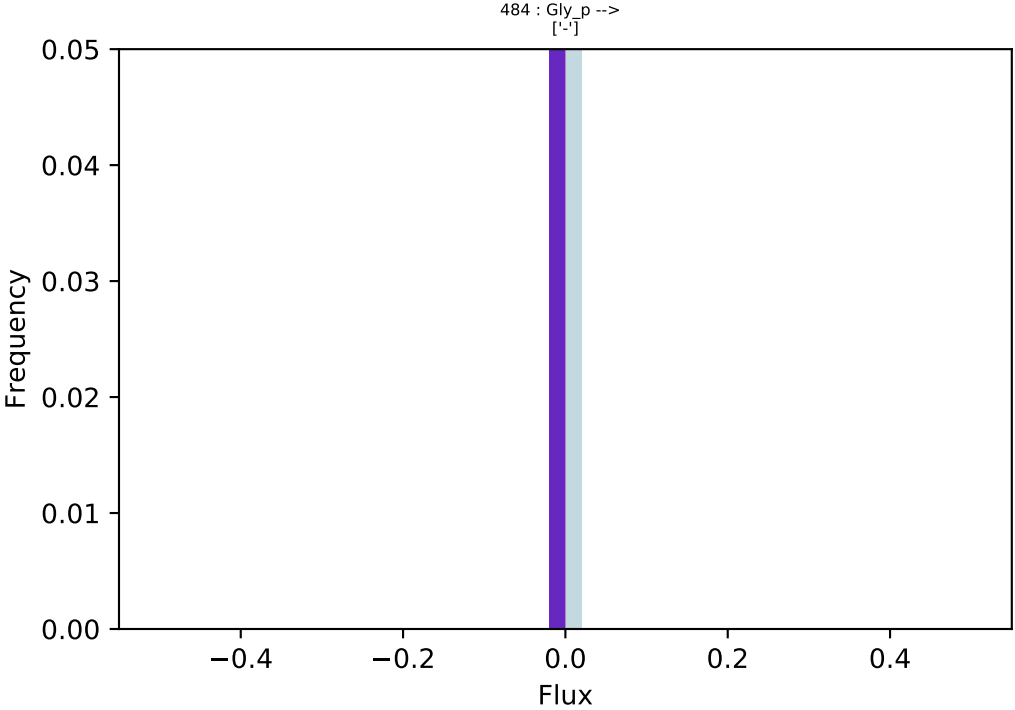
484 : Gly_p -->
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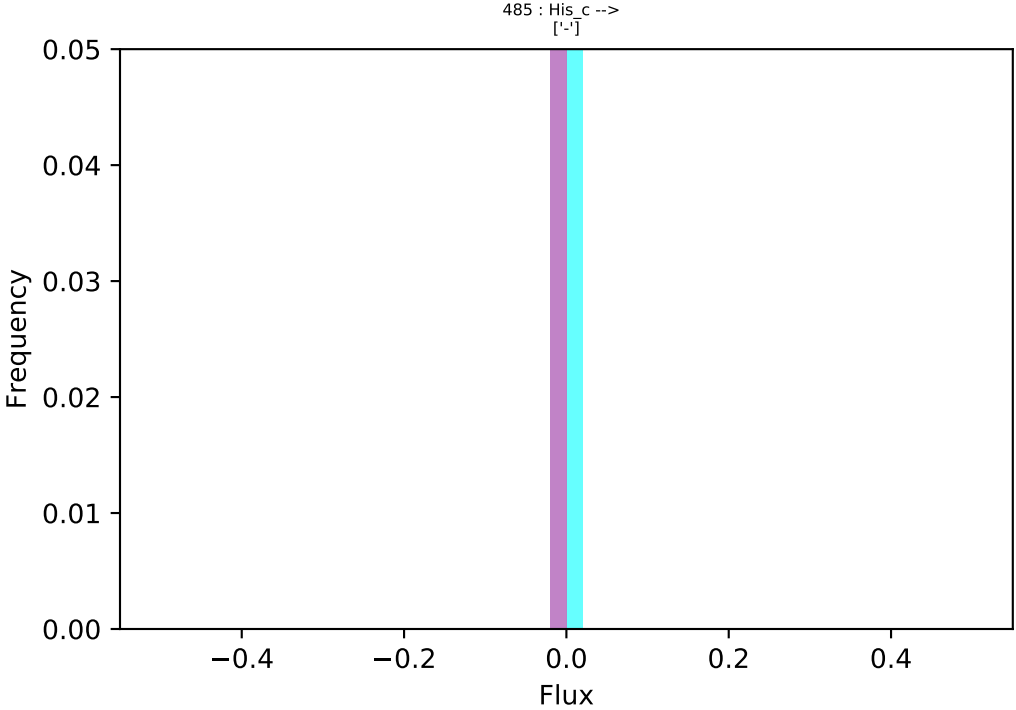
485 : His_c -->
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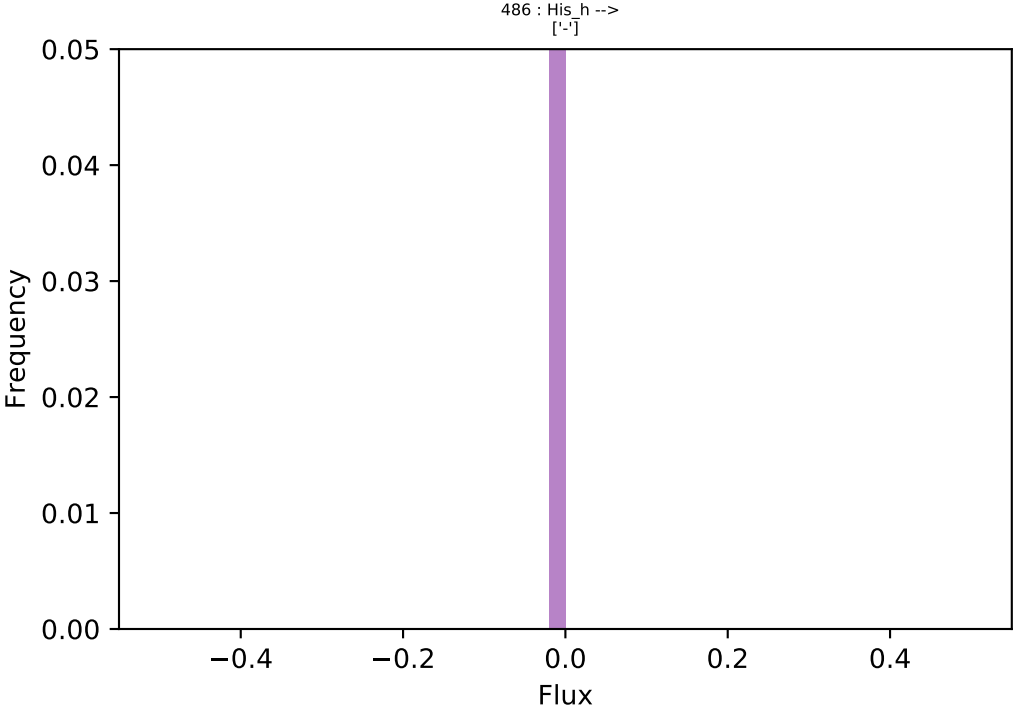
486 : His_h -->
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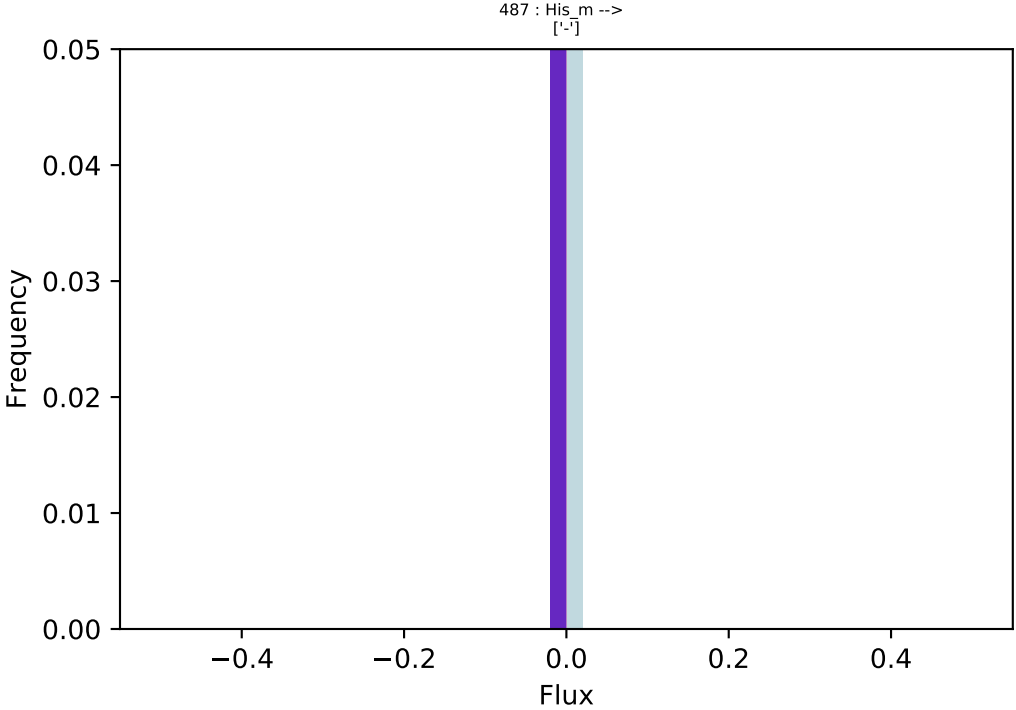
487 : His_m -->
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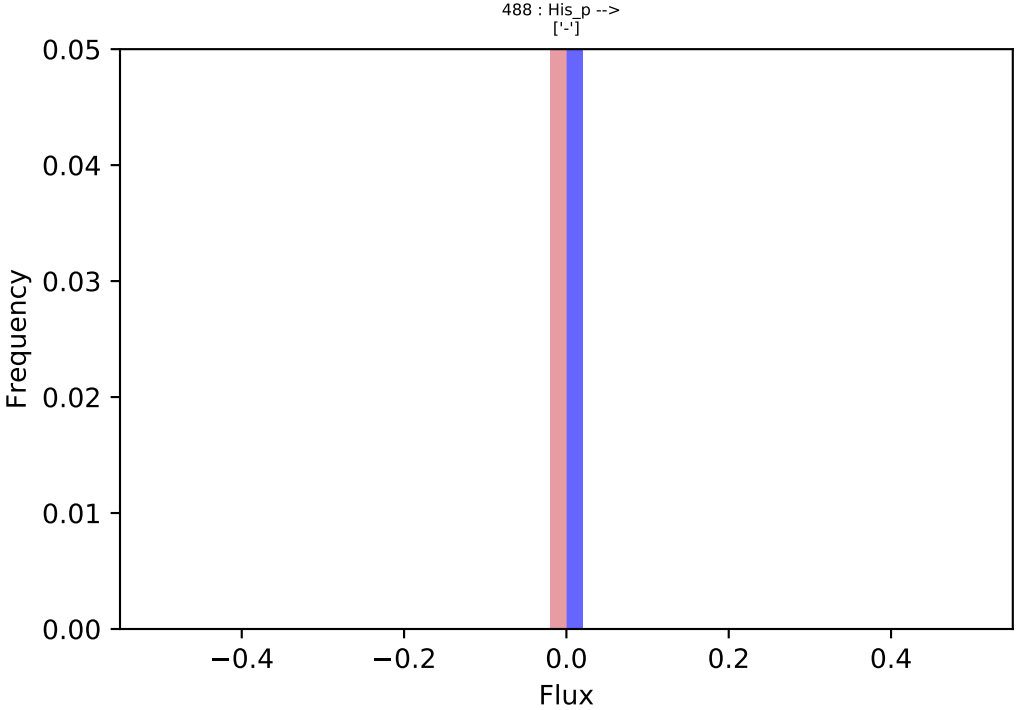
488 : His_p -->
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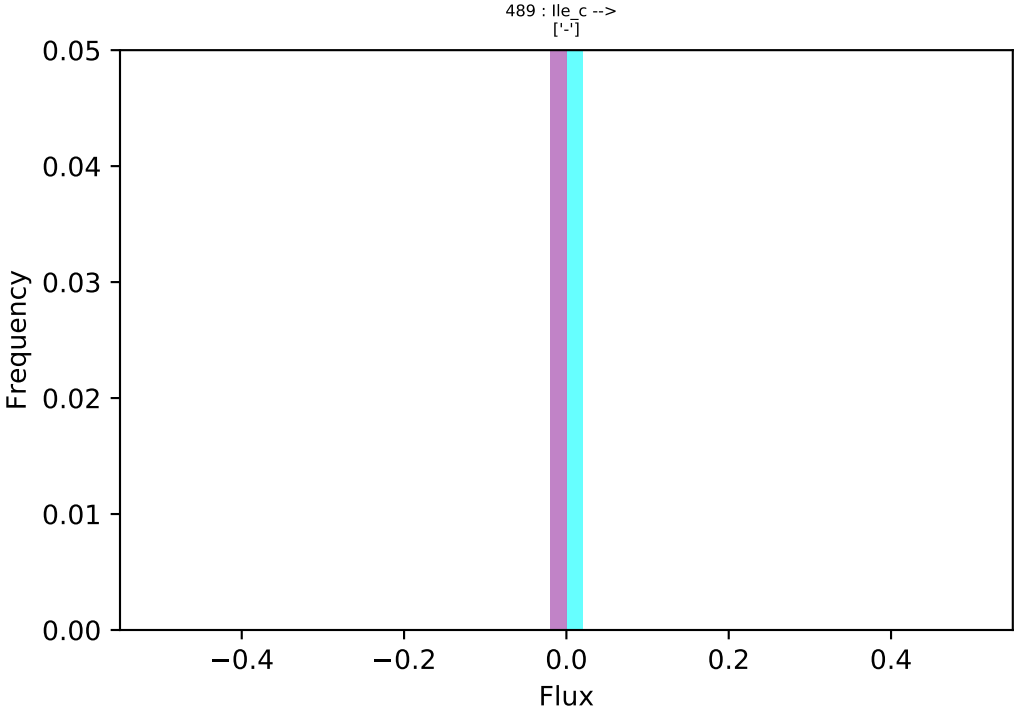
489 : Ile_c -->
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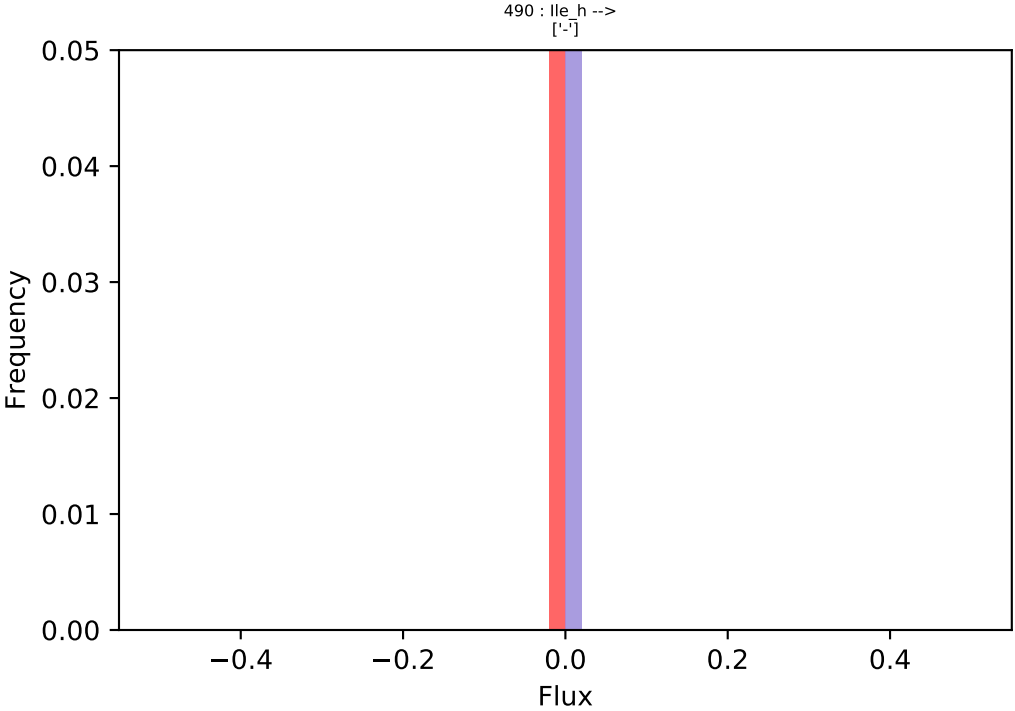
490 : Ile_h -->
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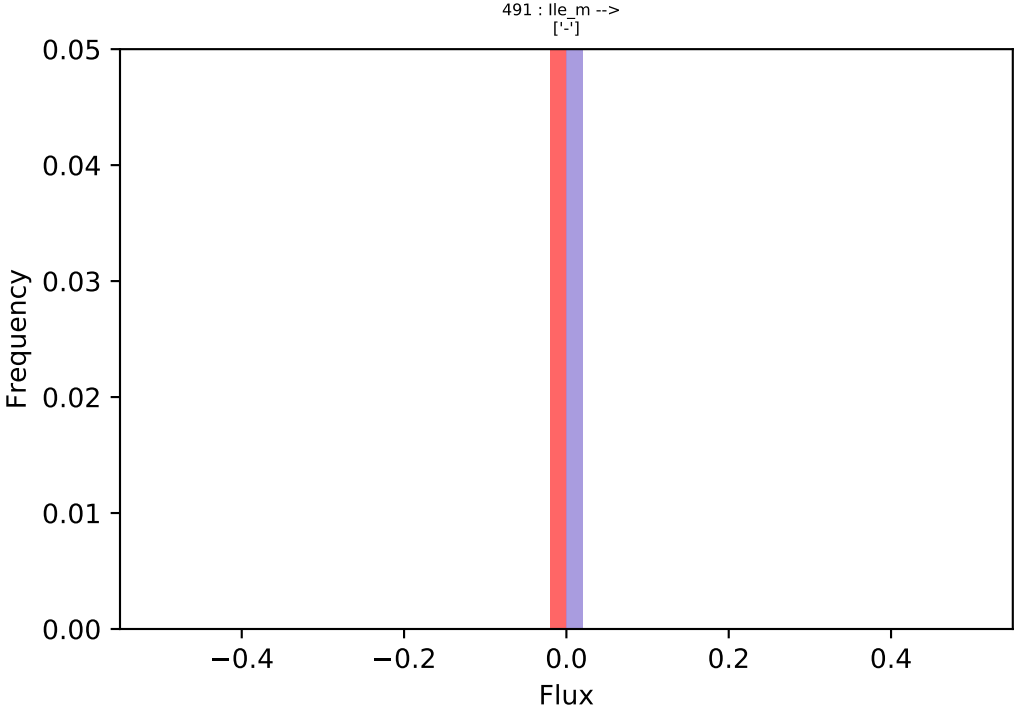
