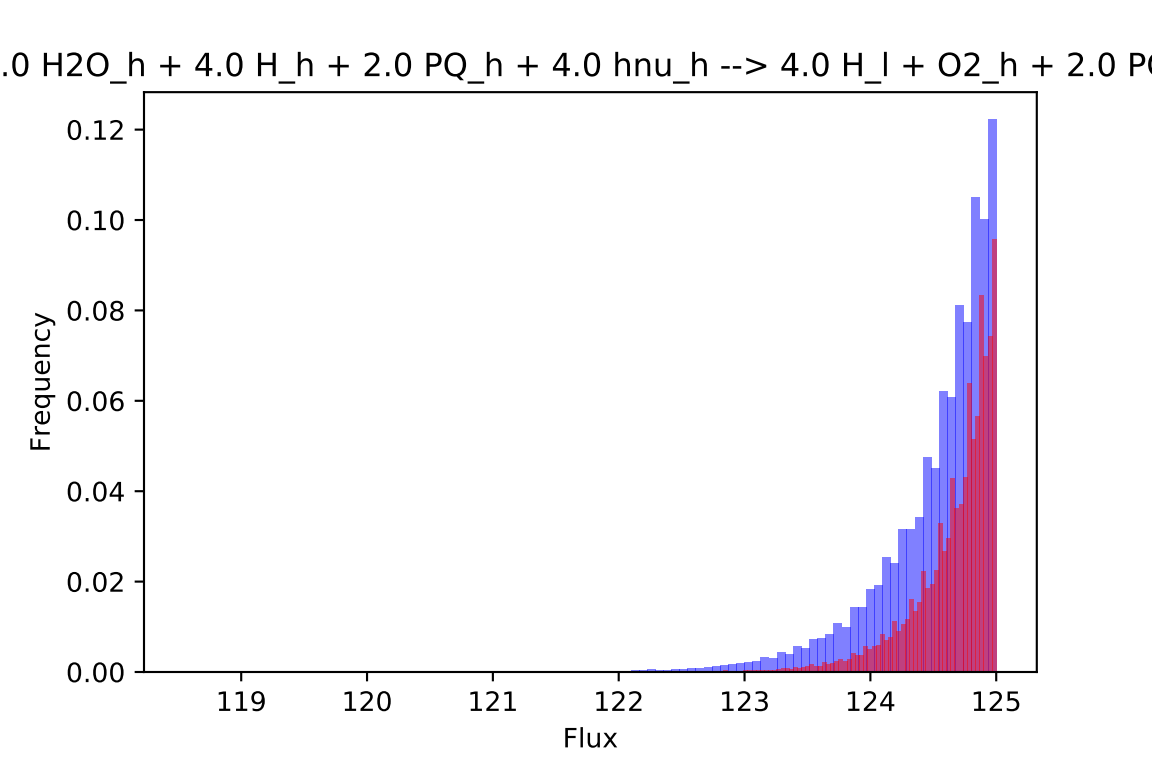
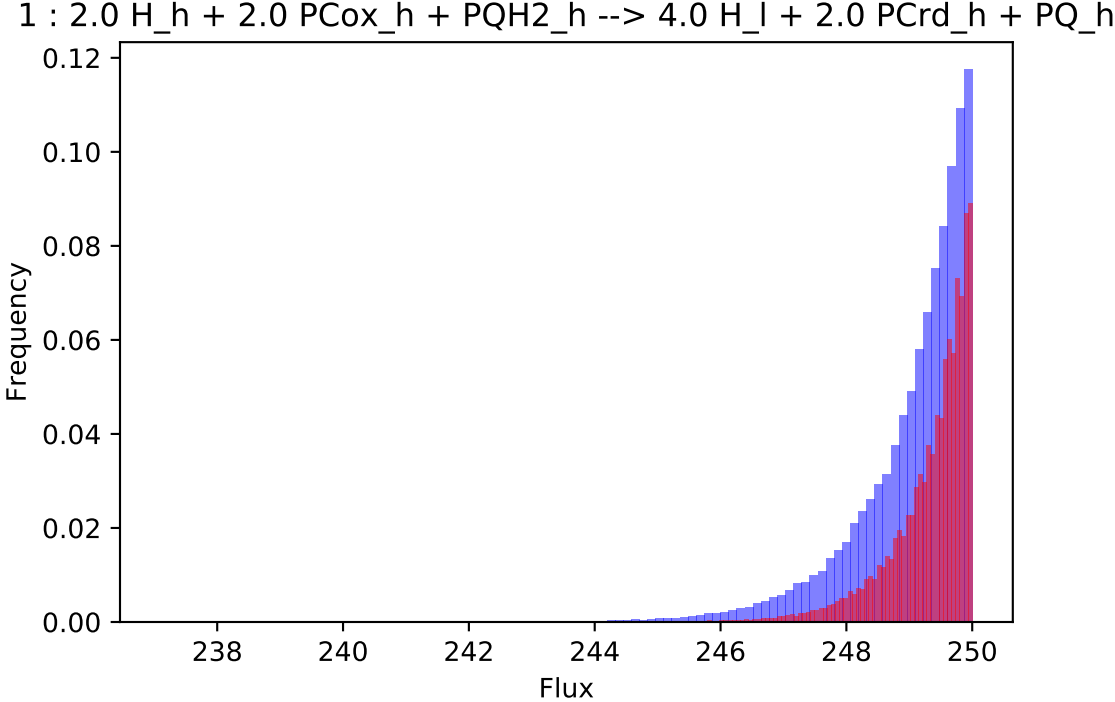
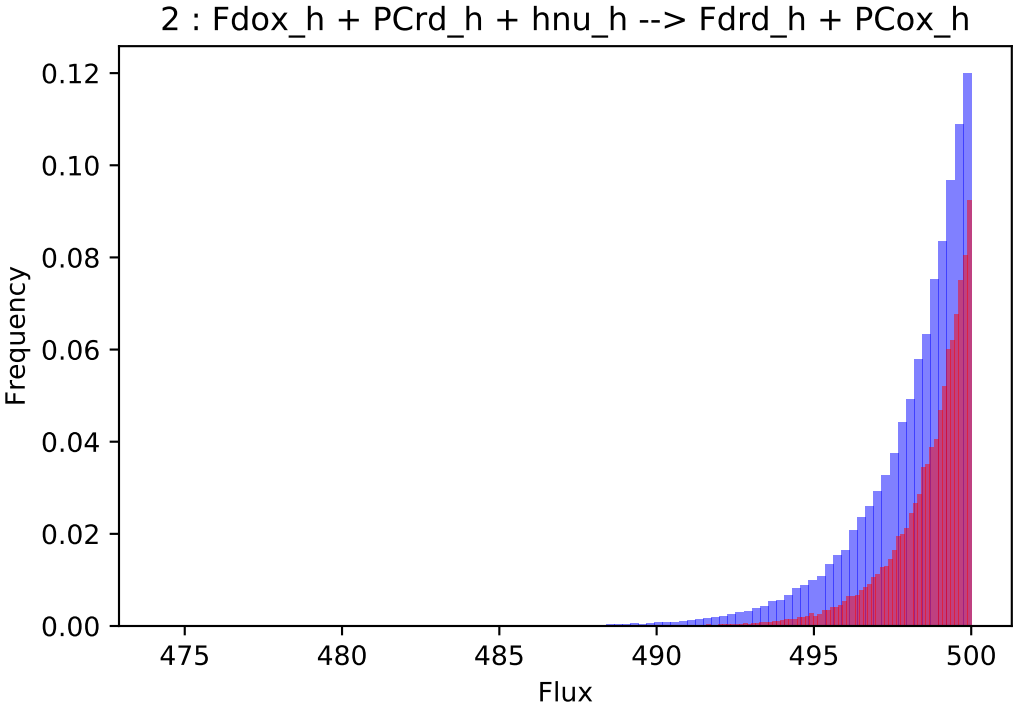
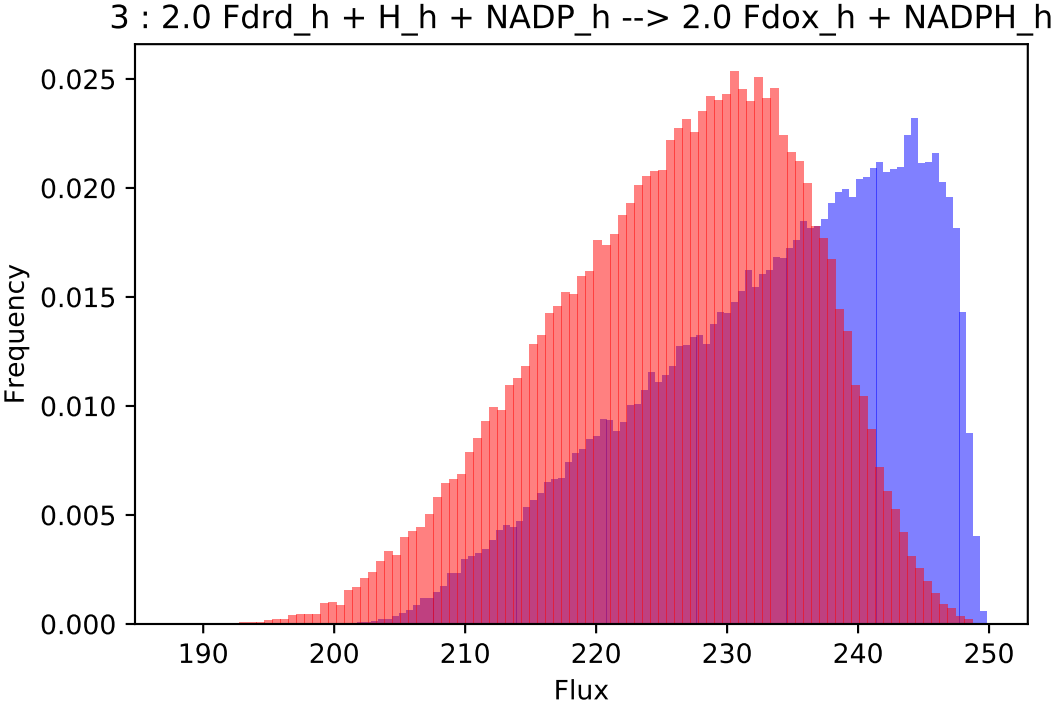
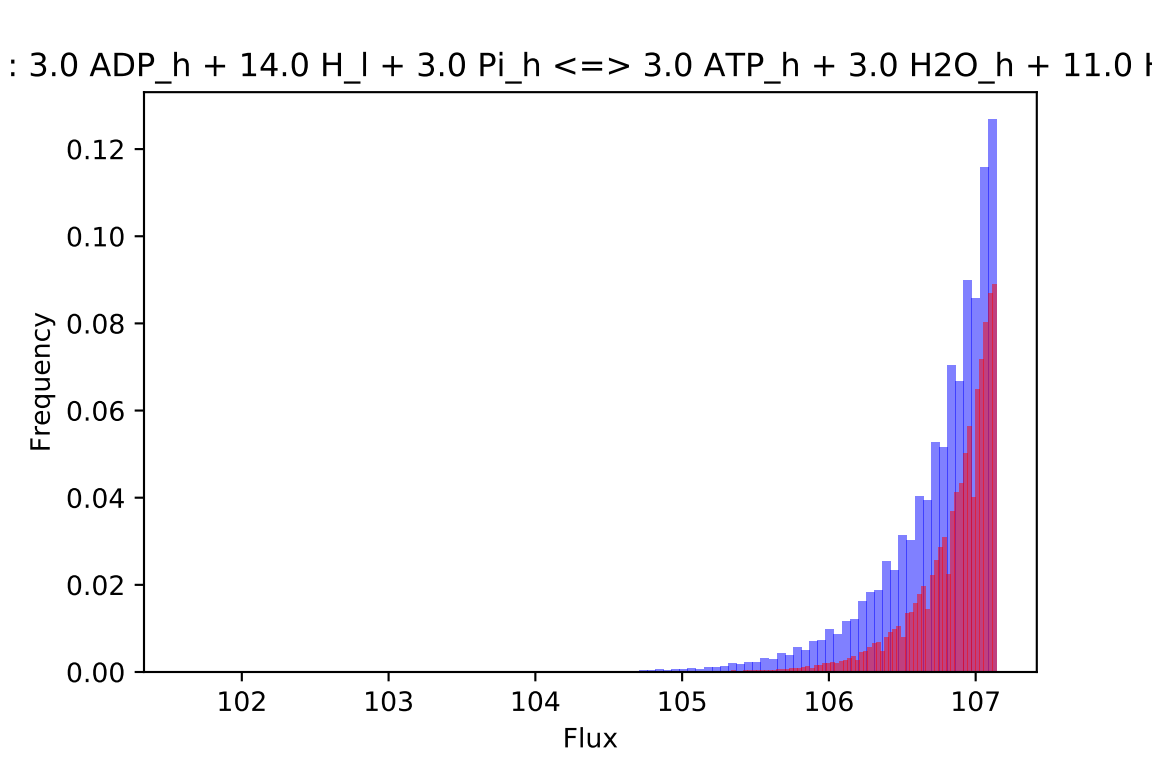
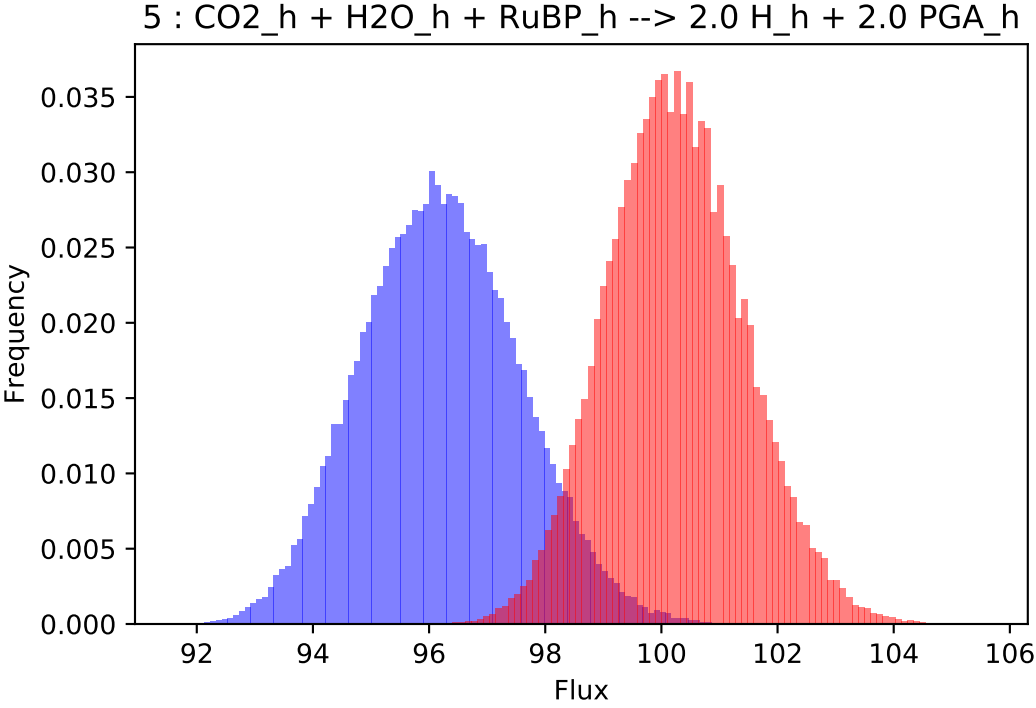