491 : Ile_m -->
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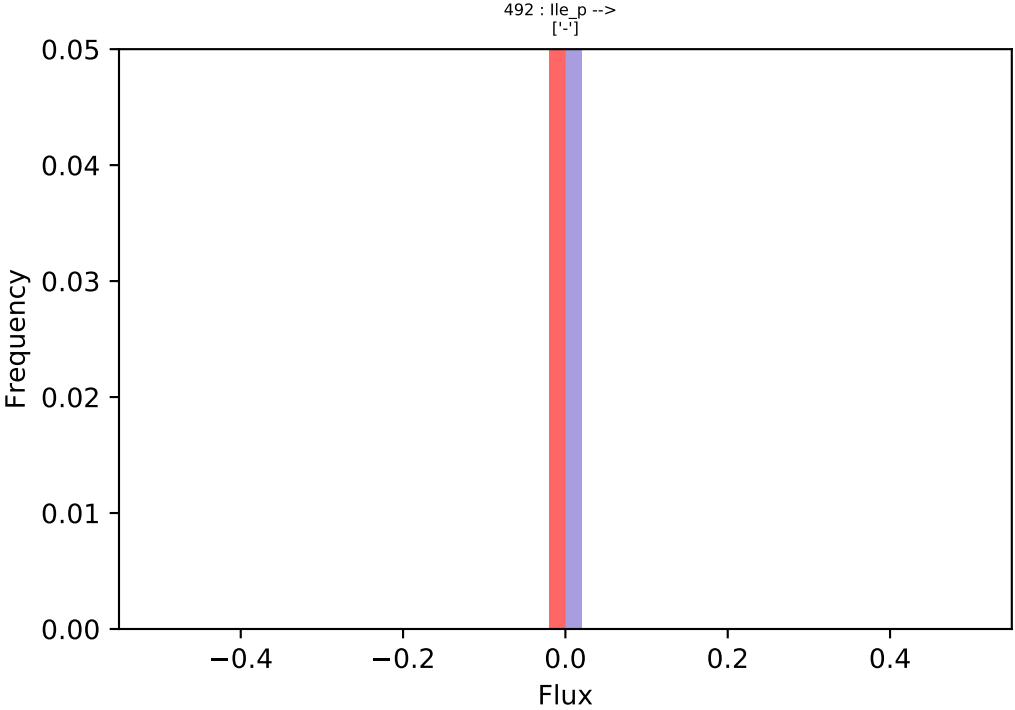
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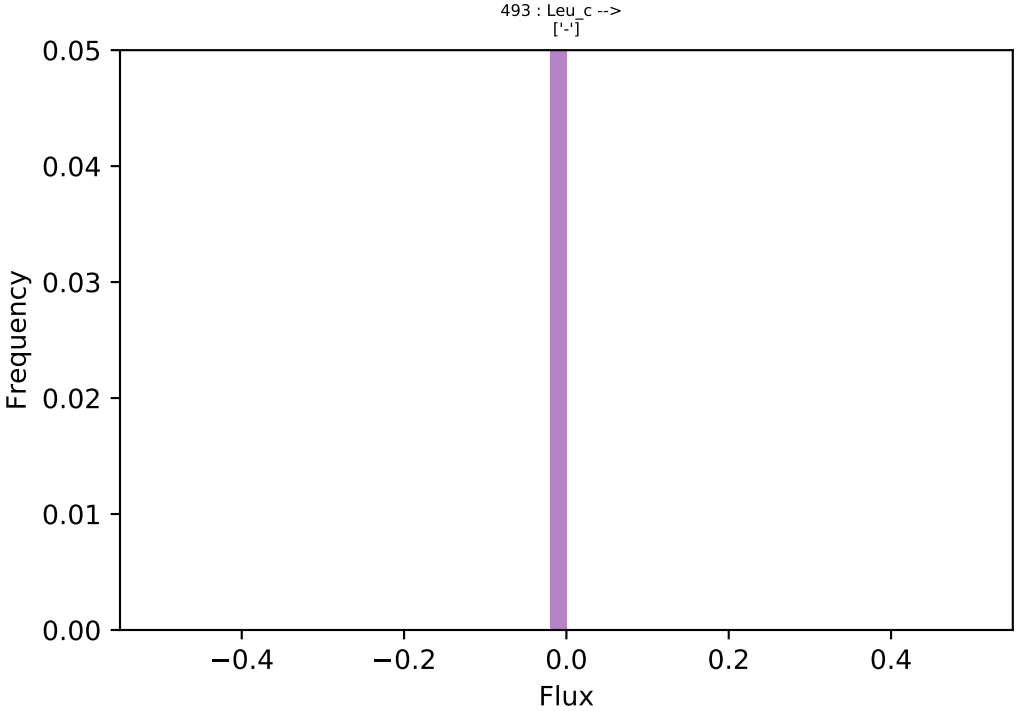
493 : Leu_c -->
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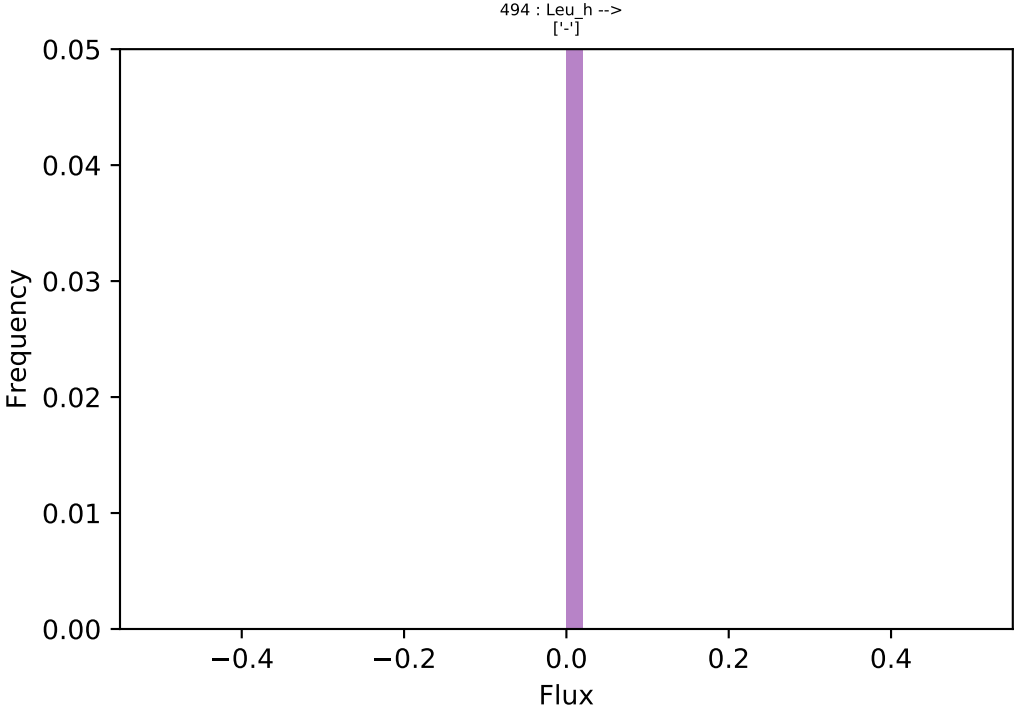
494 : Leu_h -->
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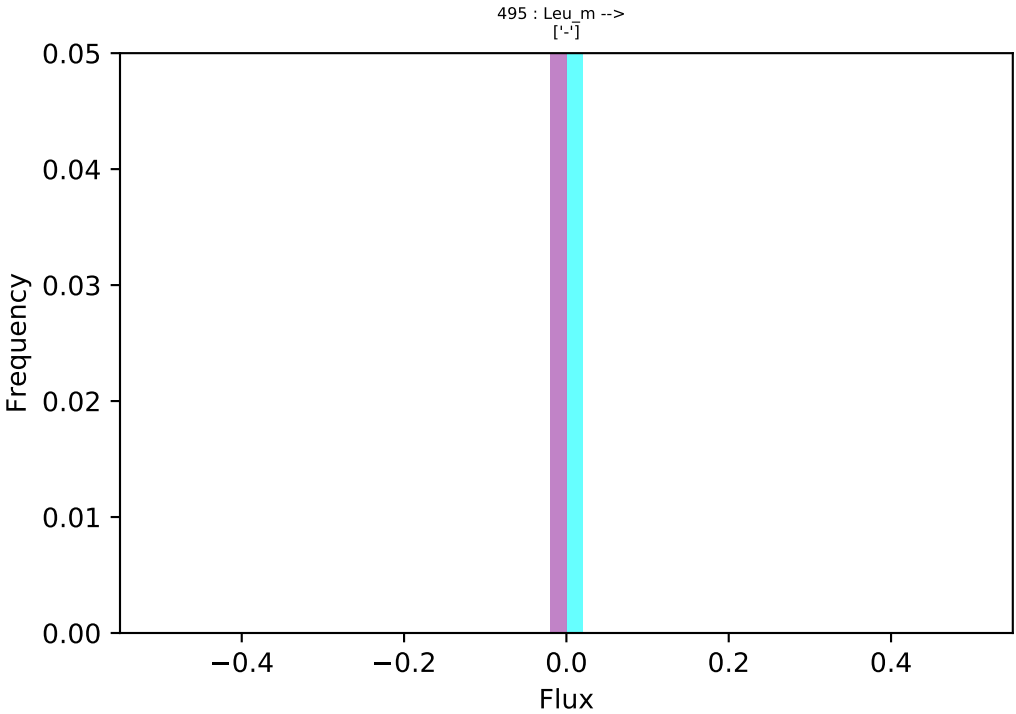
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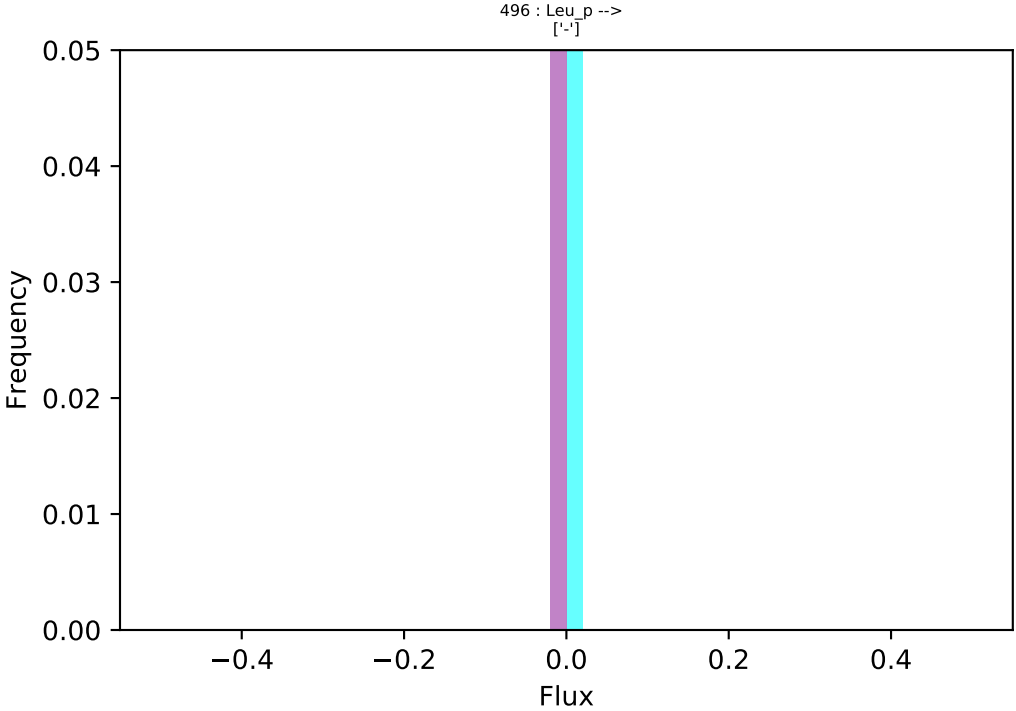
496 : Leu_p -->
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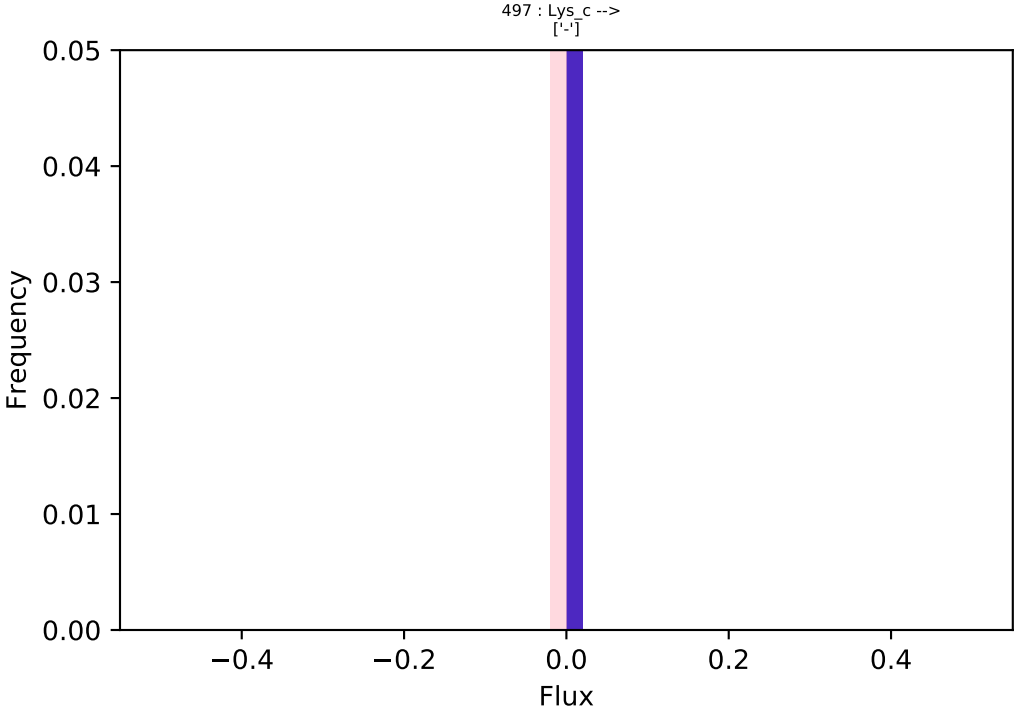
497 : Lys_c -->
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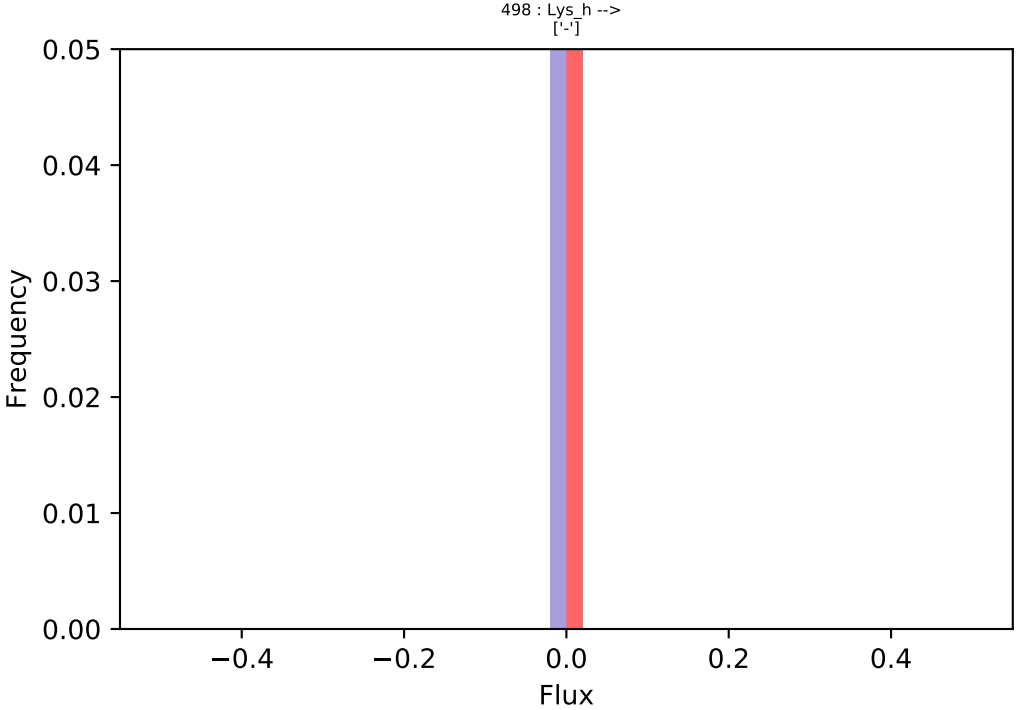
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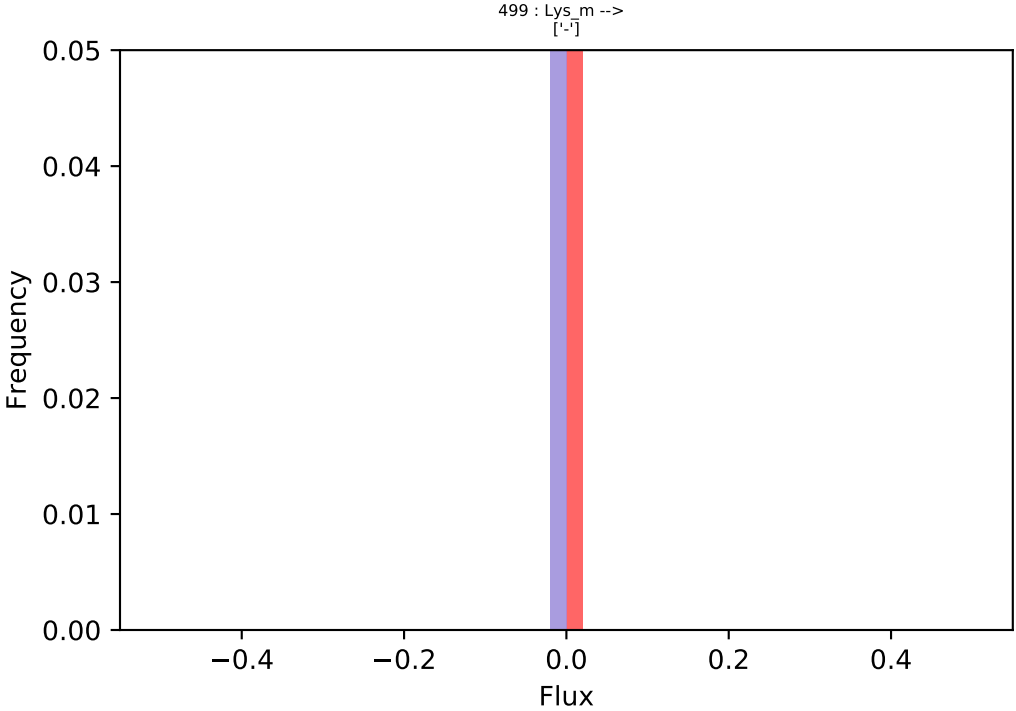
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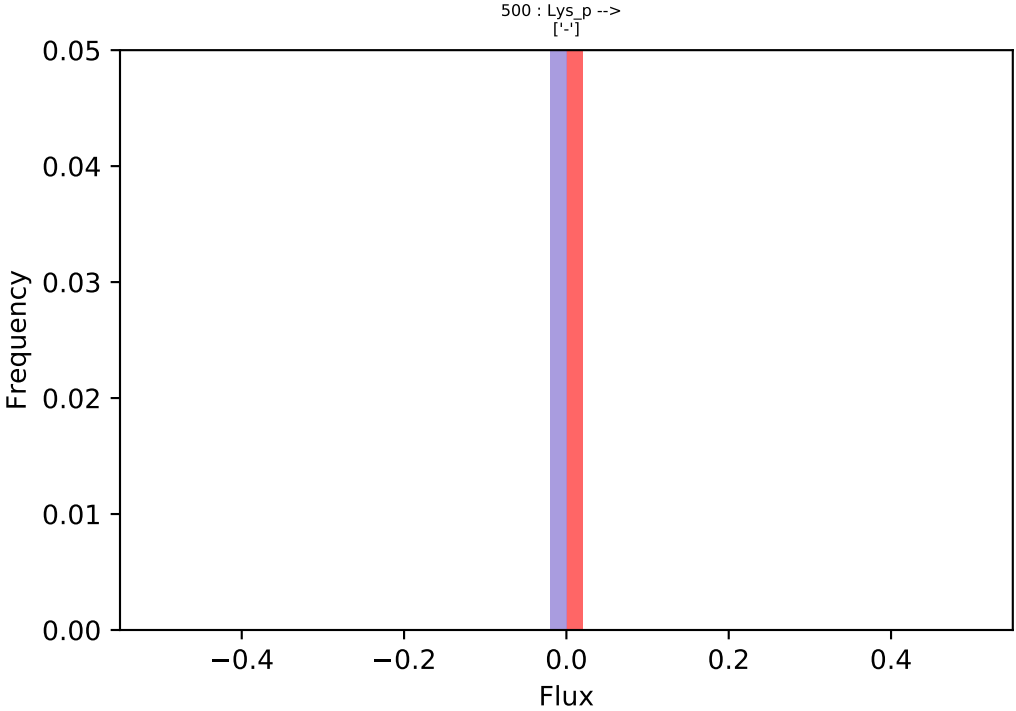
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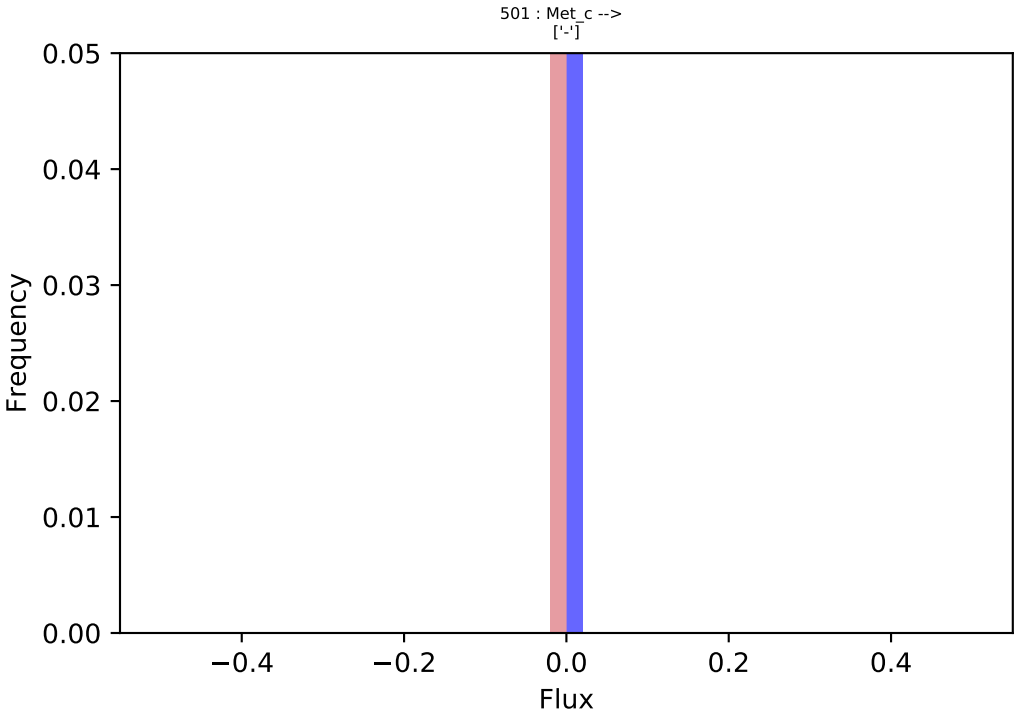
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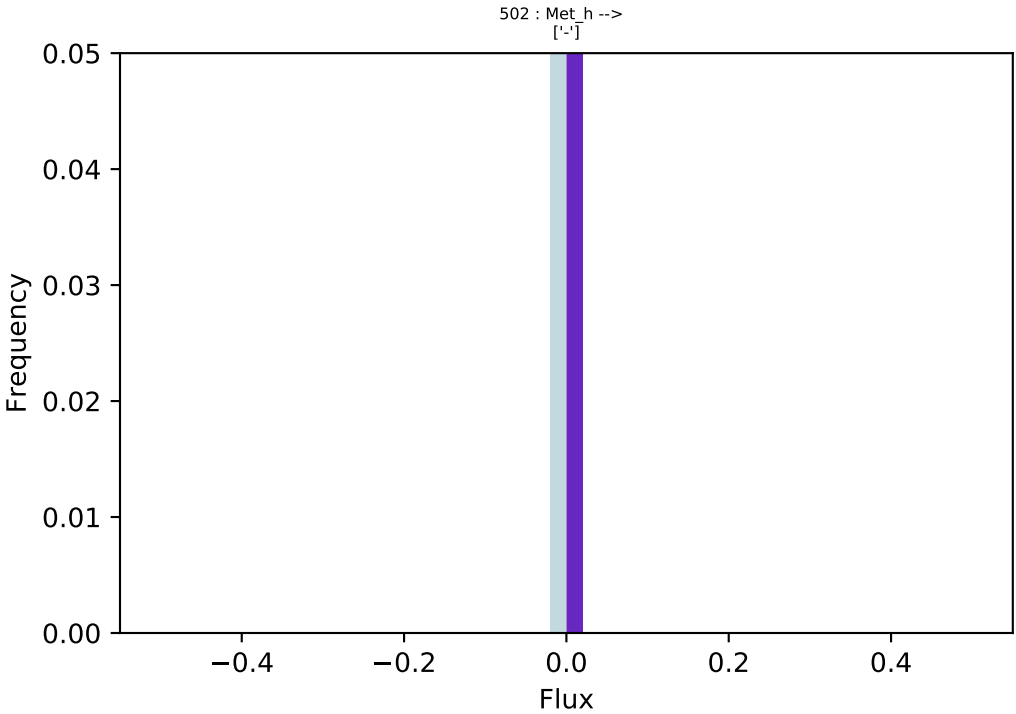
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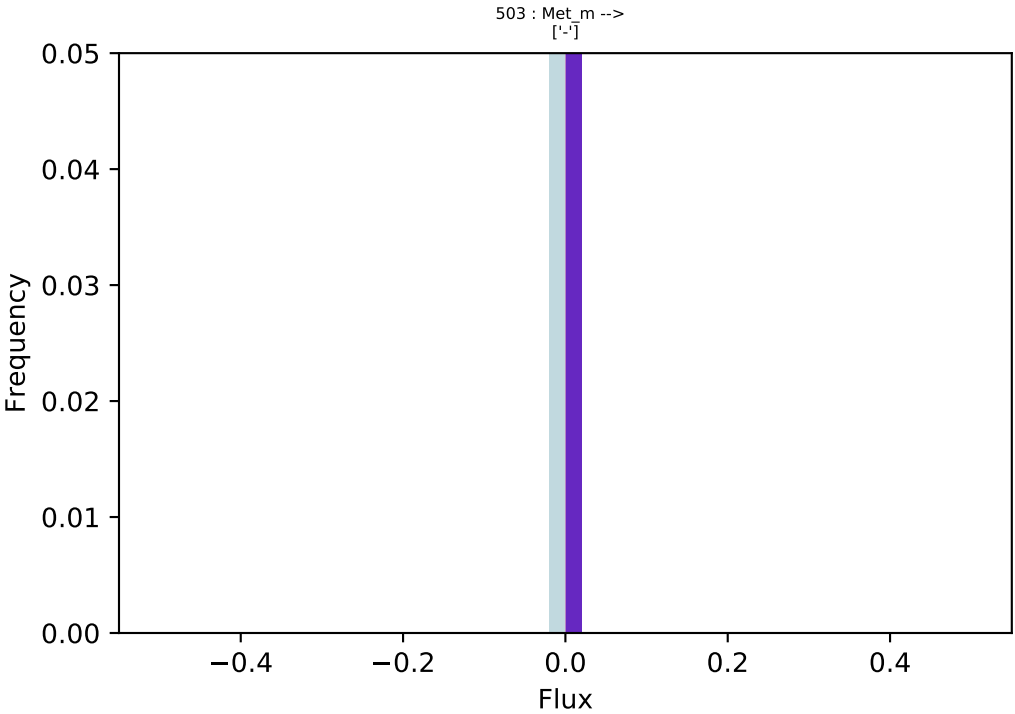
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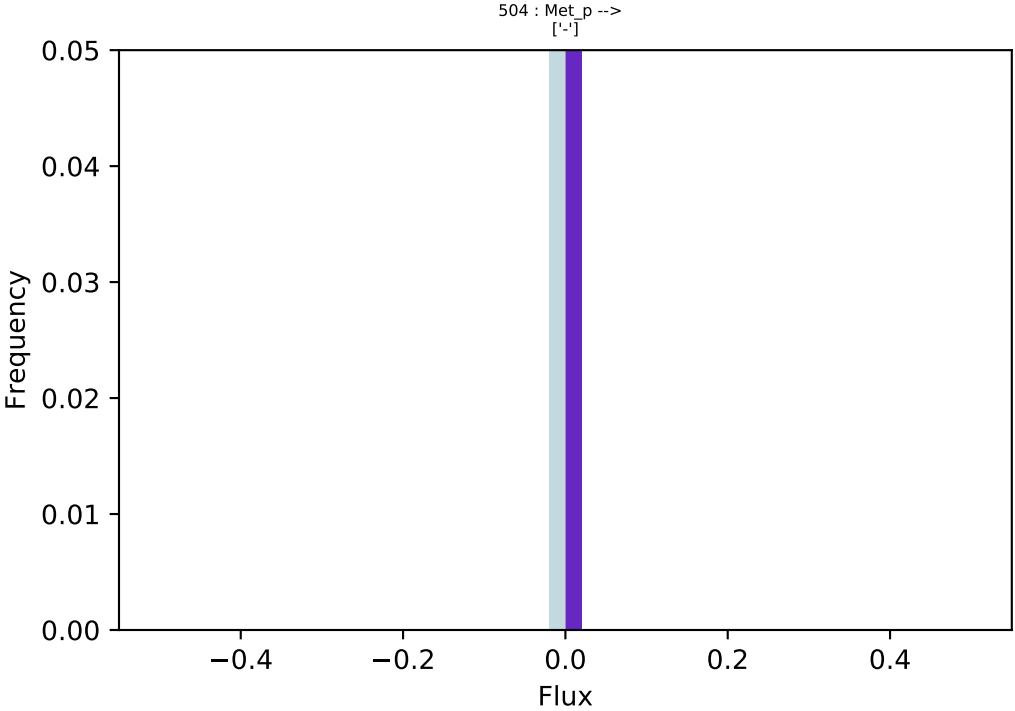
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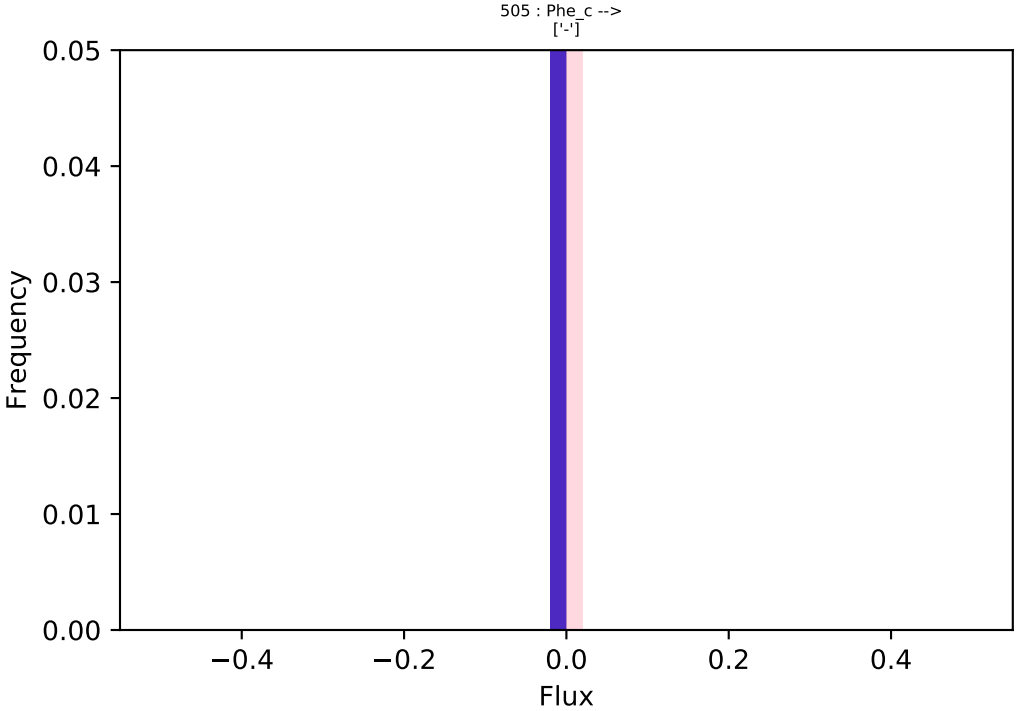
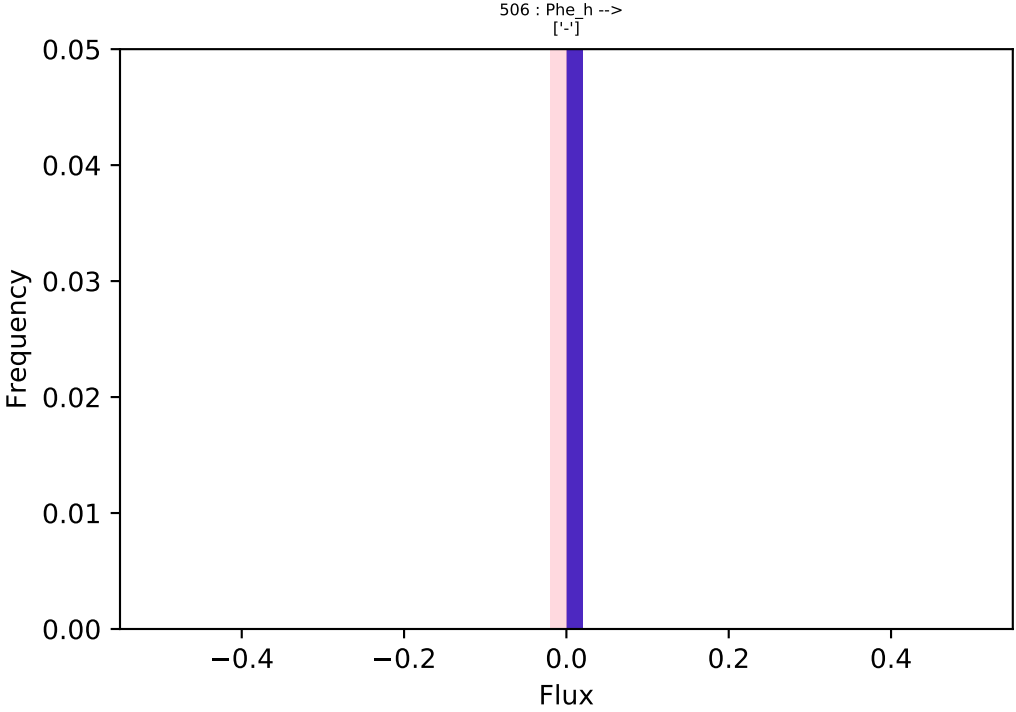
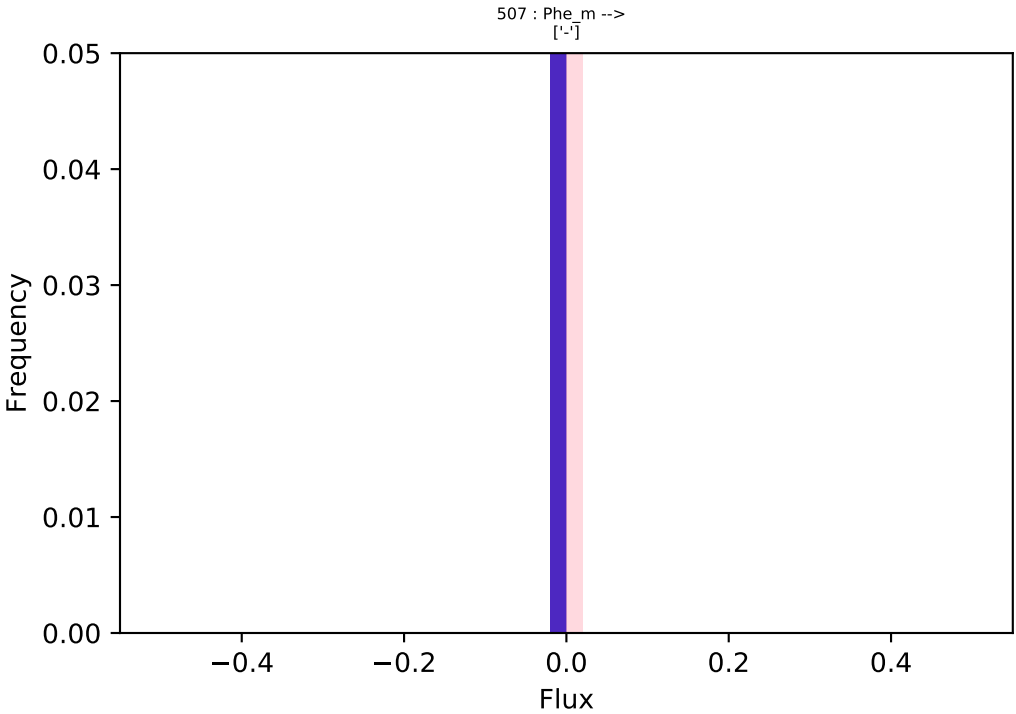
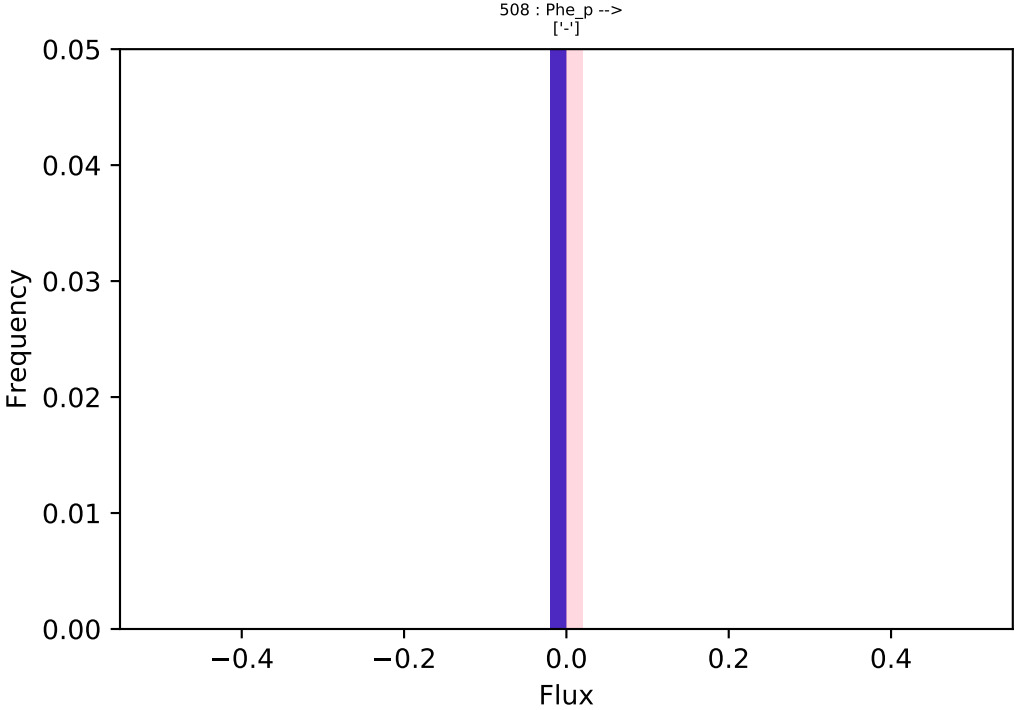
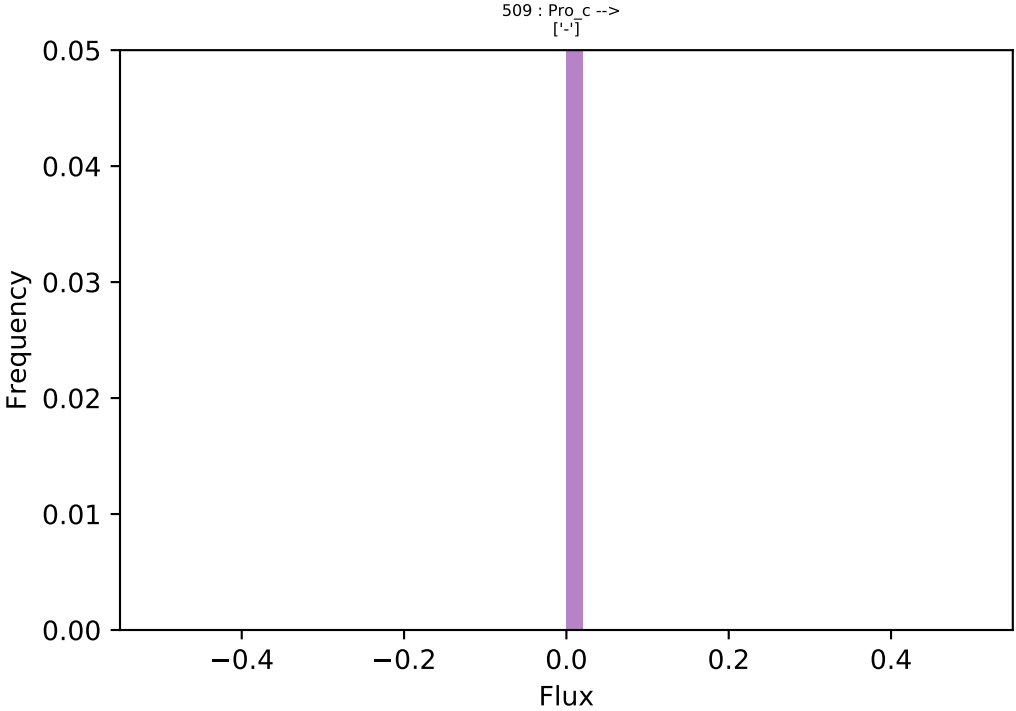
Flux