.0 H2O_h + 4.0 H_h + 2.0 PQ_h + 4.0 hnu_h --> 4.0 H_l + O2_h + 2.0 P
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
119
120
121
122
123
124
125
Flux

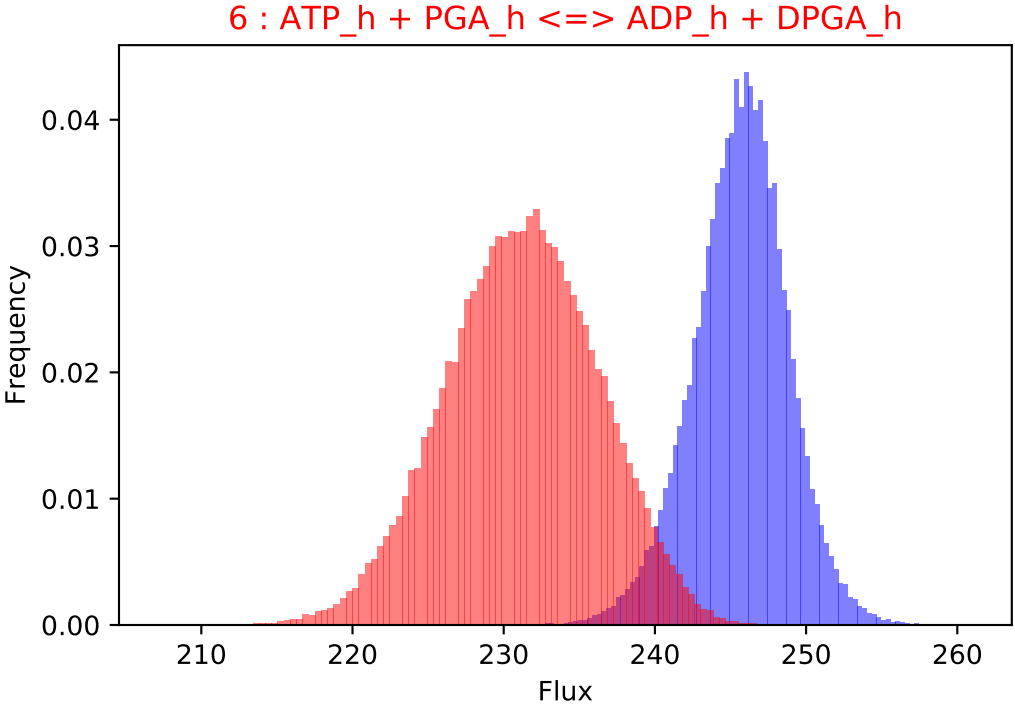

1 : 2.0 H_h + 2.0 PCox_h + PQH2_h --> 4.0 H_l + 2.0 PCrd_h + PQ_h
Frequency
0.12
0.10
0.08
0.06
0.04
0.02
0.00
238
240
242
244
246
248
250
Flux

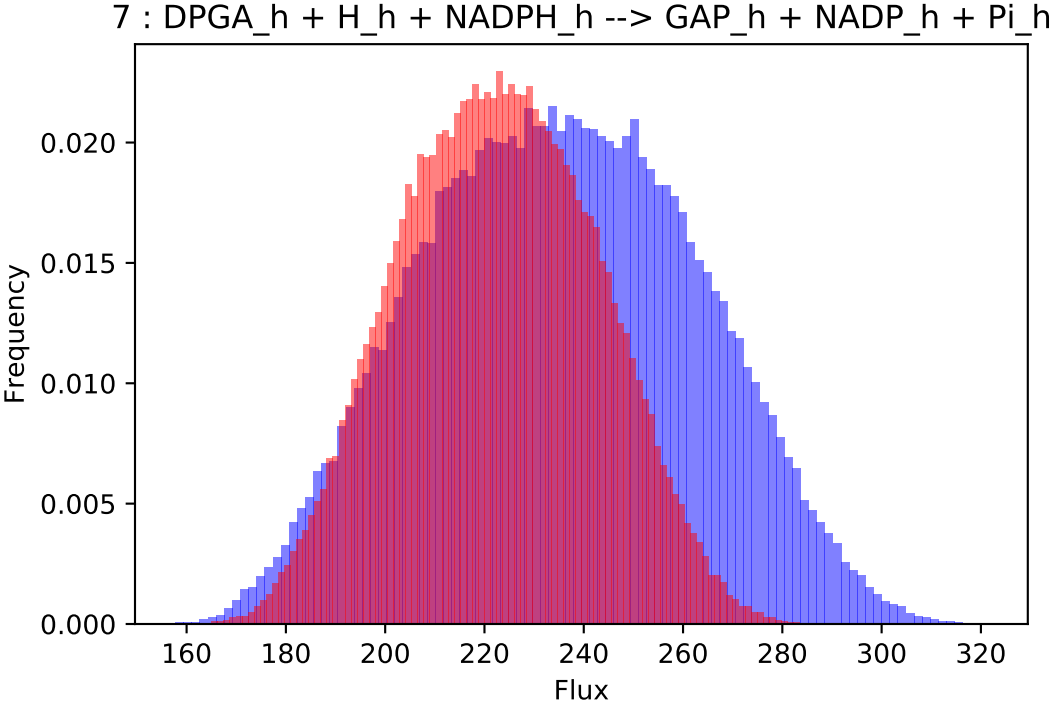

2 : Fdox_h + PCrd_h + hnu_h --> Fdrd_h + PCox_h
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
475
480
485
490
495
500
Flux