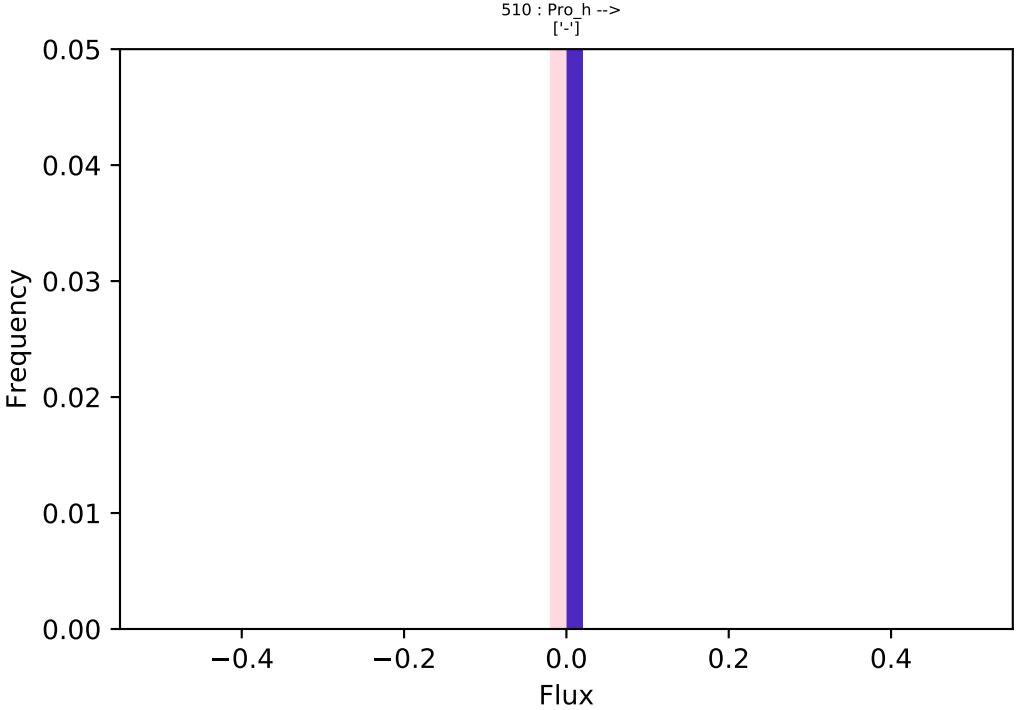

505 : Phe_c -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

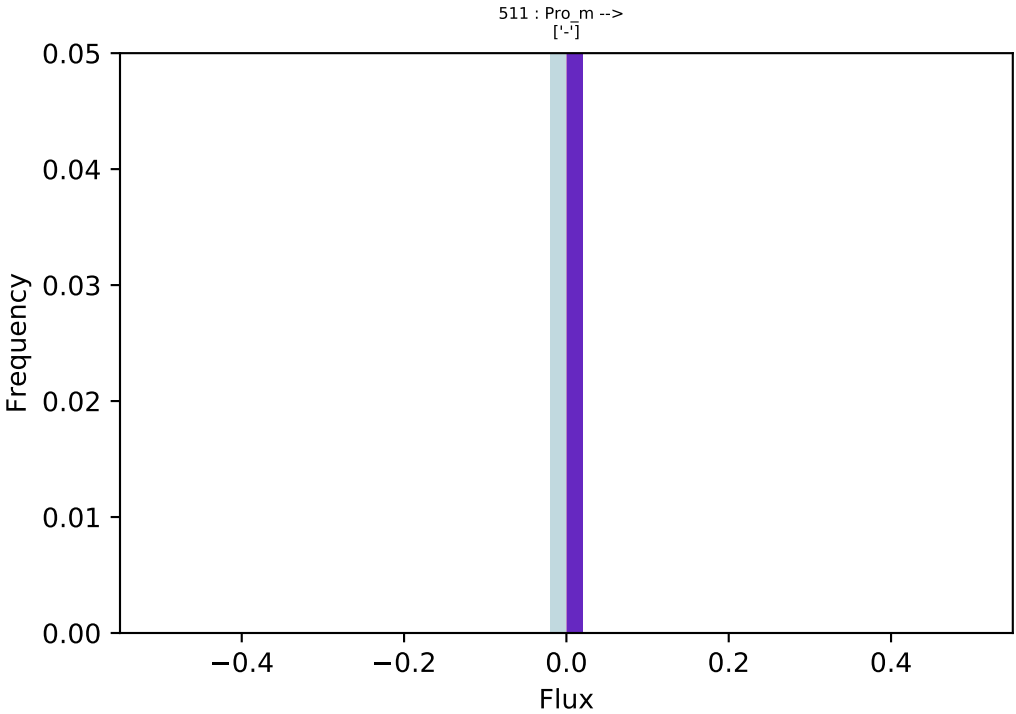

506 : Phe_h -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

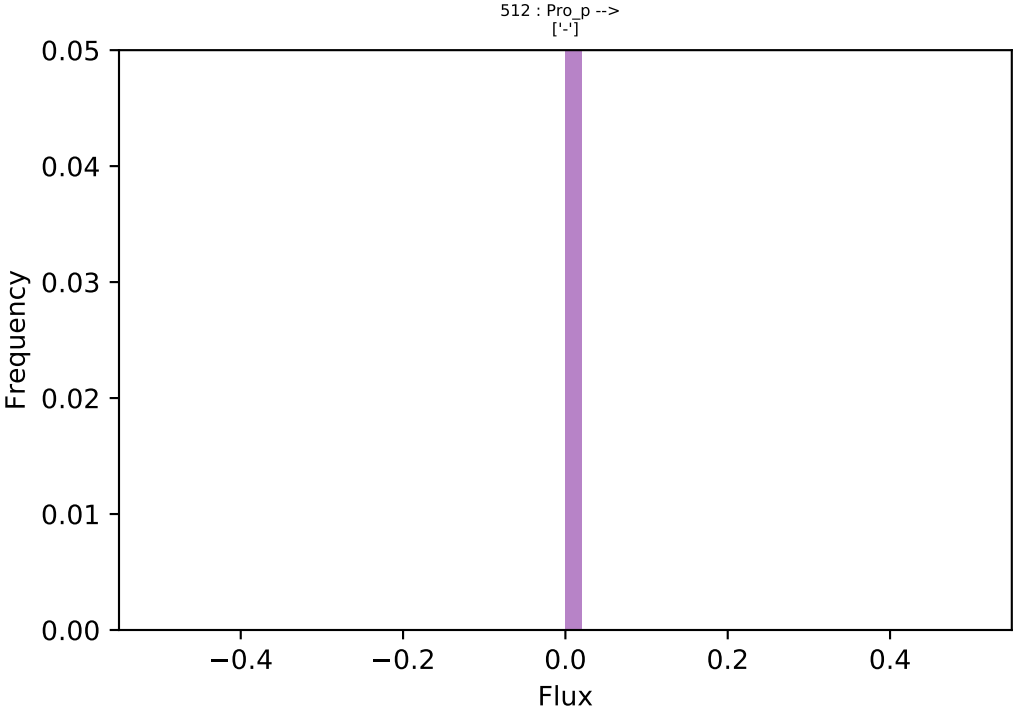

507 : Phe_m -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

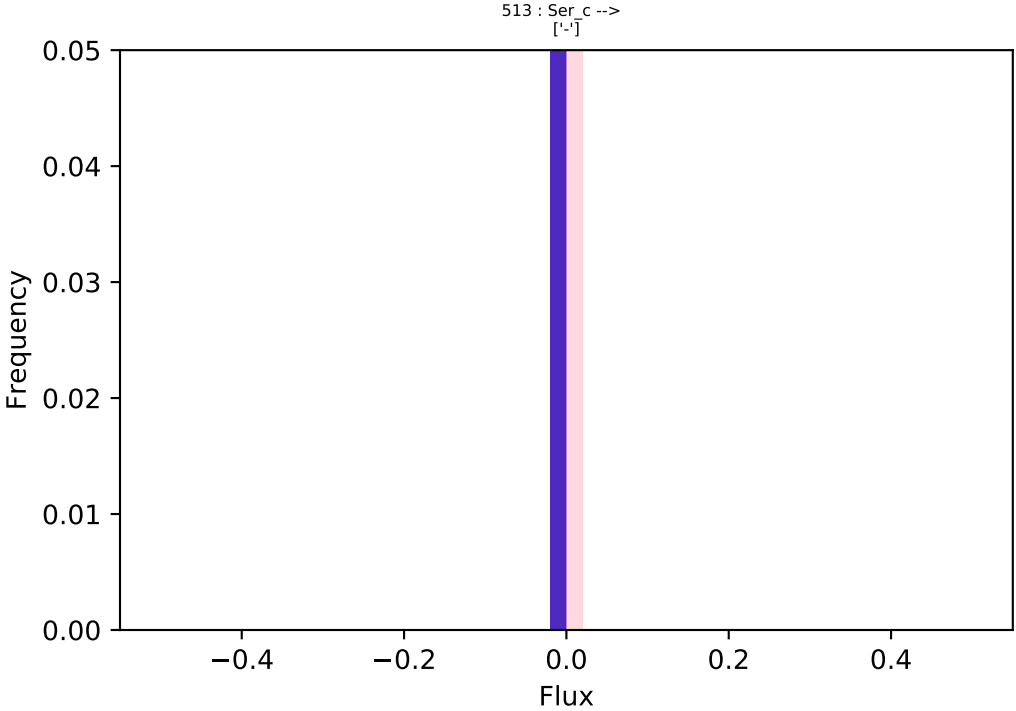

508 : Phe_p -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

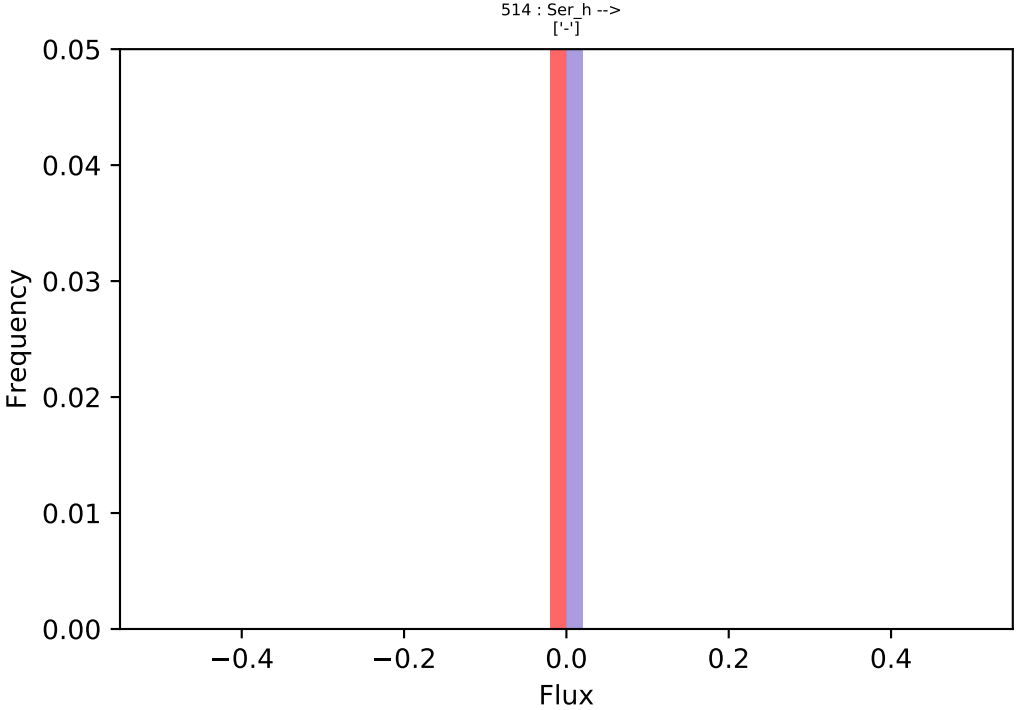

509 : Pro_c -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

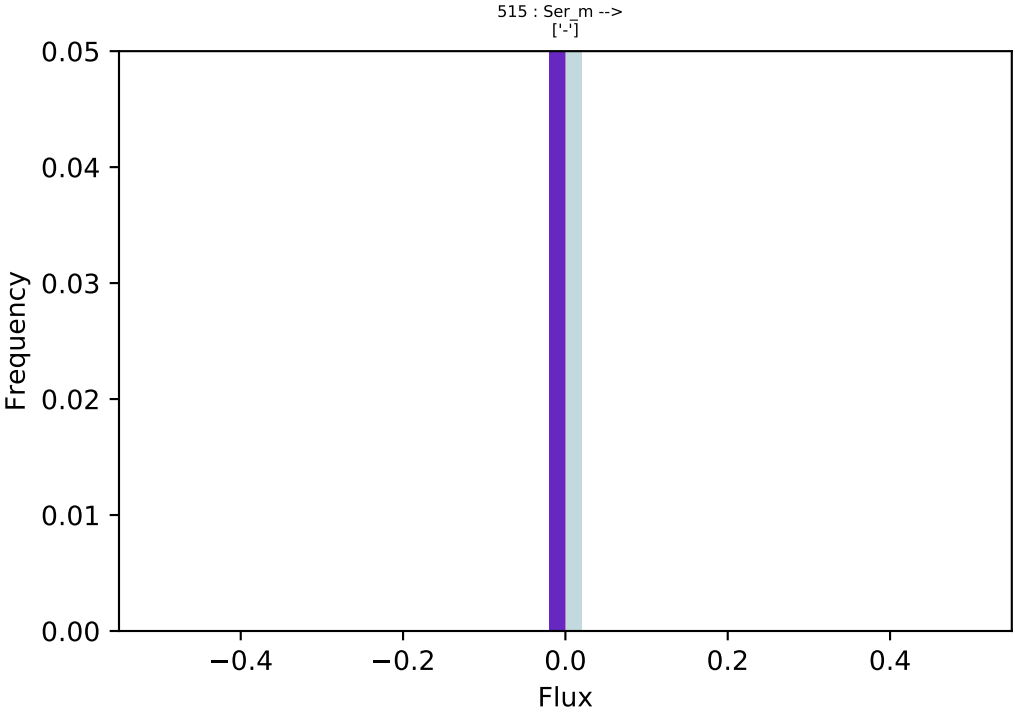

510 : Pro_h -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

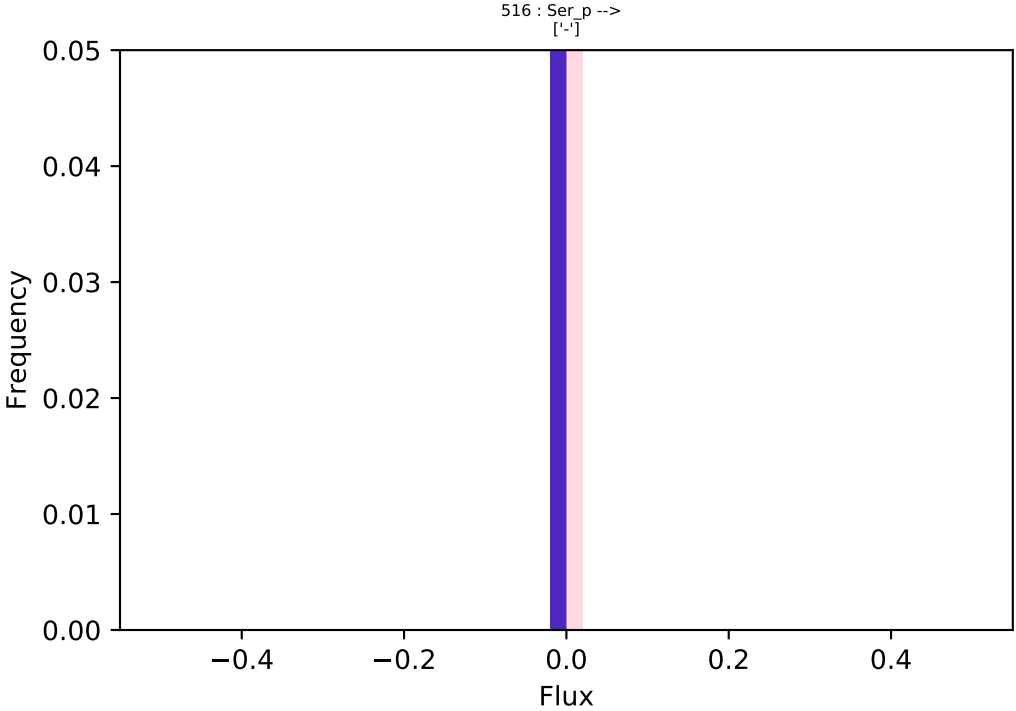

511 : Pro_m -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

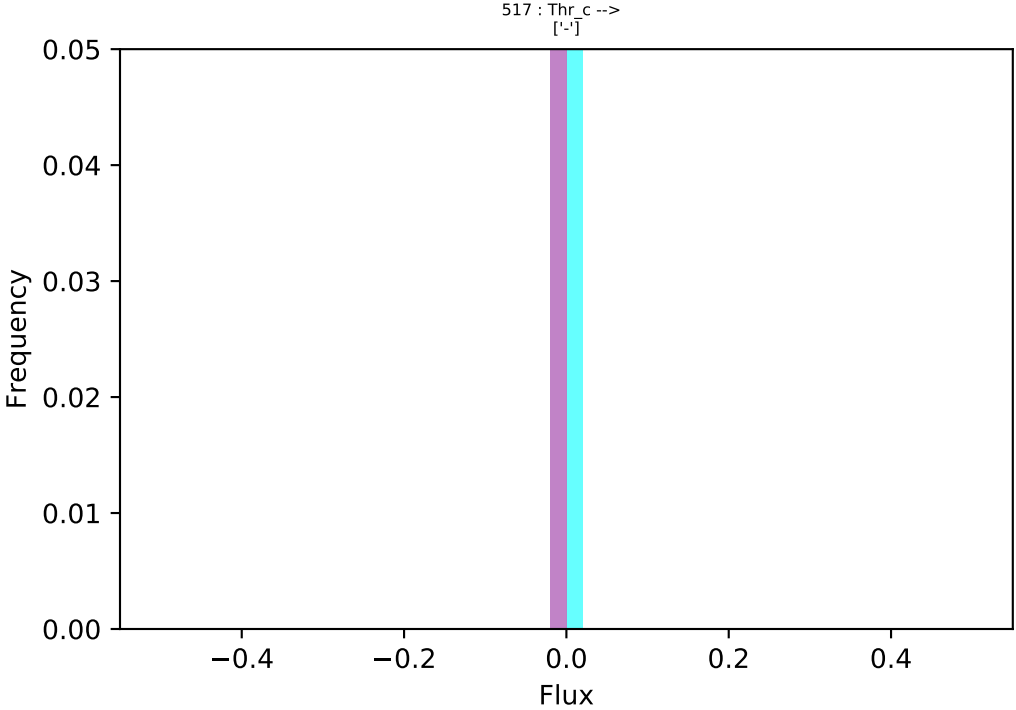

512 : Pro_p -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

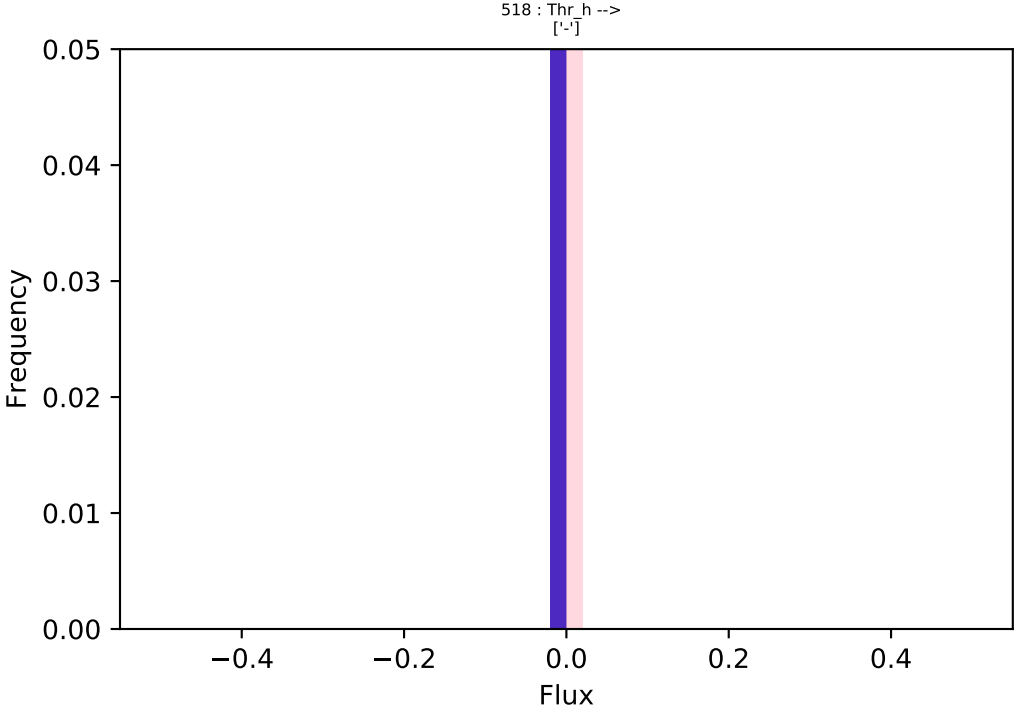

513 : Ser_c -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

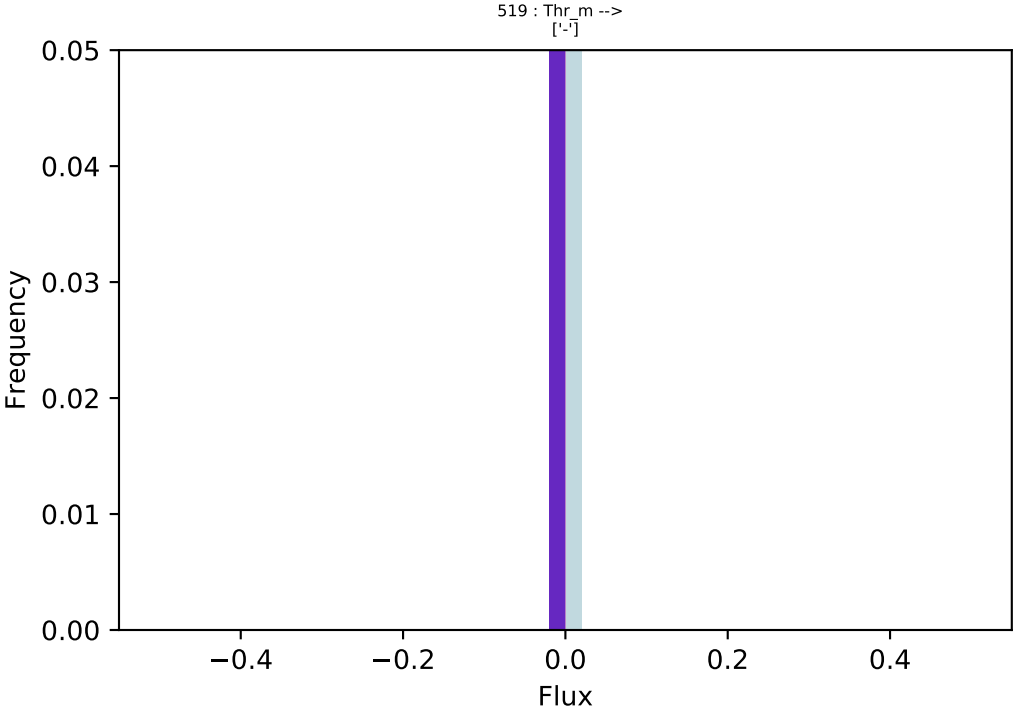

514 : Ser_h -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

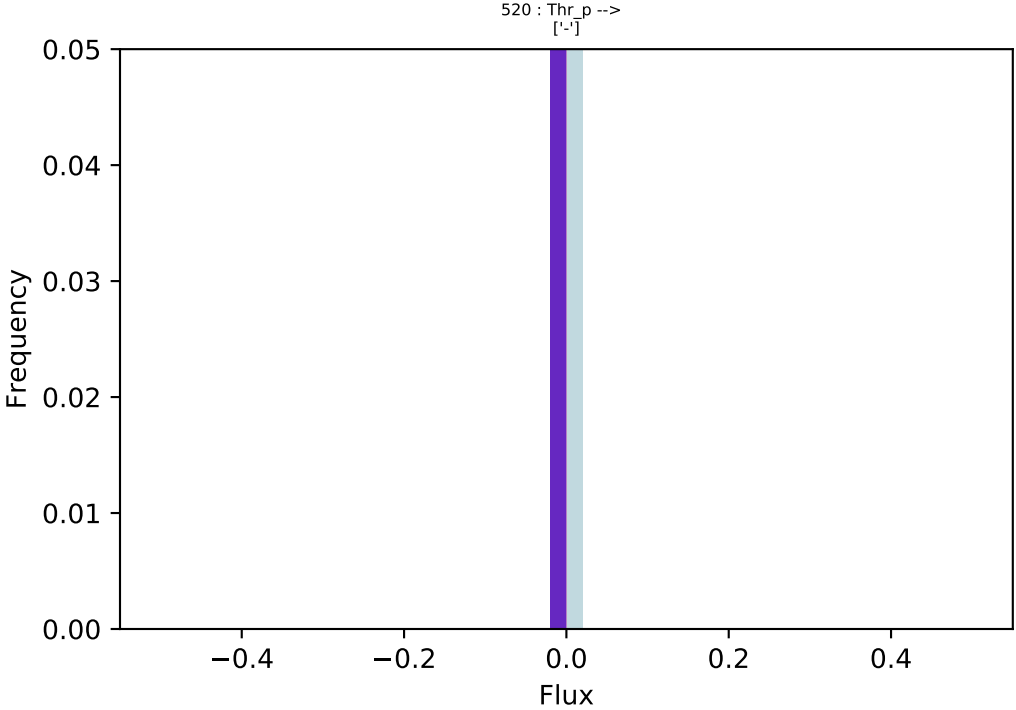

515 : Ser_m -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

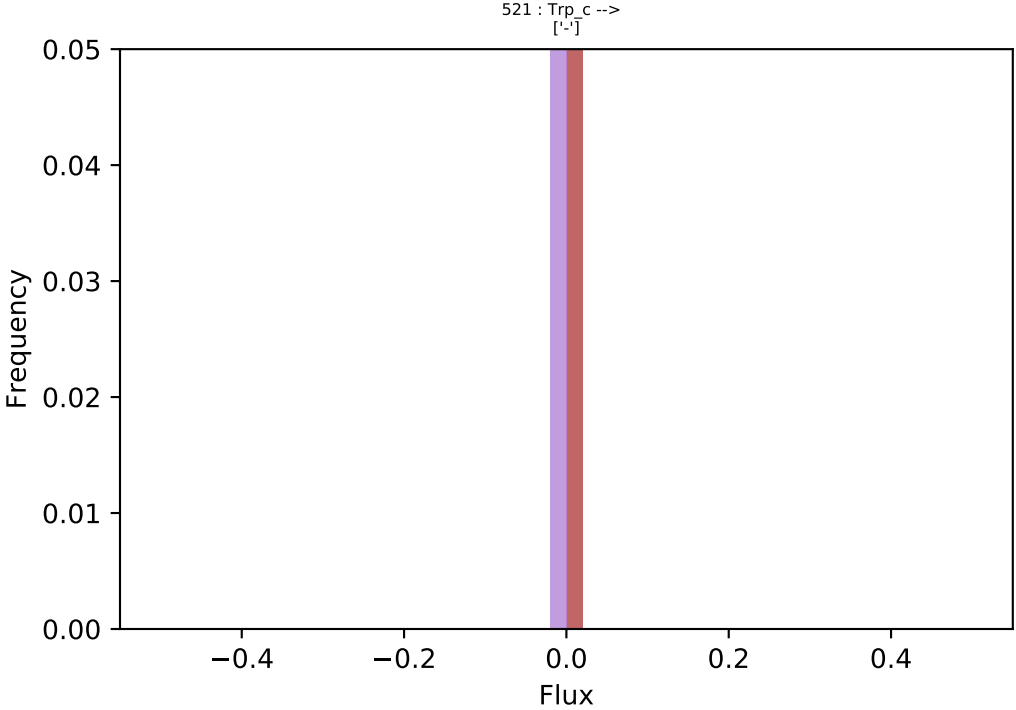

516 : Ser_p -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

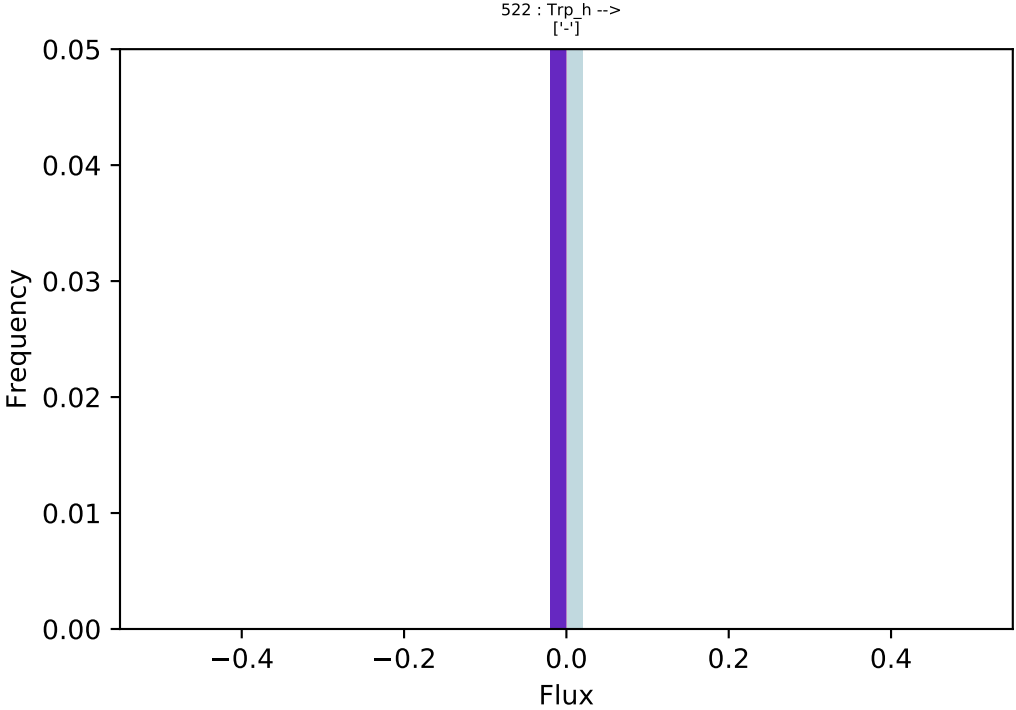

517 : Thr_c -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

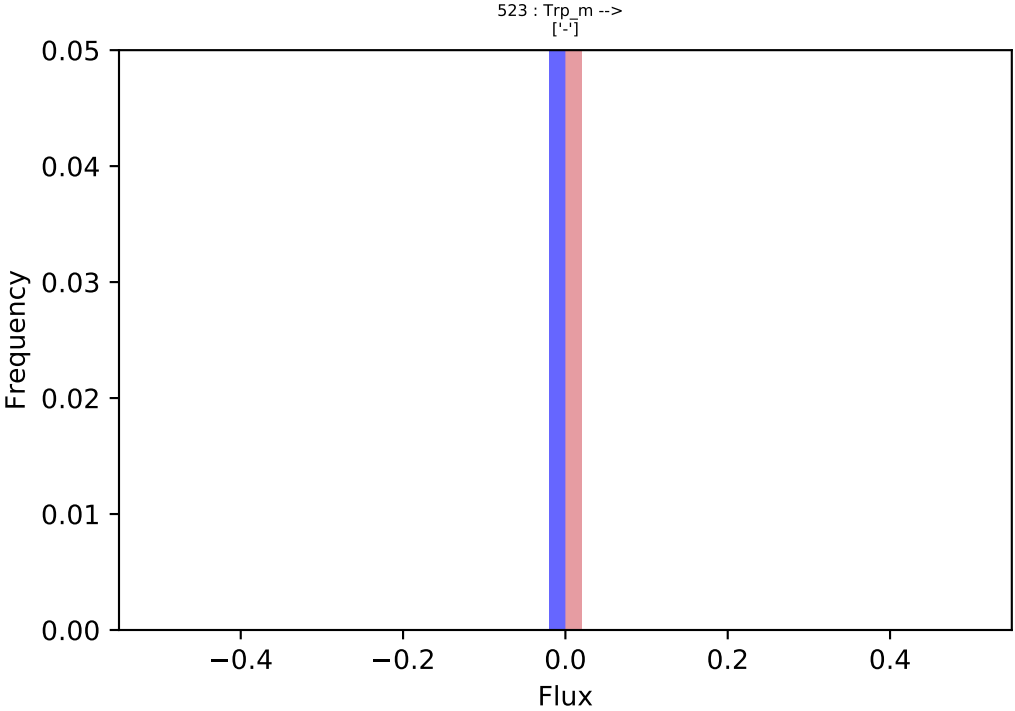

518 : Thr_h -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

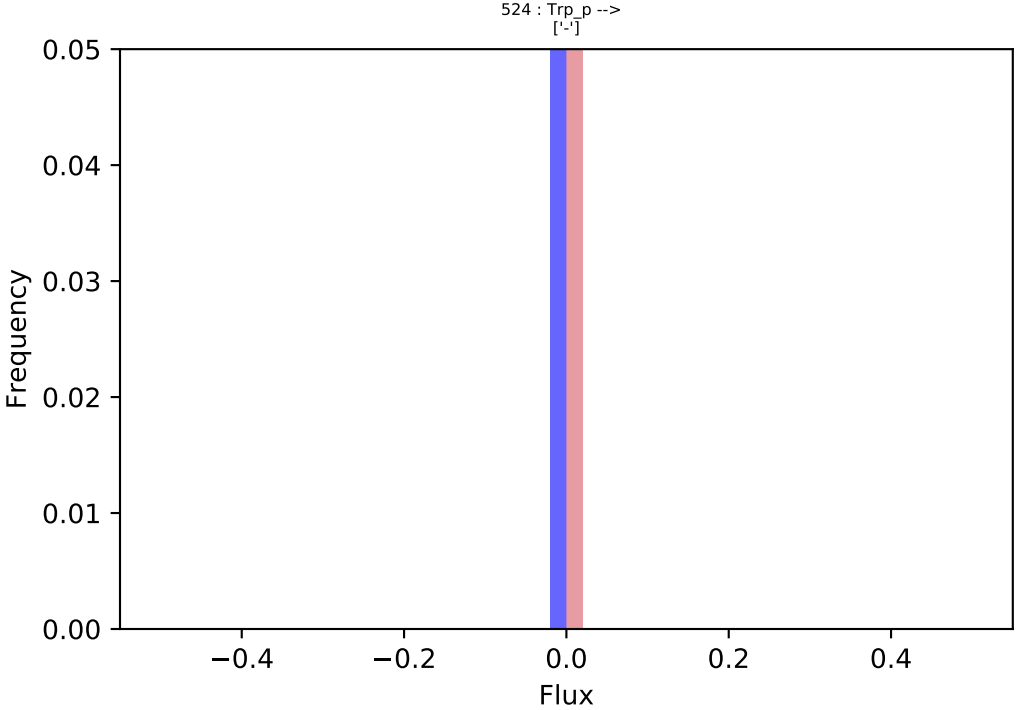

519 : Thr_m -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

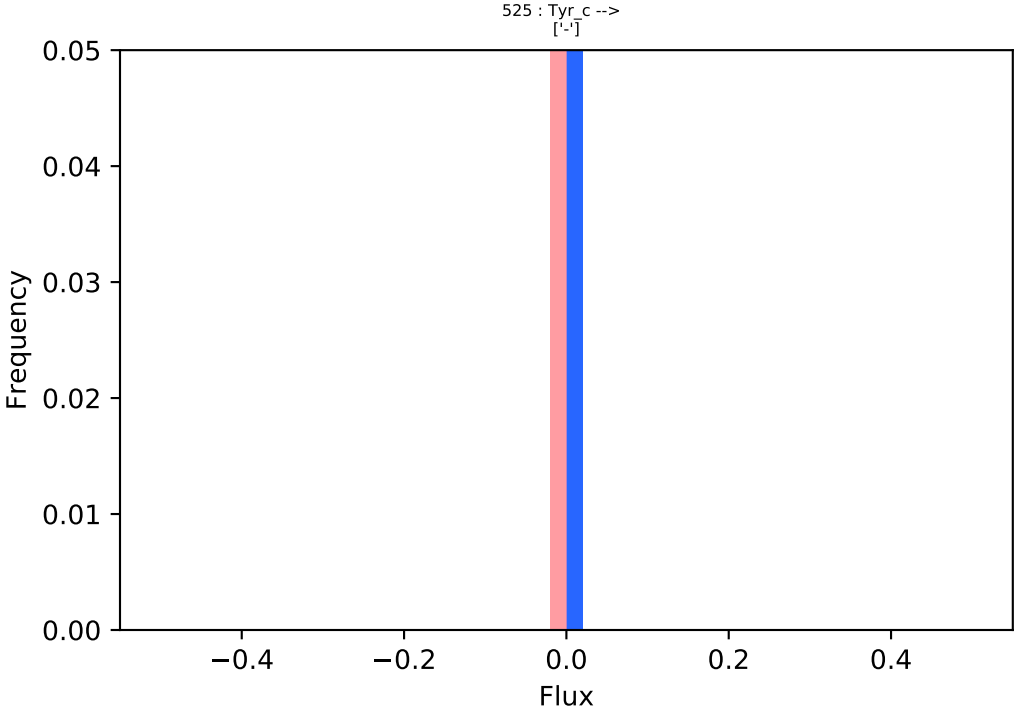

520 : Thr_p -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

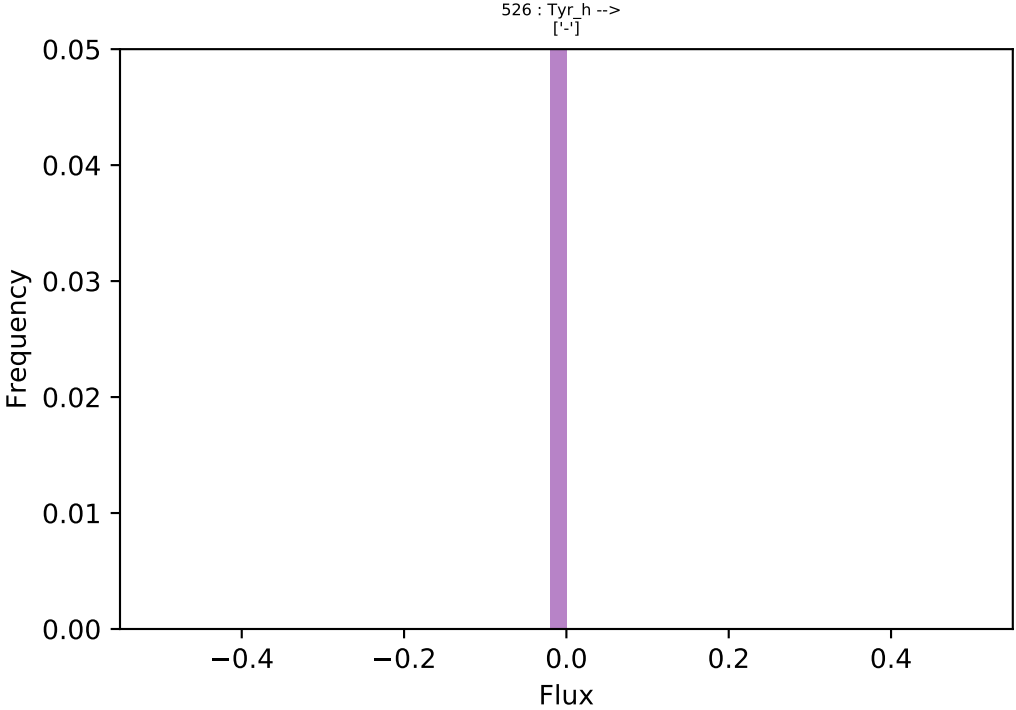

521 : Trp_c -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

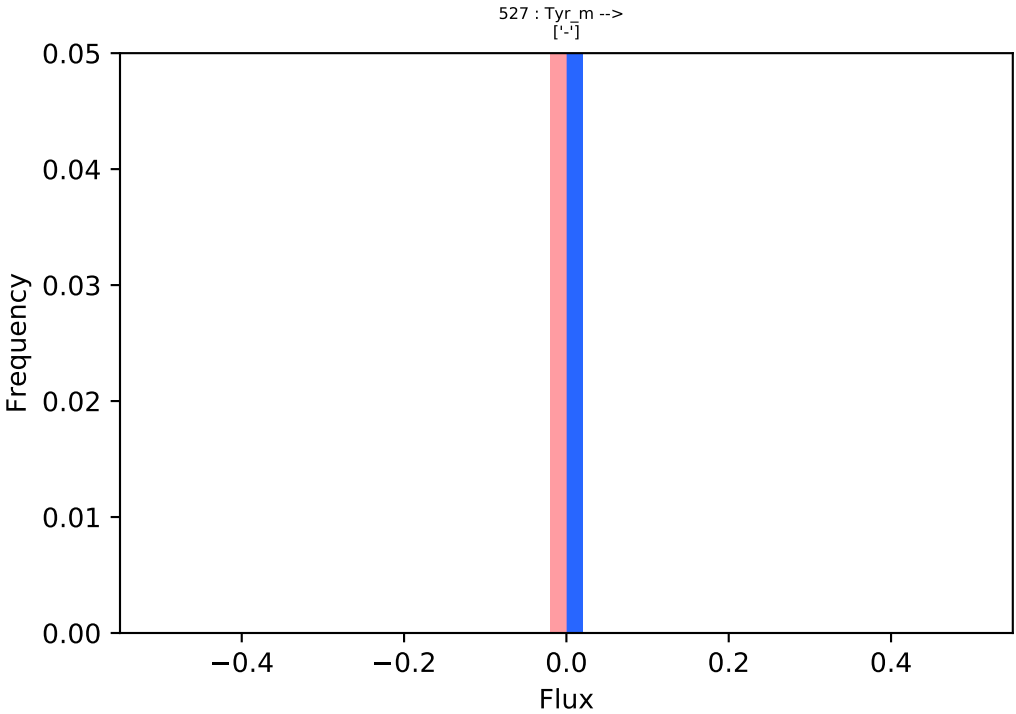

522 : Trp_h -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

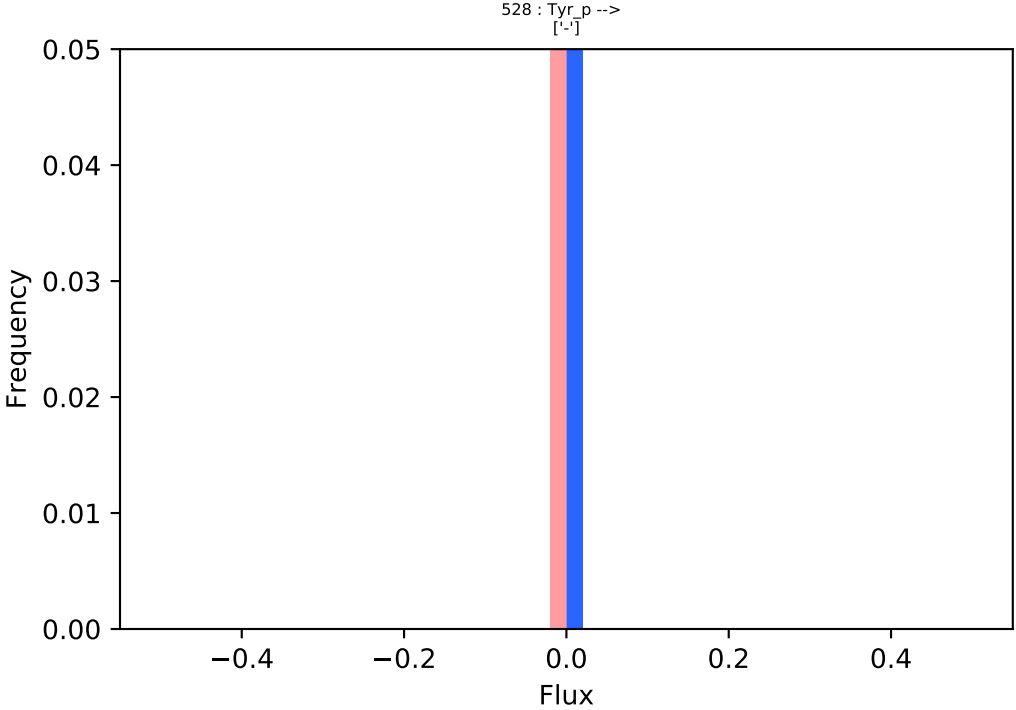

523 : Trp_m -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

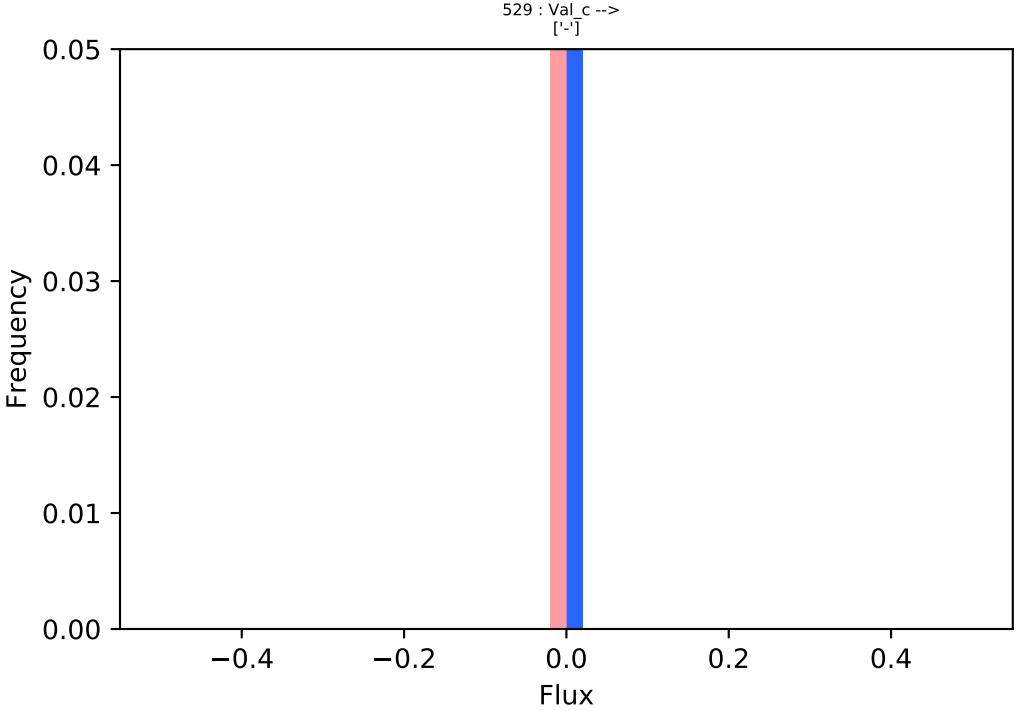

524 : Trp_p -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