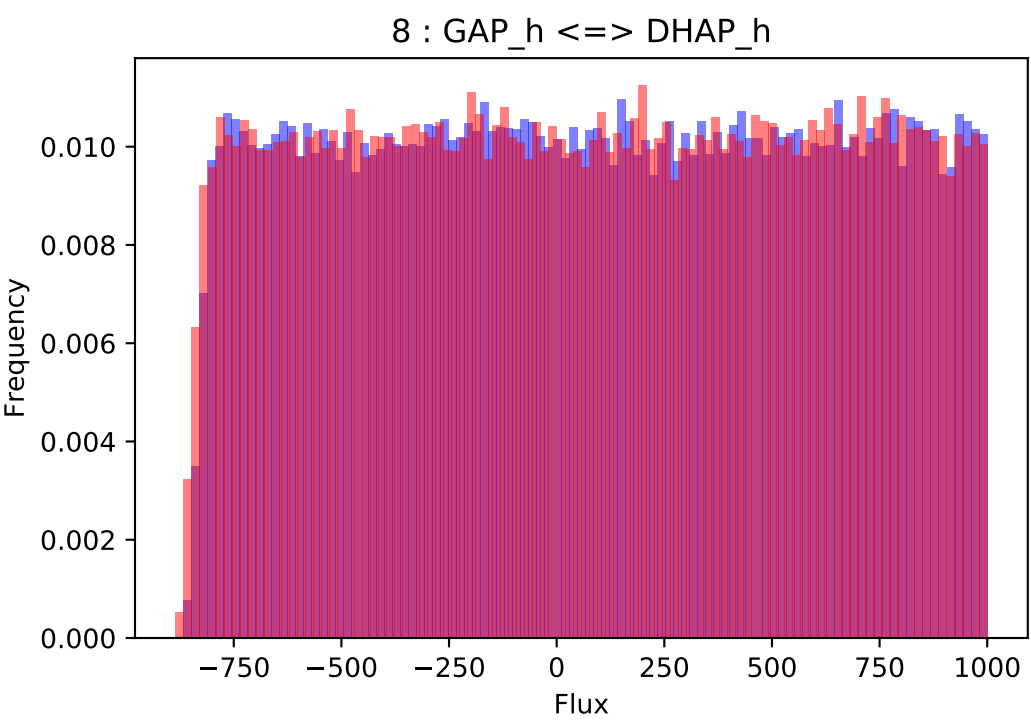

3 : 2.0 Fdrd_h + H_h + NADP_h --> 2.0 Fdox_h + NADPH_h
Frequency
0.025
0.020
0.015
0.010
0.005
0.000
190
200
210
220
230
240
250
Flux

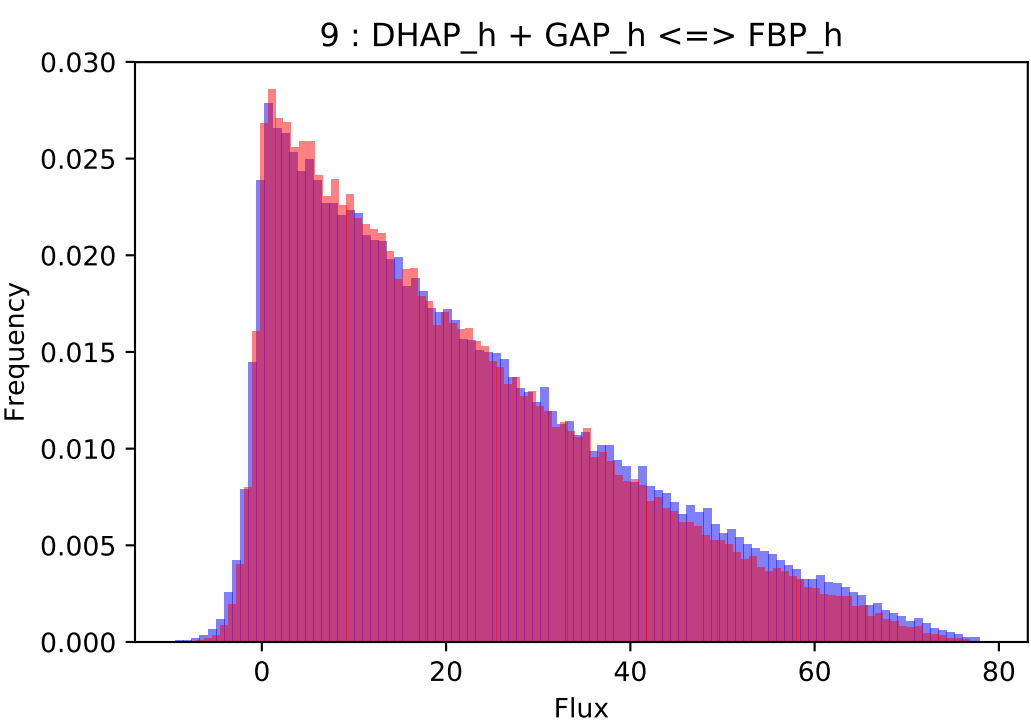

: 3.0 ADP_h + 14.0 H_l + 3.0 Pi_h <=> 3.0 ATP_h + 3.0 H2O_h + 11.0 H
Frequency
0.00
0.02
0.04
0.06
0.08
0.10
0.12
102
103
104
105
106
107
Flux

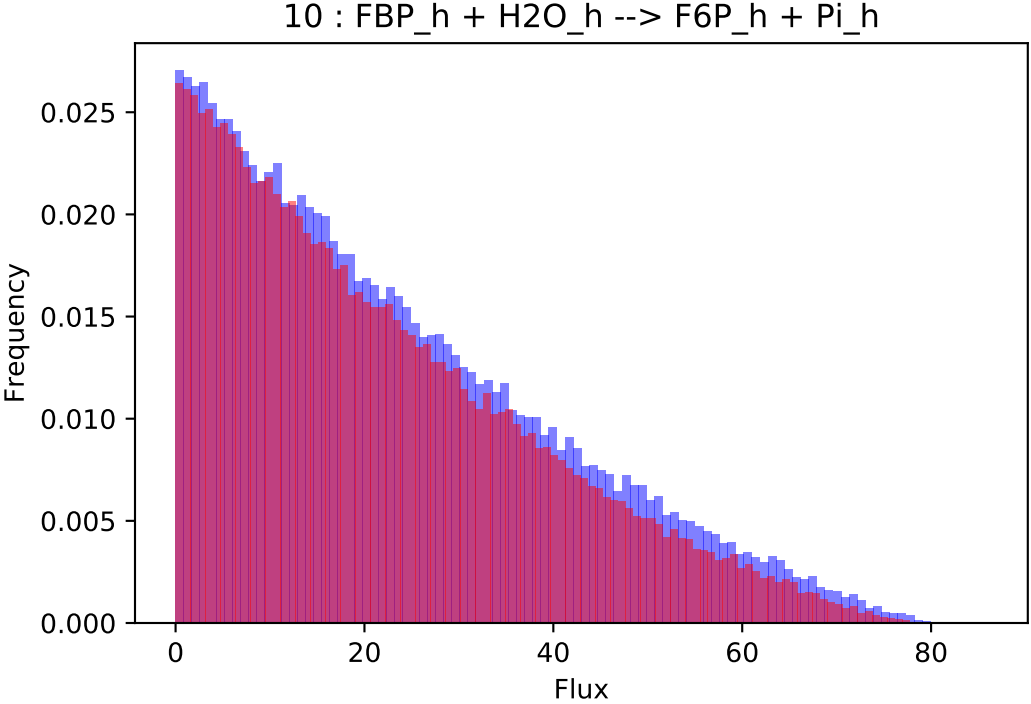

5 : CO2_h + H2O_h + RuBP_h --> 2.0 H_h + 2.0 PGA_h
Frequency
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
92
94
96
98
100
102
104
106
Flux