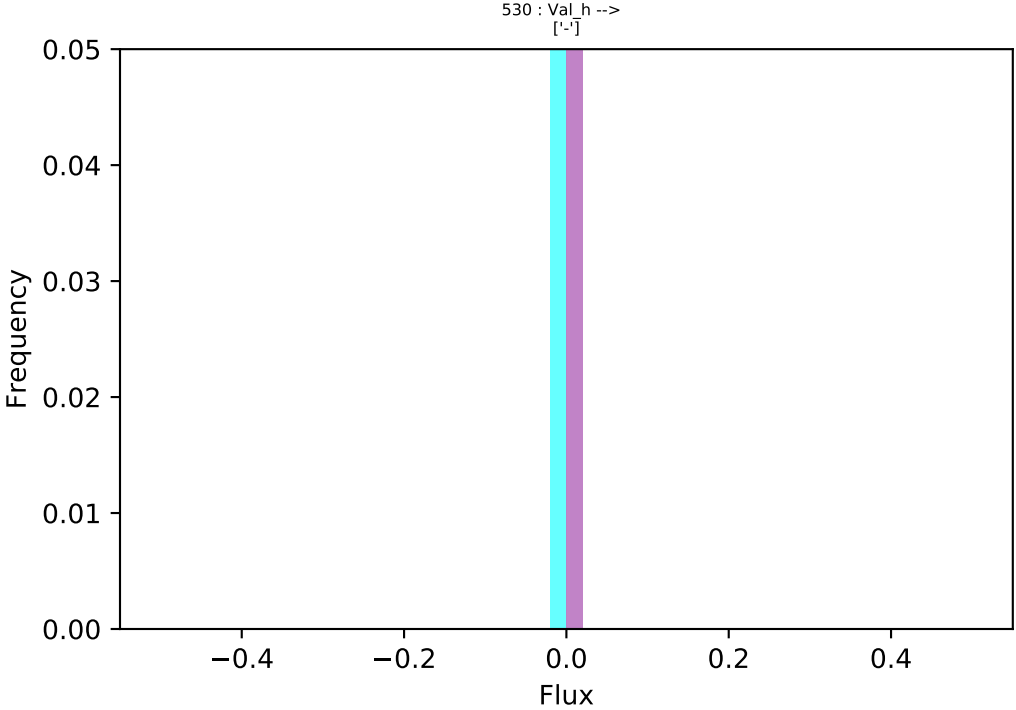

525 : Tyr_c -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

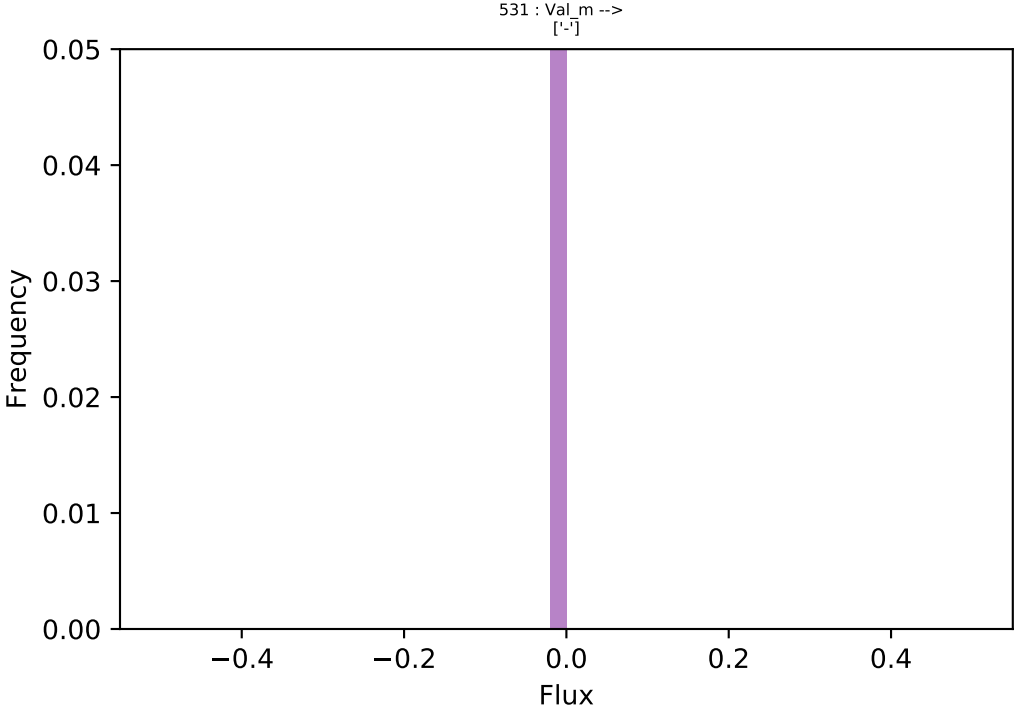

526 : Tyr_h -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

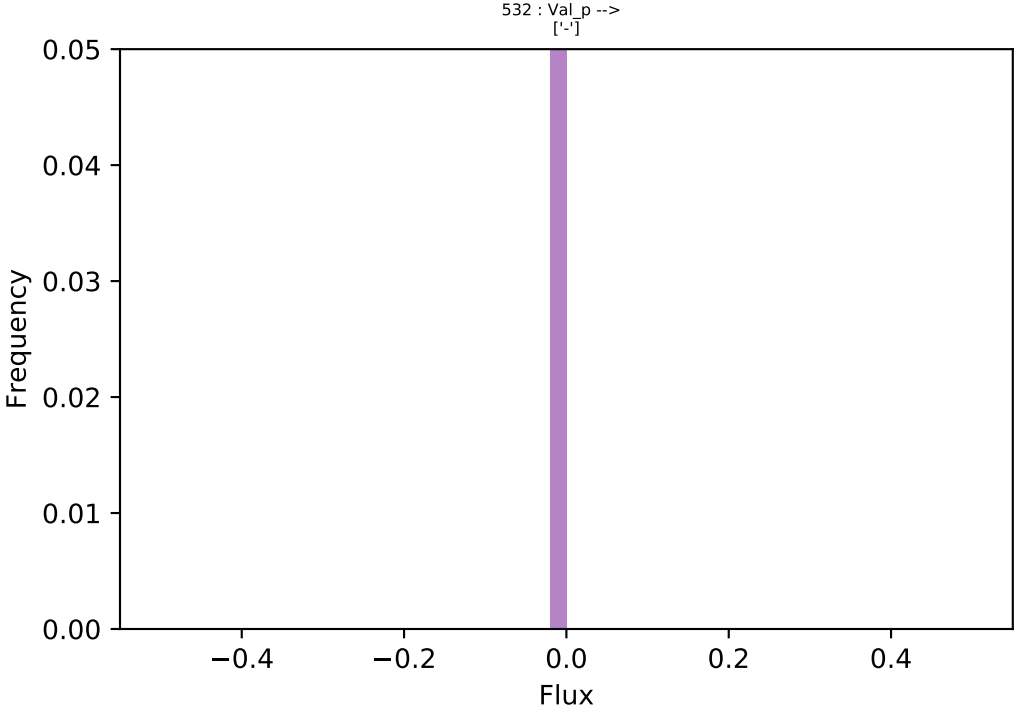

527 : Tyr_m -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

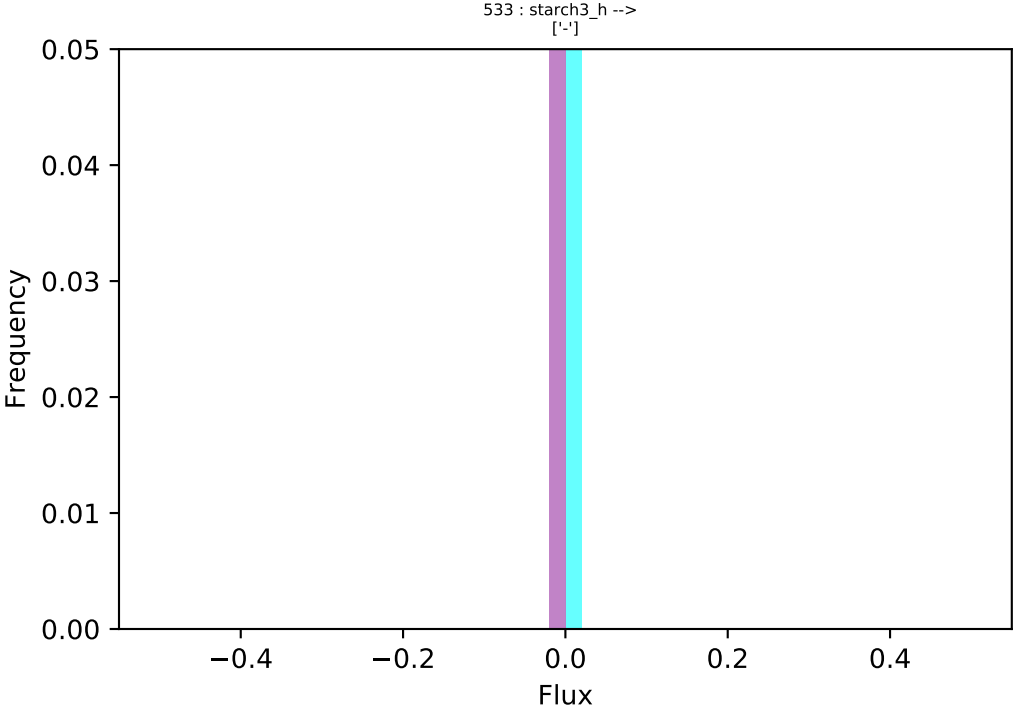

528 : Tyr_p -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

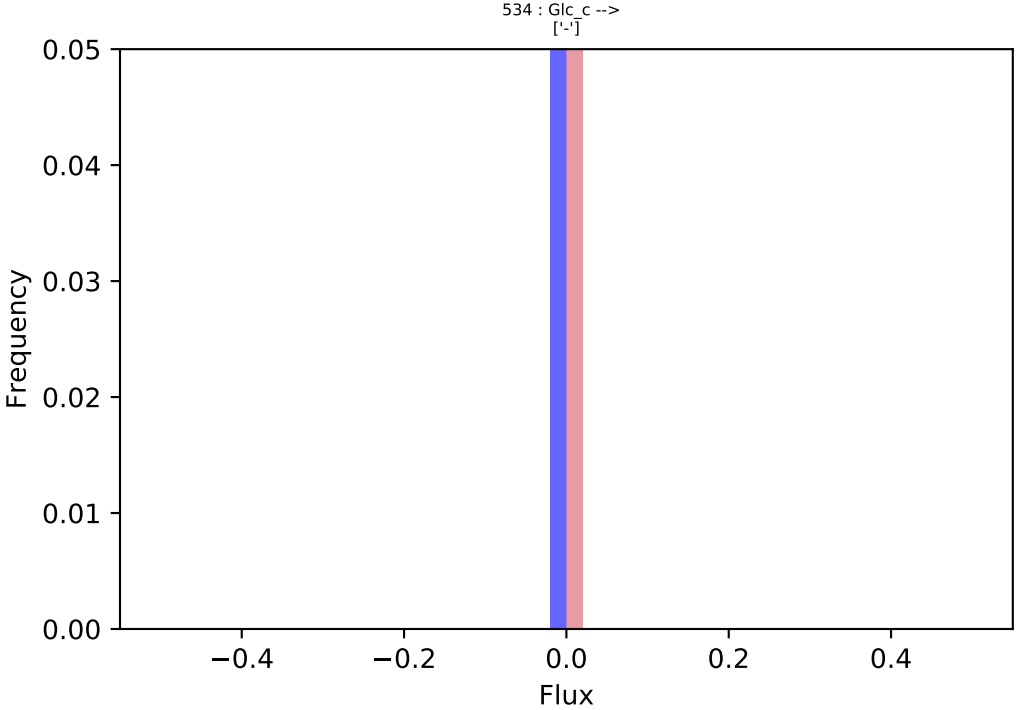

529 : Val_c -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

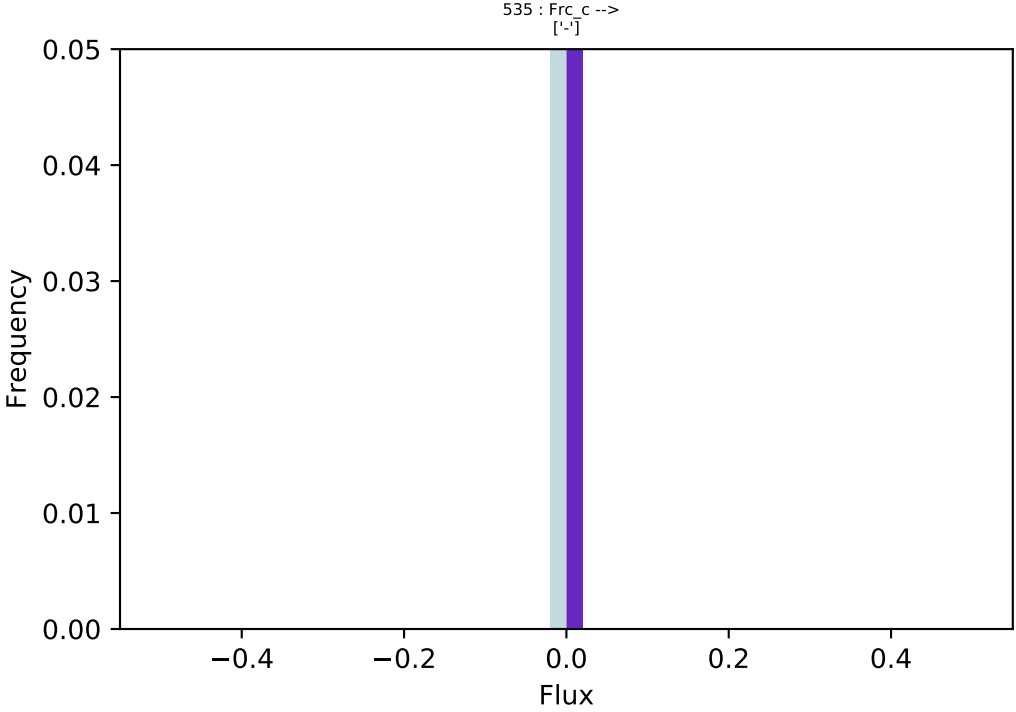

530 : Val_h -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

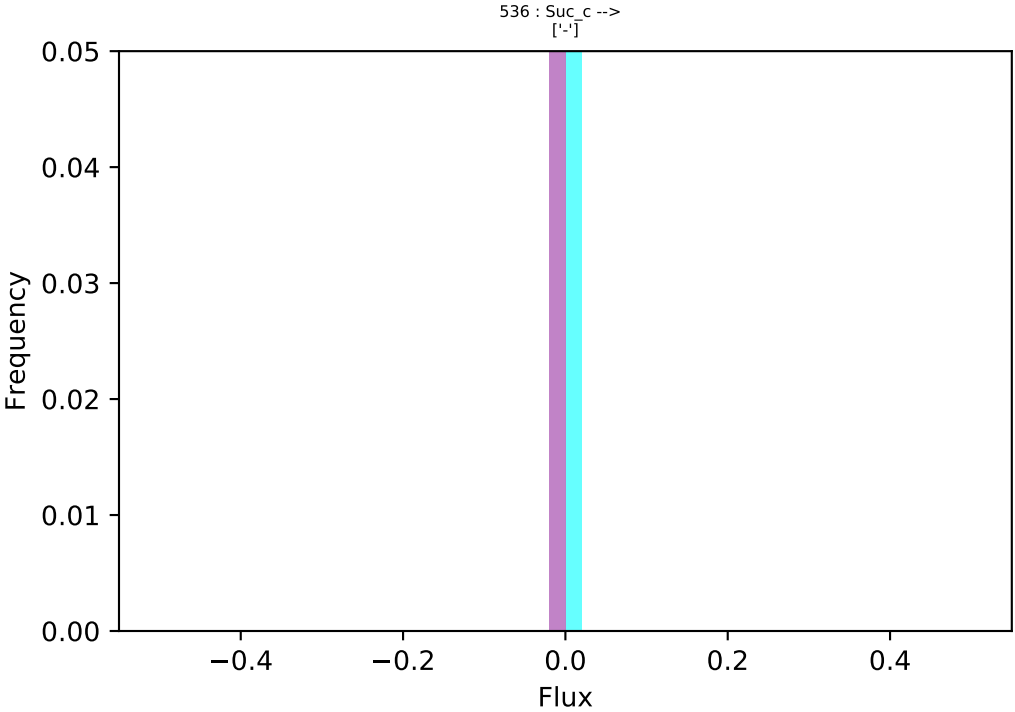

531 : Val_m -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

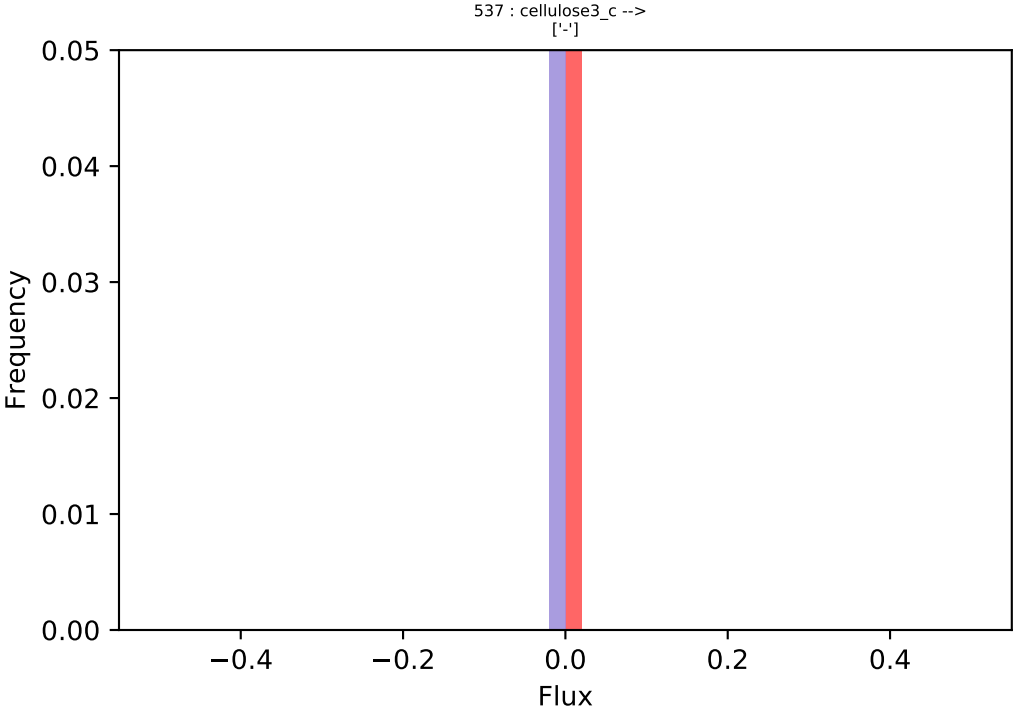

532 : Val_p -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

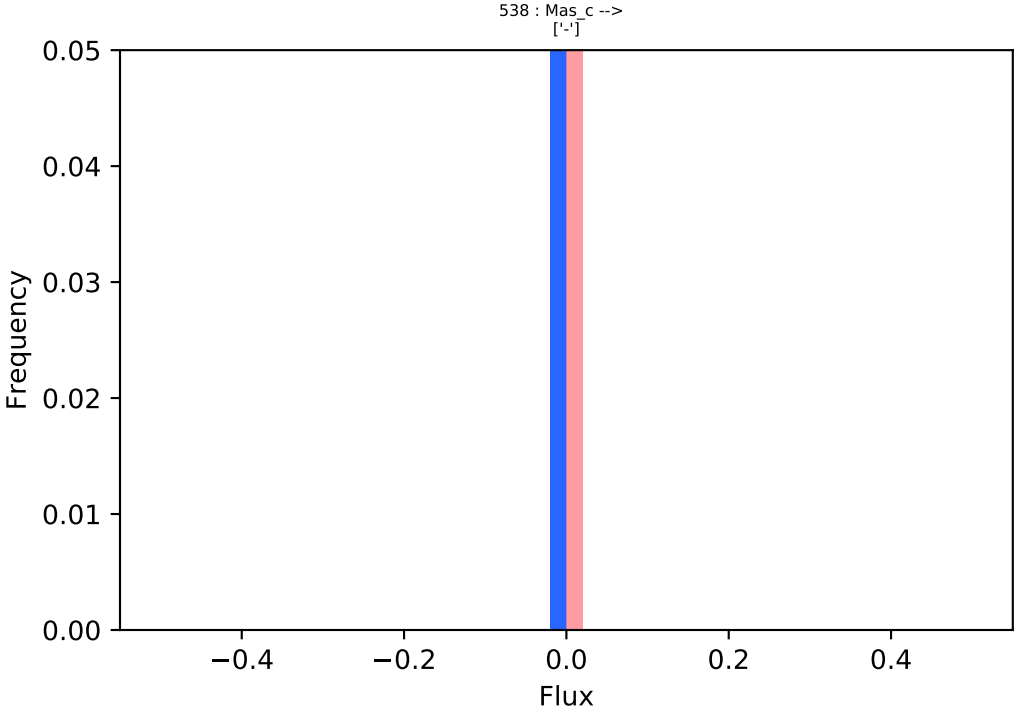

533 : starch3_h -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

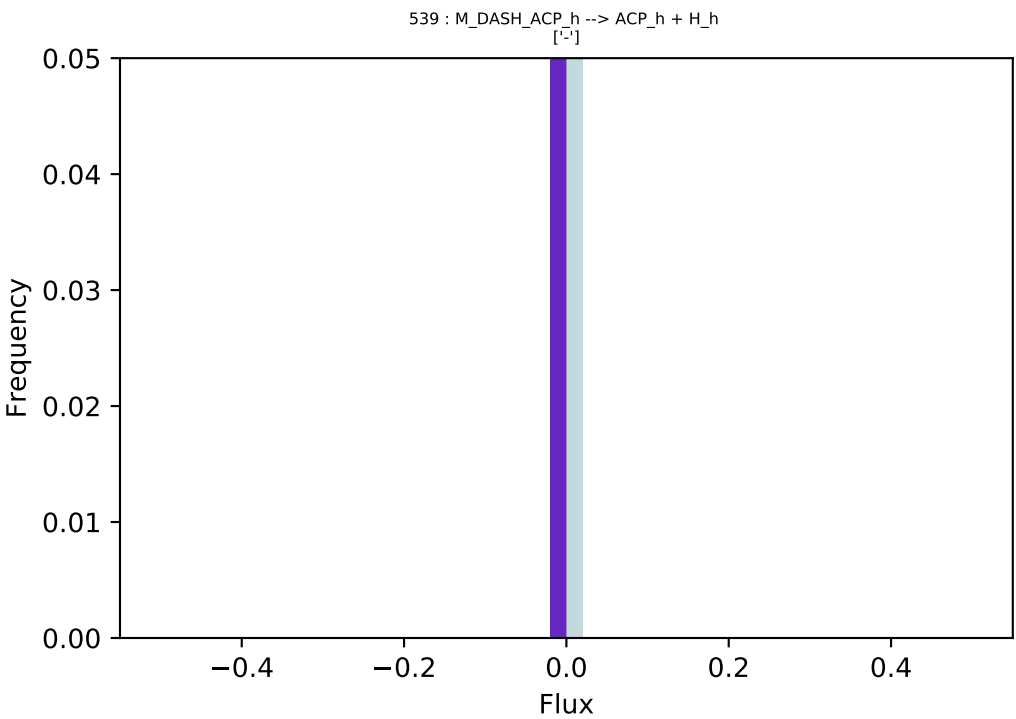

534 : Glc_c -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

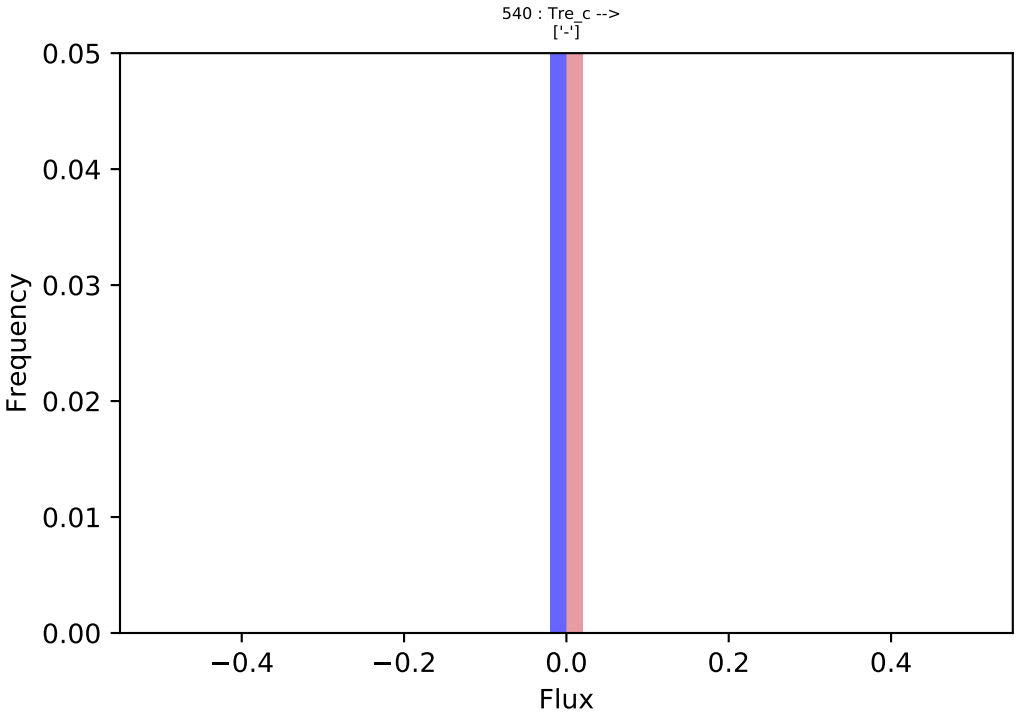

535 : Frc_c -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

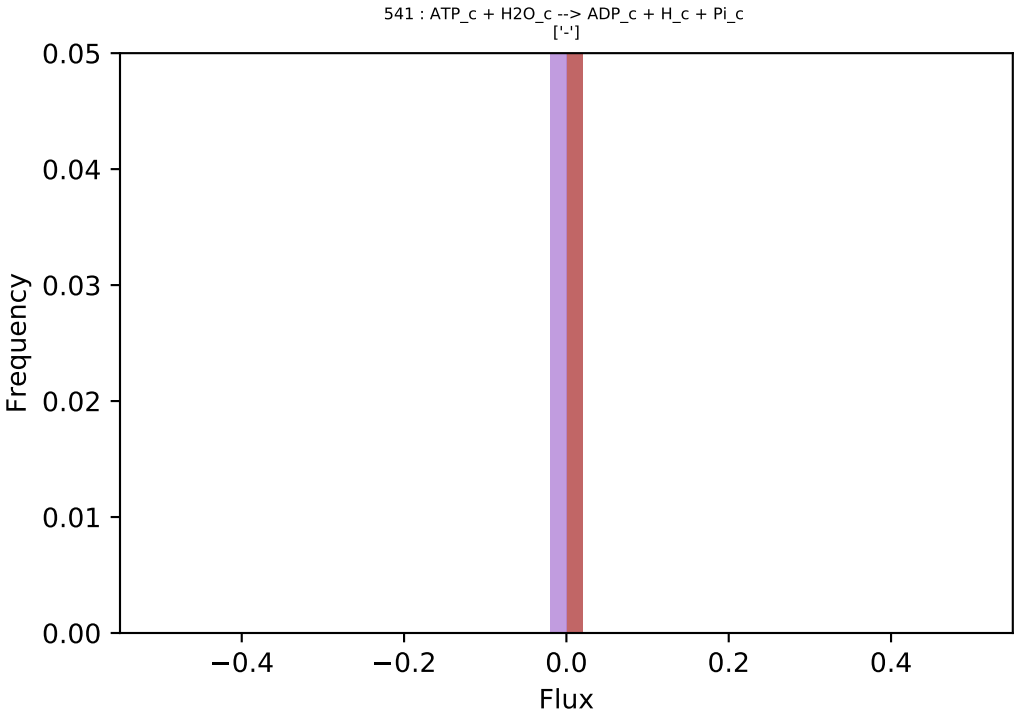

536 : Suc_c -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

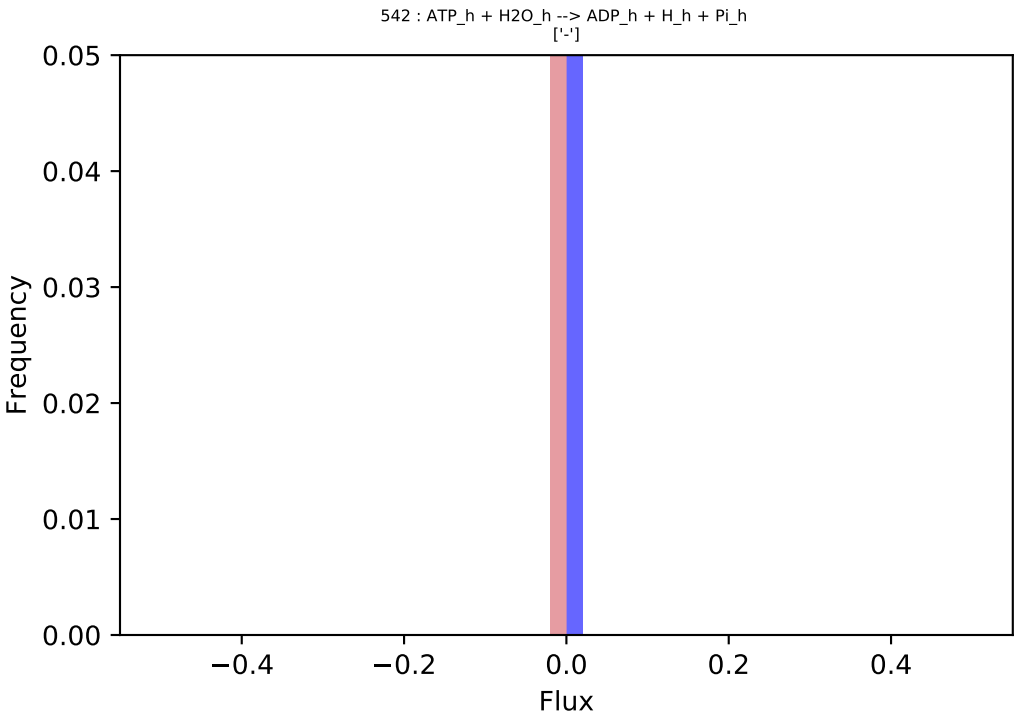

537 : cellulose3_c -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

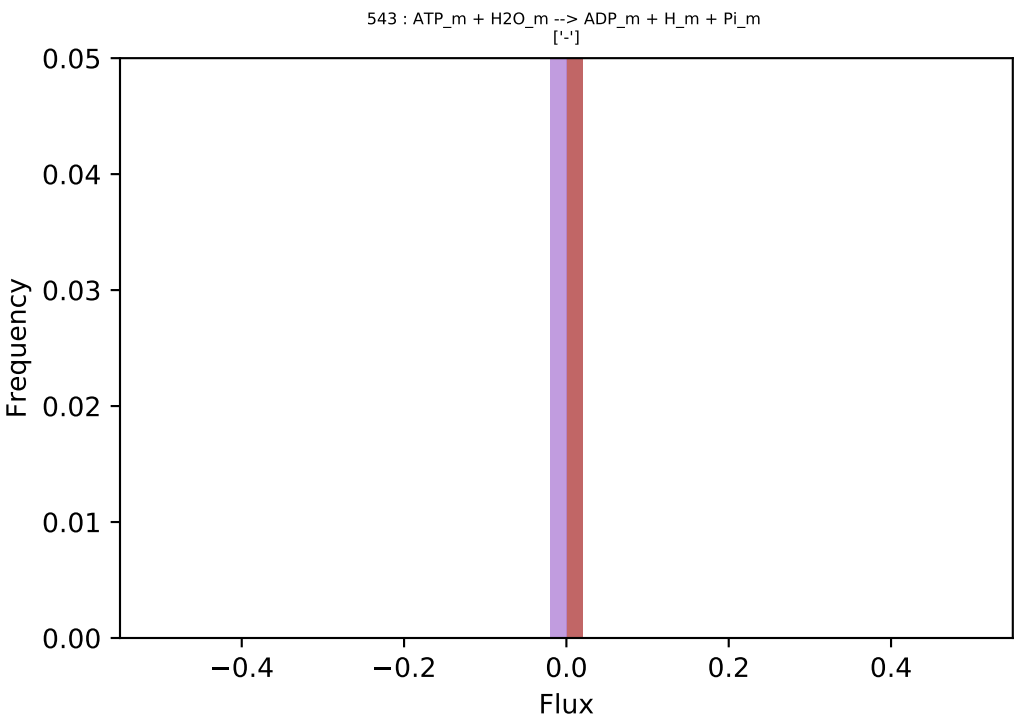

538 : Mas_c -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

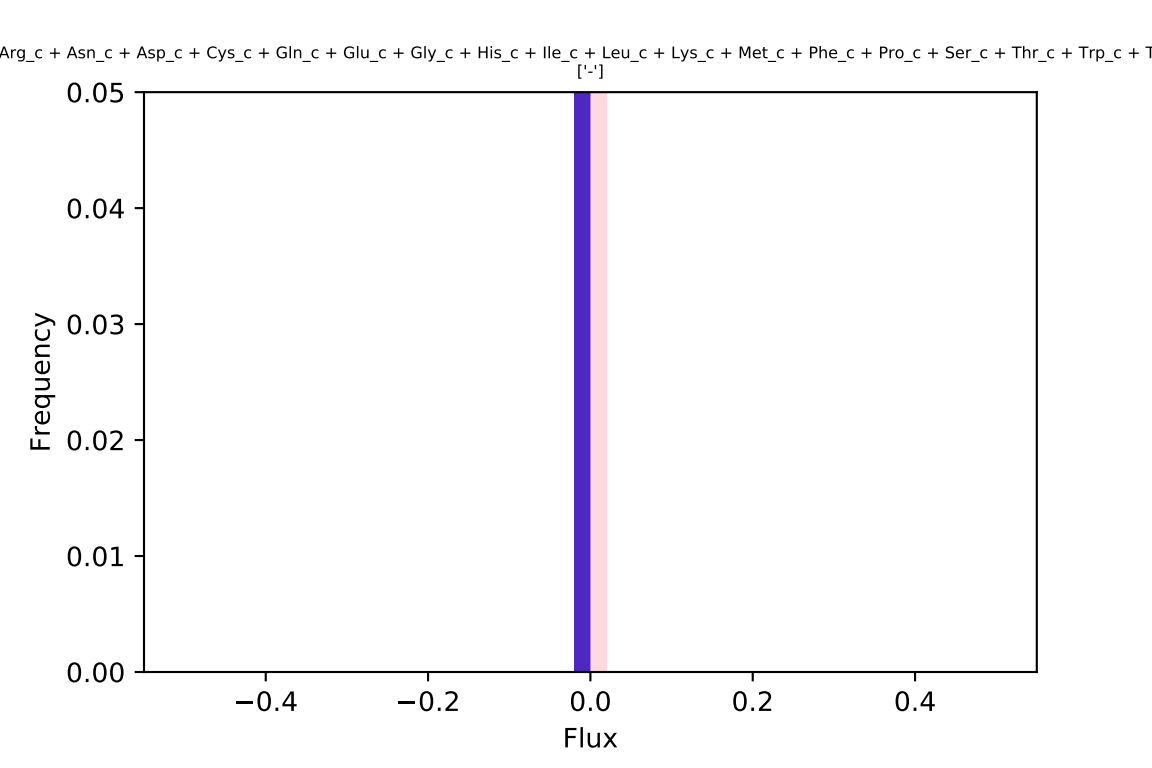

539 : M_DASH_ACP_h --> ACP_h + H_h
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

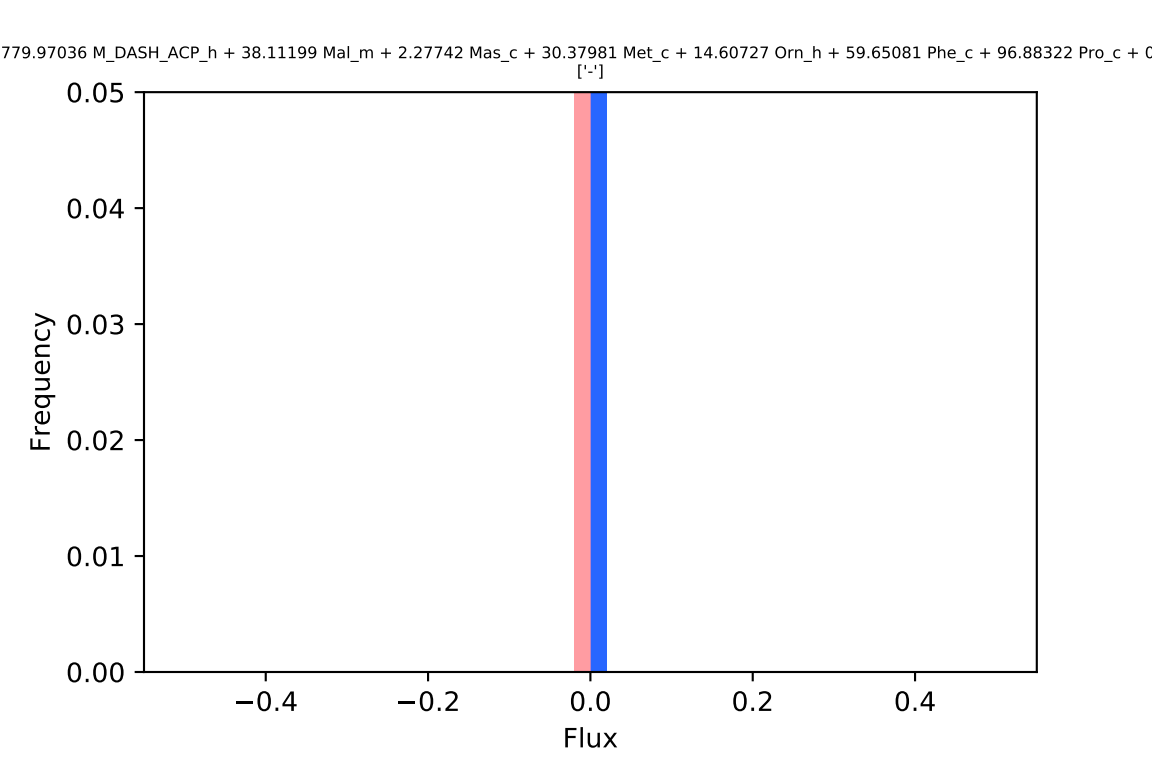

540 : Tre_c -->
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

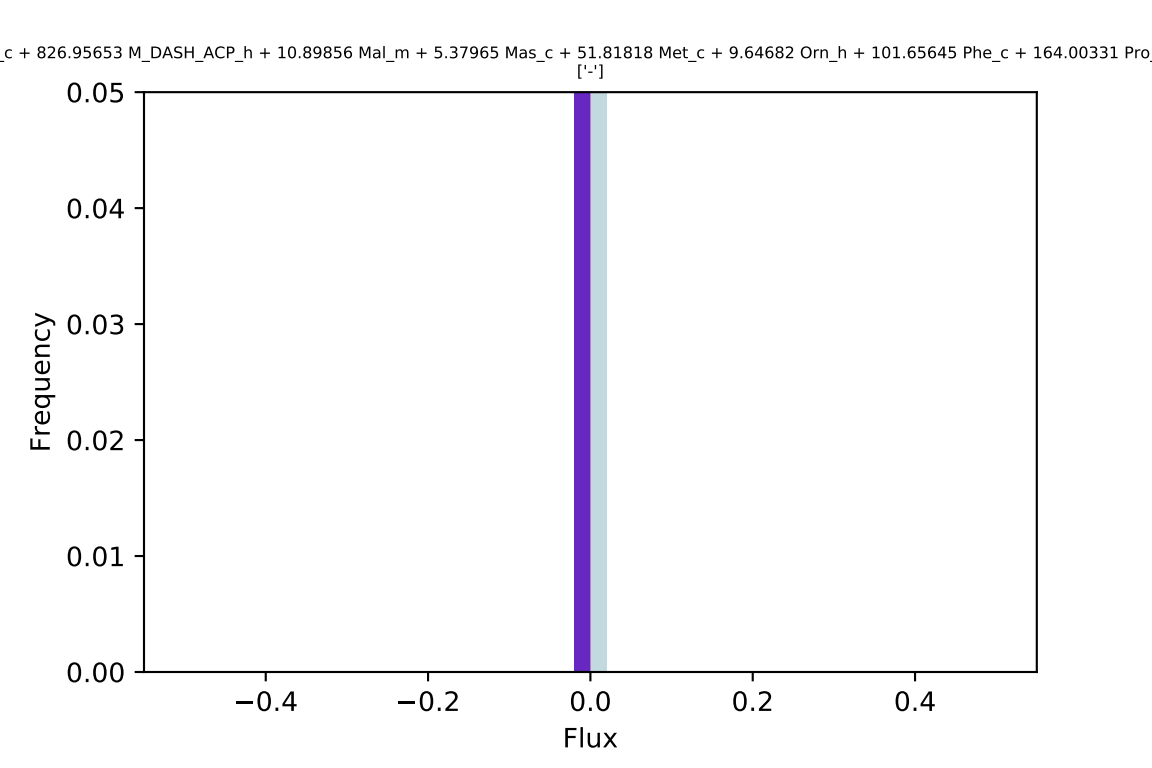

541 : ATP_c + H2O_c --> ADP_c + H_c + Pi_c
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

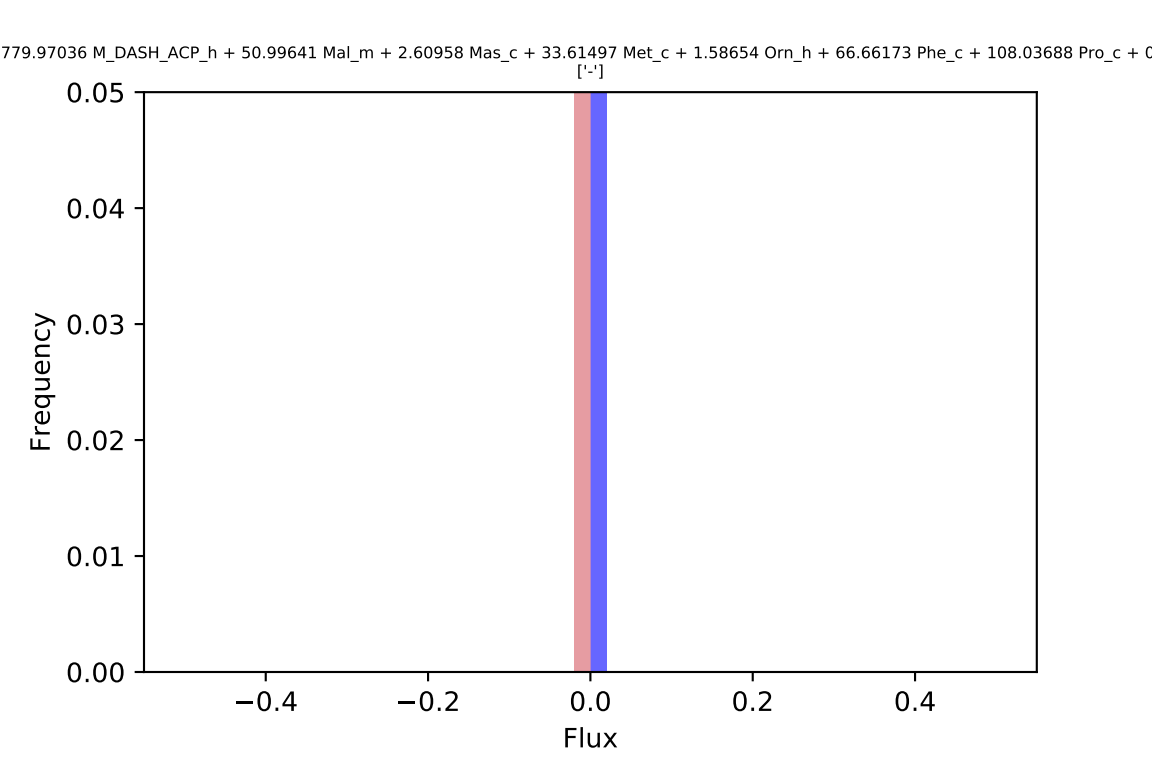

542 : ATP_h + H2O_h --> ADP_h + H_h + Pi_h
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

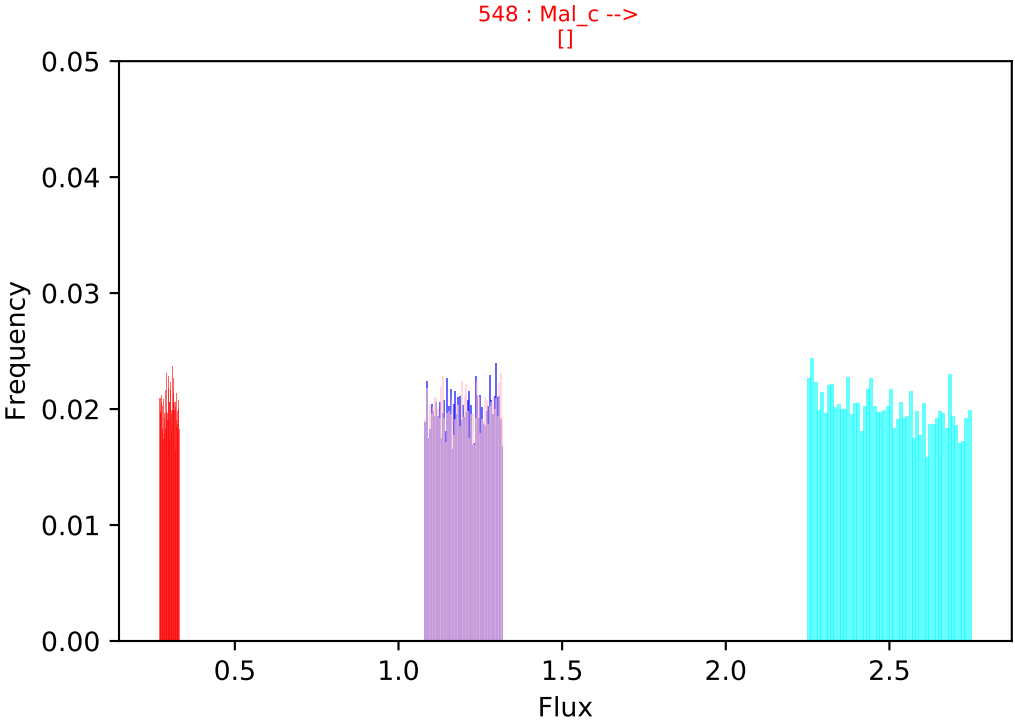

543 : ATP_m + H2O_m --> ADP_m + H_m + Pi_m
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

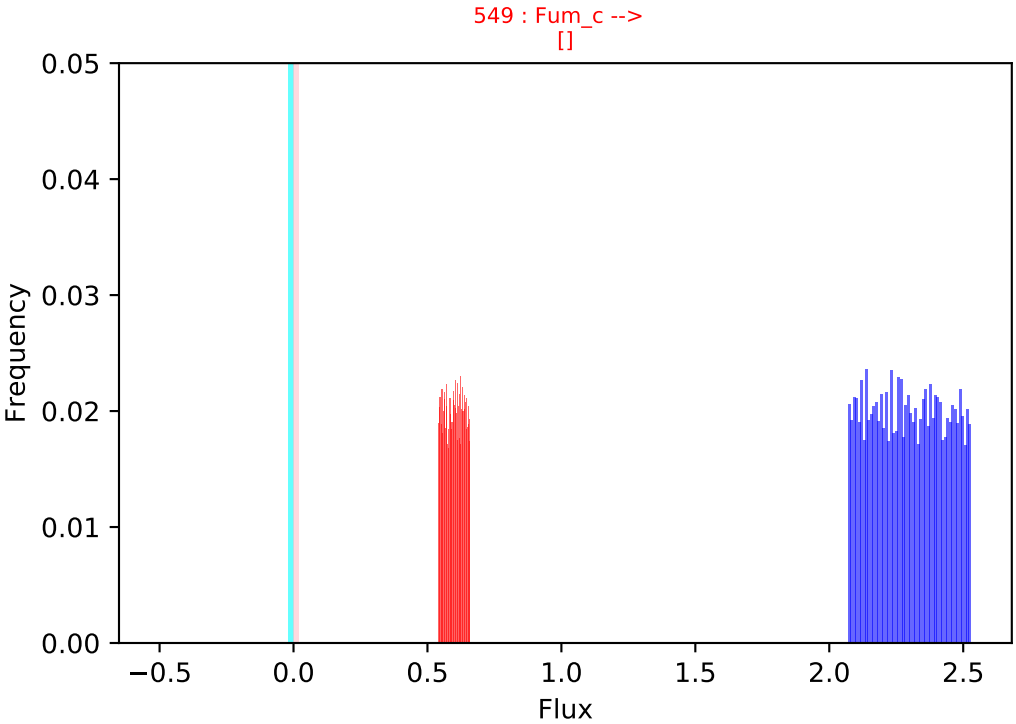