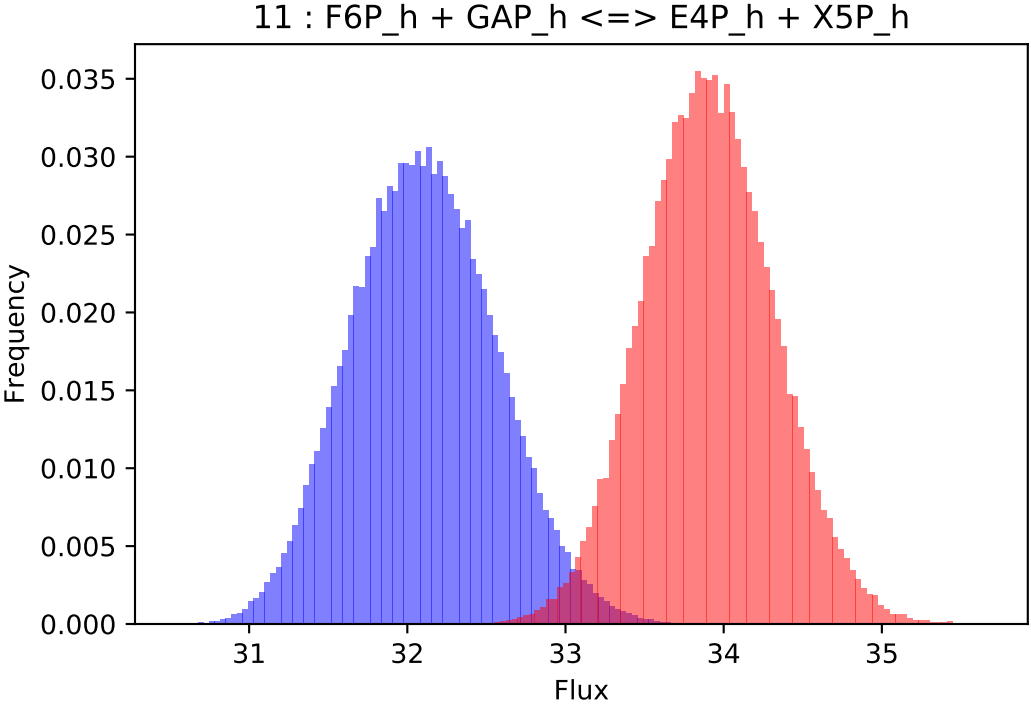

6 : ATP_h + PGA_h <=> ADP_h + DPGA_h
0.04
0.03
0.02
0.01
0.00
Frequency
210
220
230
240
250
260
Flux

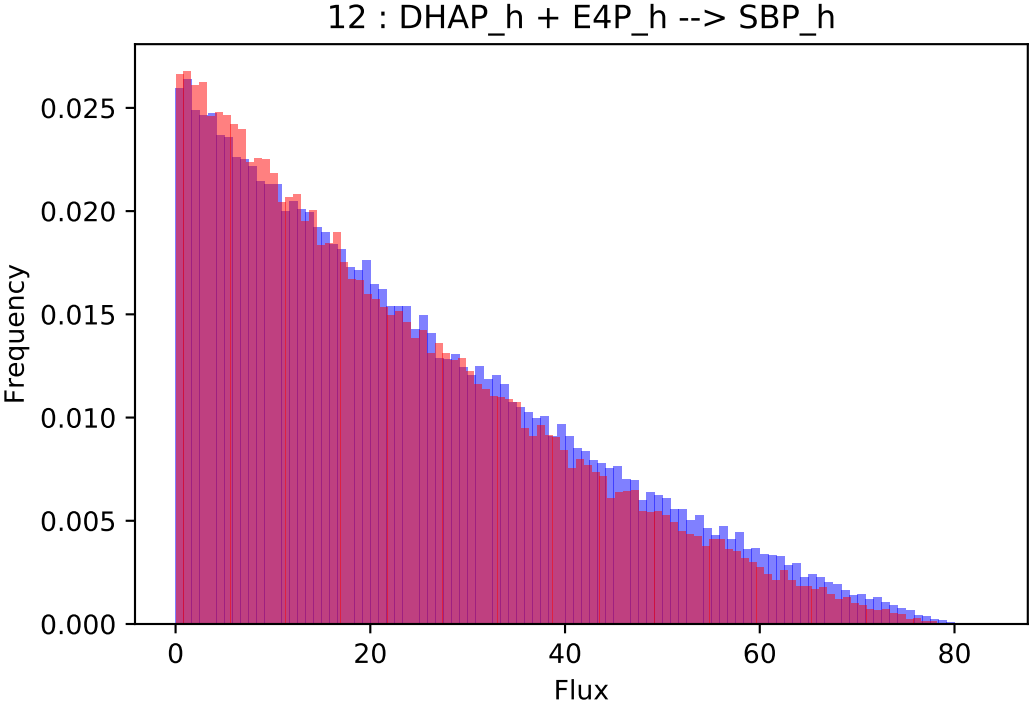

7 : DPGA_h + H_h + NADPH_h --> GAP_h + NADP_h + Pi_h
Frequency
0.020
0.015
0.010
0.005
0.000
160
180
200
220
240
260
280
300
320
Flux