Arg_c + Asn_c + Asp_c + Cys_c + Gln_c + Glu_c + Gly_c + His_c + Ile_c + Leu_c + Lys_c + Met_c + Phe_c + Pro_c + Ser_c + Thr_c + Trp_c + T
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

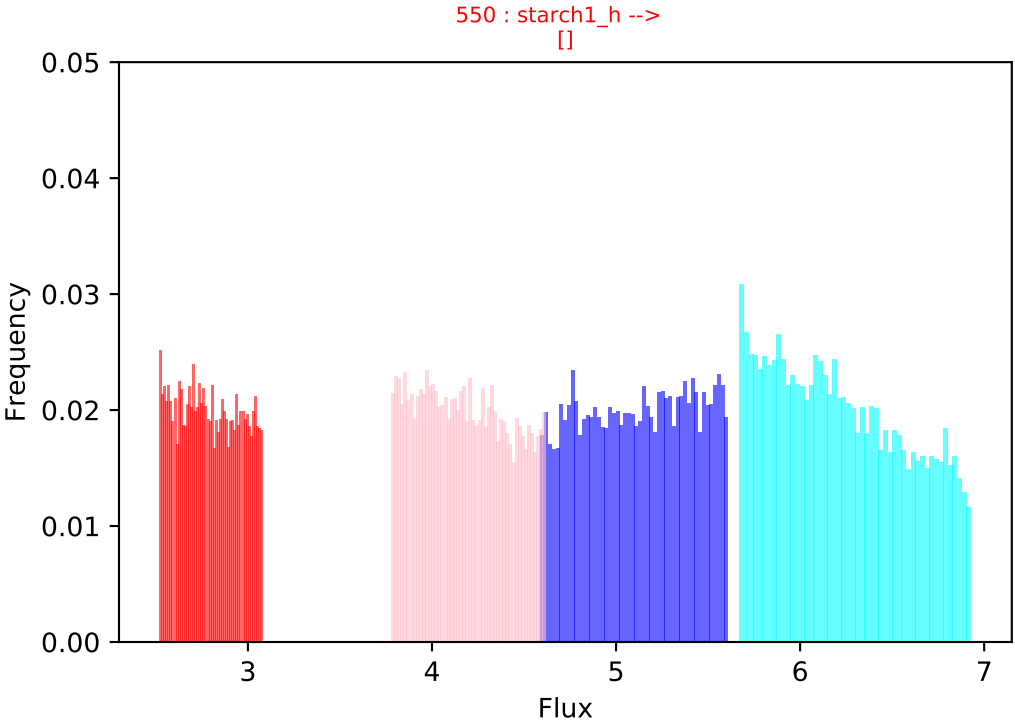

779.97036 M_DASH_ACP_h + 38.11199 Mal_m + 2.27742 Mas_c + 30.37981 Met_c + 14.60727 Orn_h + 59.65081 Phe_c + 96.88322 Pro_c + 0
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


_c + 826.95653 M_DASH_ACP_h + 10.89856 Mal_m + 5.37965 Mas_c + 51.81818 Met_c + 9.64682 Orn_h + 101.65645 Phe_c + 164.00331 Pro_
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


779.97036 M_DASH_ACP_h + 50.99641 Mal_m + 2.60958 Mas_c + 33.61497 Met_c + 1.58654 Orn_h + 66.66173 Phe_c + 108.03688 Pro_c + 0
['-']
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


548 : Mal_c -->
[]
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
0.5
1.0
1.5
2.0
2.5
Flux


549 : Fum_c -->
[]
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−0.5
0.0
0.5
1.0
1.5
2.0
2.5
Flux


550 : starch1_h -->
[]
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
3
4
5
6
7
Flux