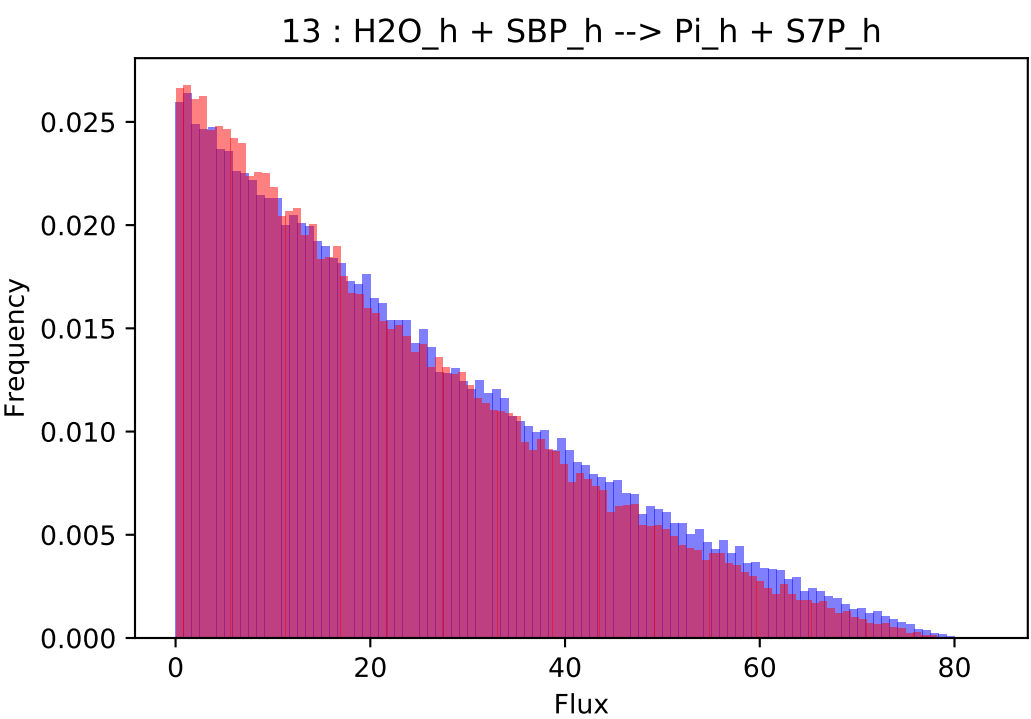

8 : GAP_h <=> DHAP_h
Frequency
0.000
0.002
0.004
0.006
0.008
0.010
−750
−500
−250
0
250
500
750
1000
Flux

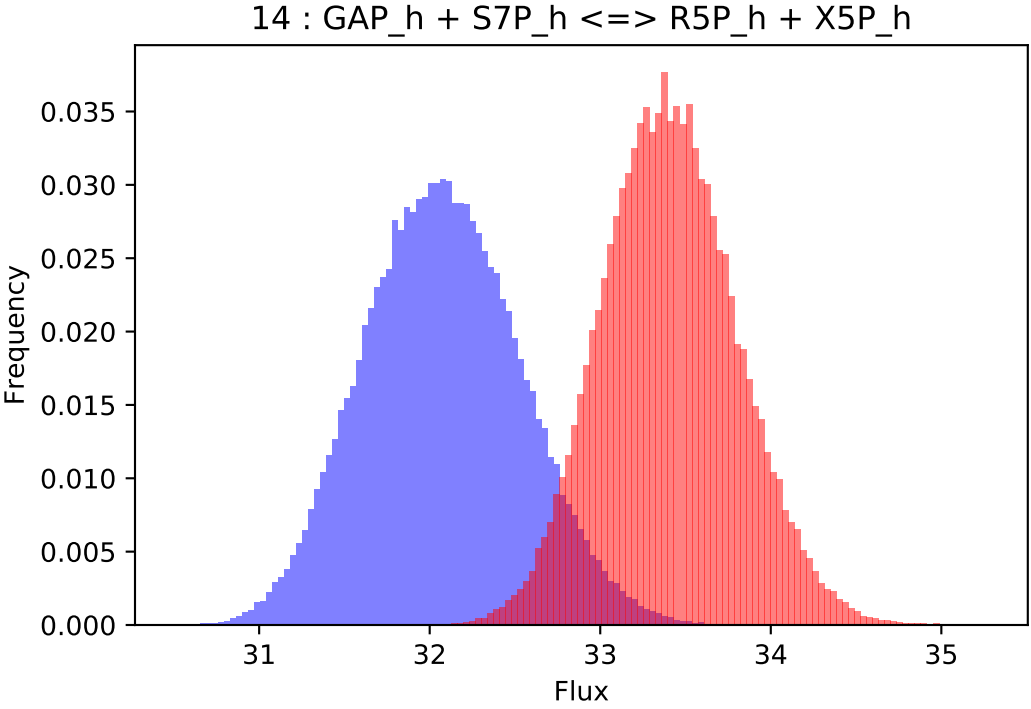

9 : DHAP_h + GAP_h <=> FBP_h
0.030
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
0
20
40
60
80
Flux

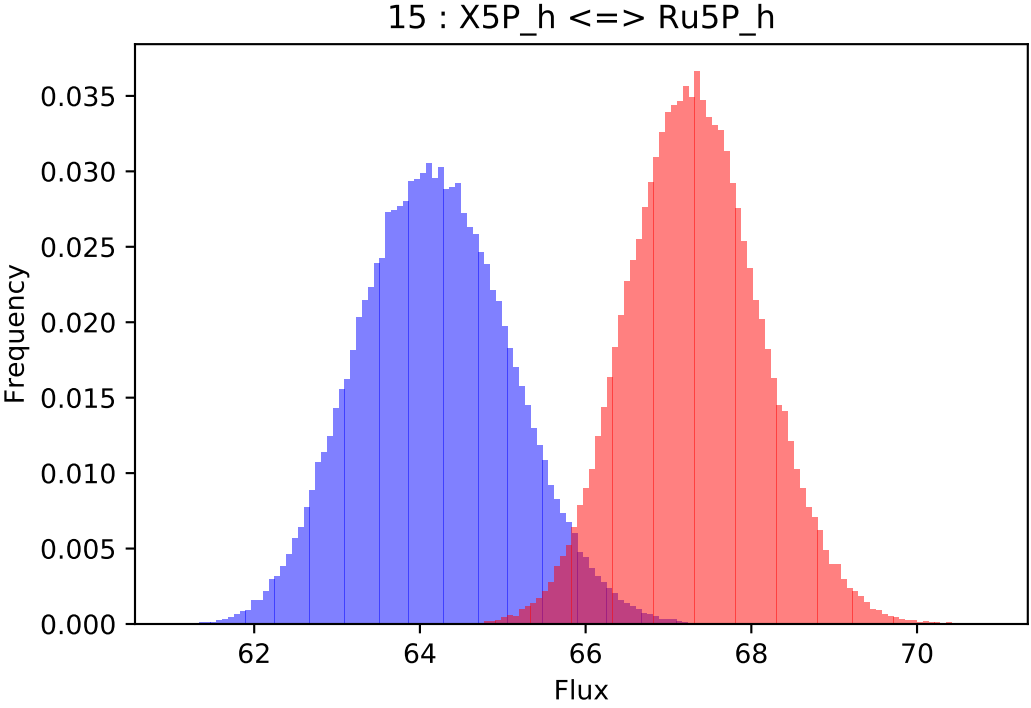

10 : FBP_h + H2O_h --> F6P_h + Pi_h
Frequency
0.025
0.020
0.015
0.010
0.005
0.000
0
20
40
60
80
Flux

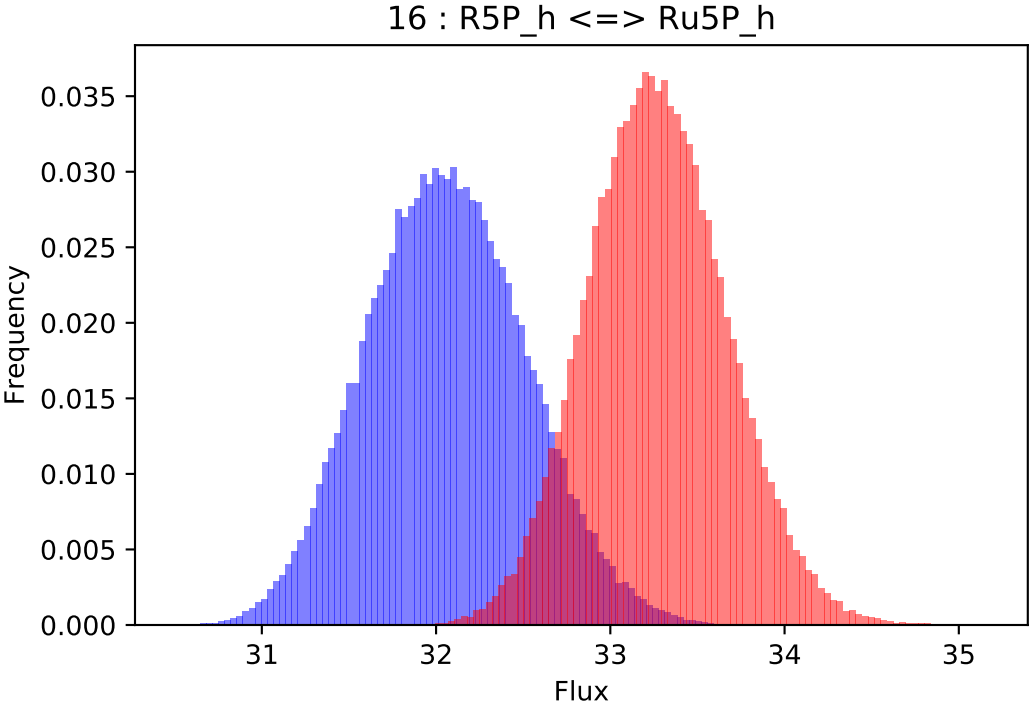

11 : F6P_h + GAP_h <=> E4P_h + X5P_h
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
31
32
33
34
35
Flux

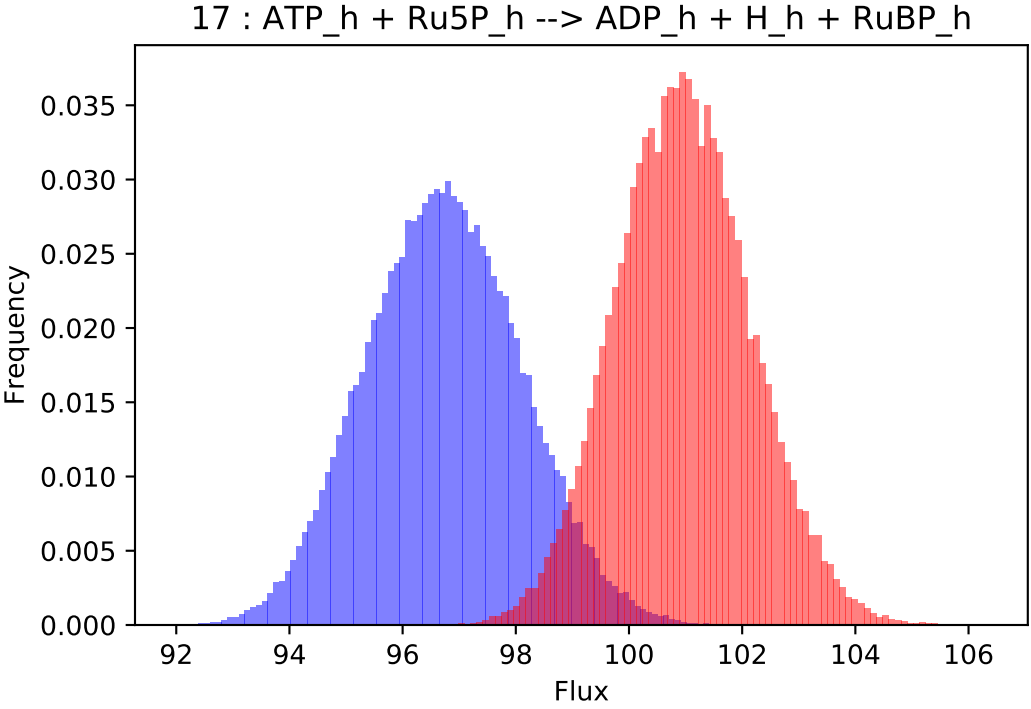

12 : DHAP_h + E4P_h --> SBP_h
Frequency
0.025
0.020
0.015
0.010
0.005
0.000
0
20
40
60
80
Flux

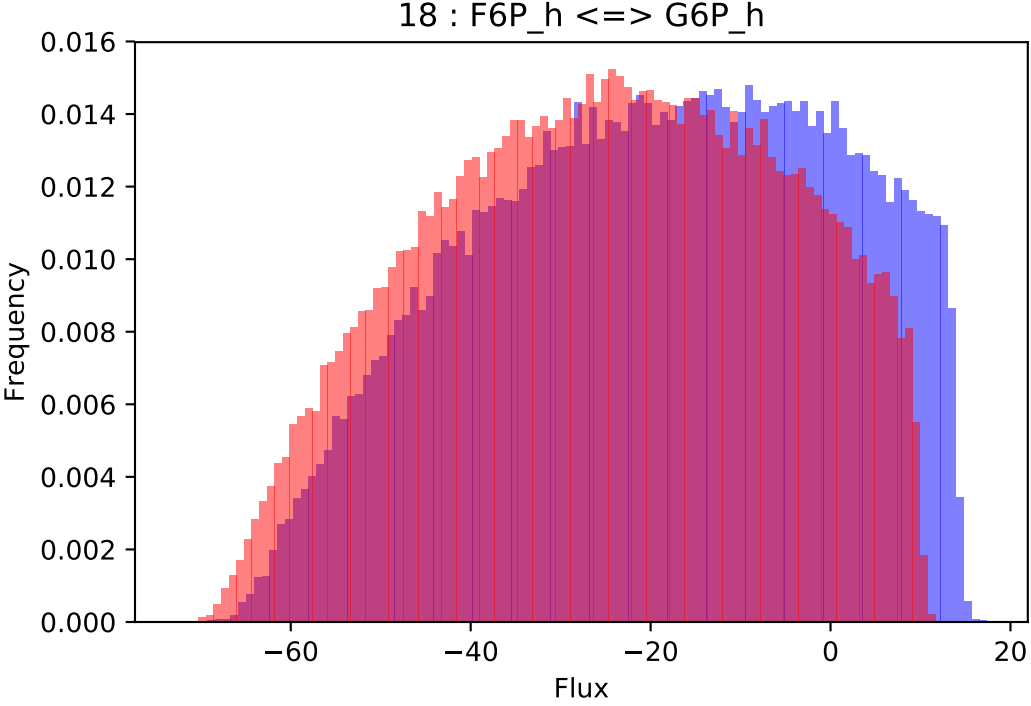

13 : H2O_h + SBP_h --> Pi_h + S7P_h
Frequency
0.025
0.020
0.015
0.010
0.005
0.000
0
20
40
60
80
Flux

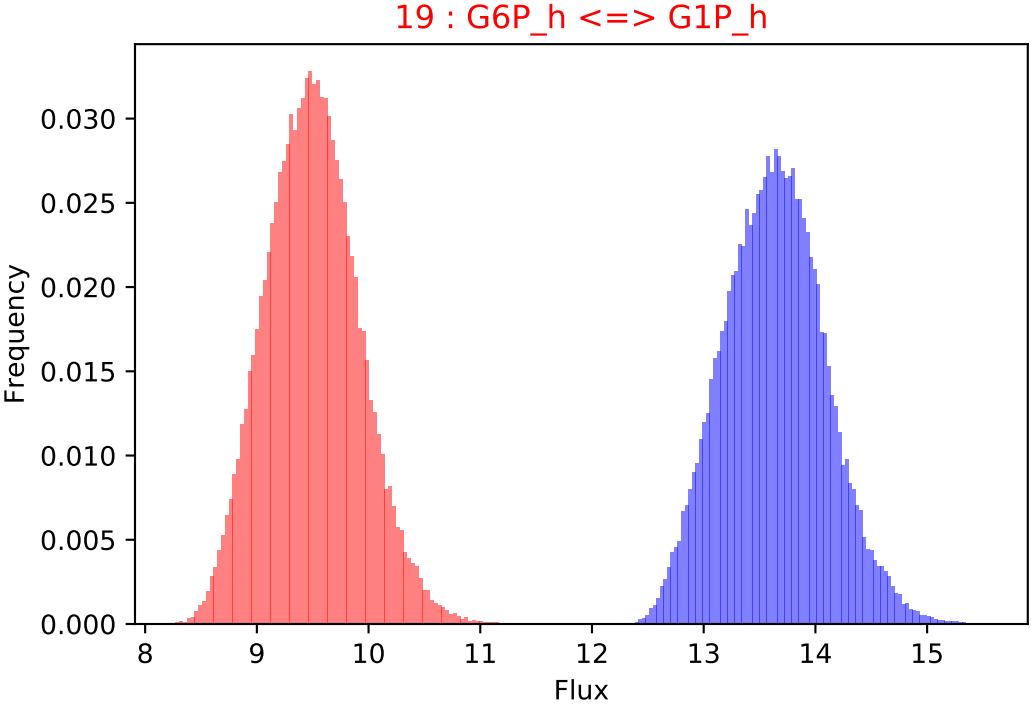

14 : GAP_h + S7P_h <=> R5P_h + X5P_h
Frequency
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
31
32
33
34
35
Flux

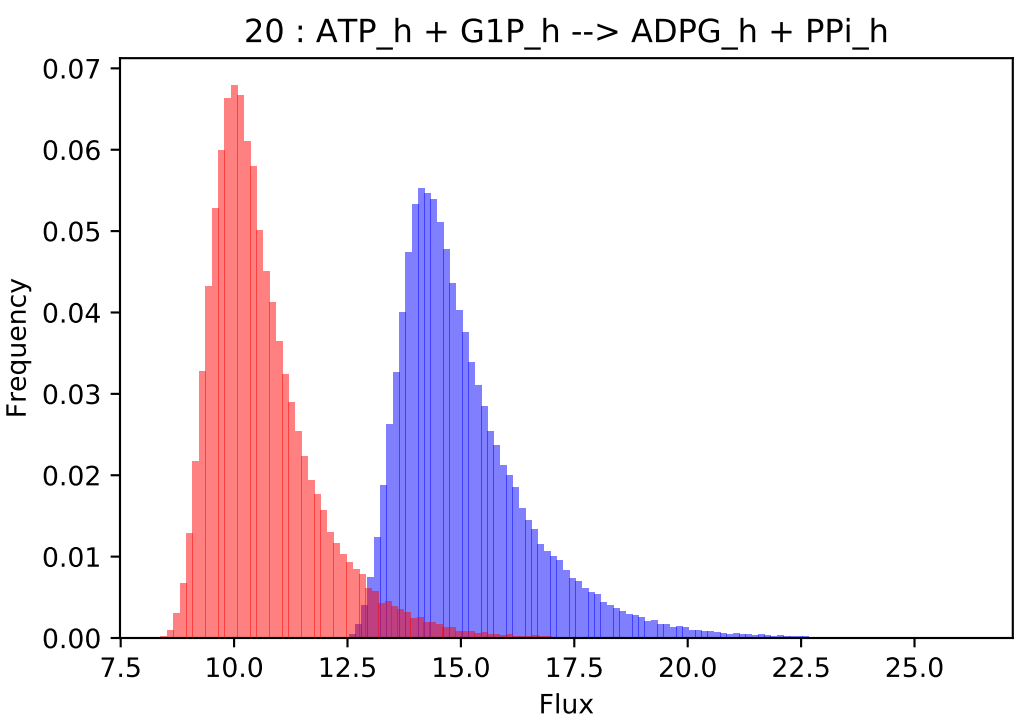

15 : X5P_h <=> Ru5P_h
Frequency
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
62
64
66
68
70
Flux

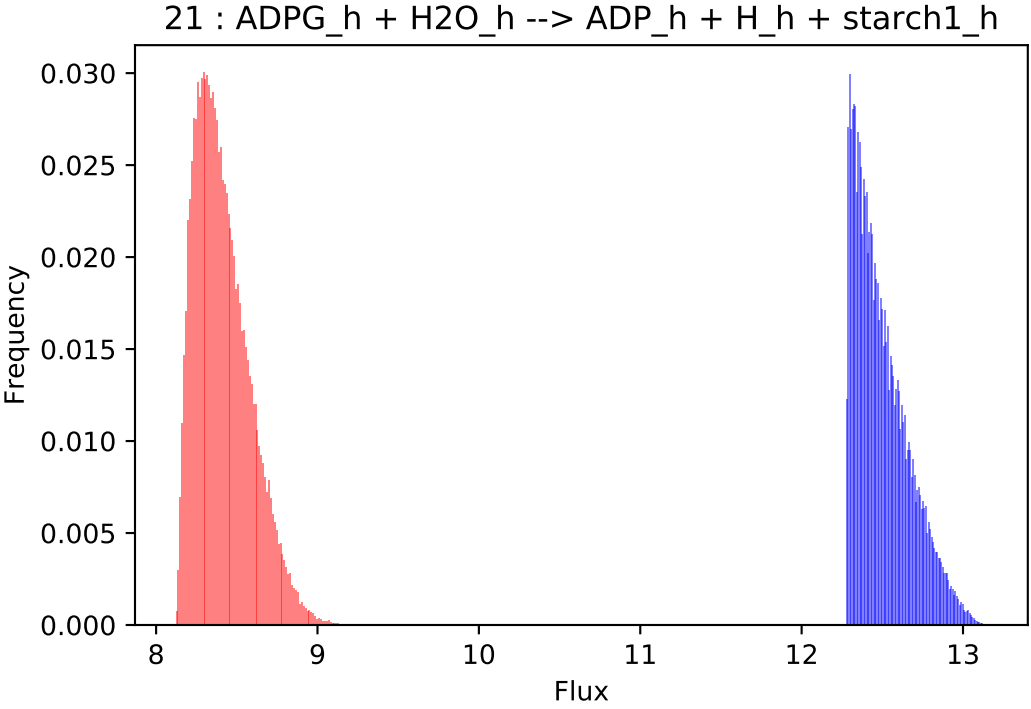

16 : R5P_h <=> Ru5P_h
Frequency
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
31
32
33
34
35
Flux

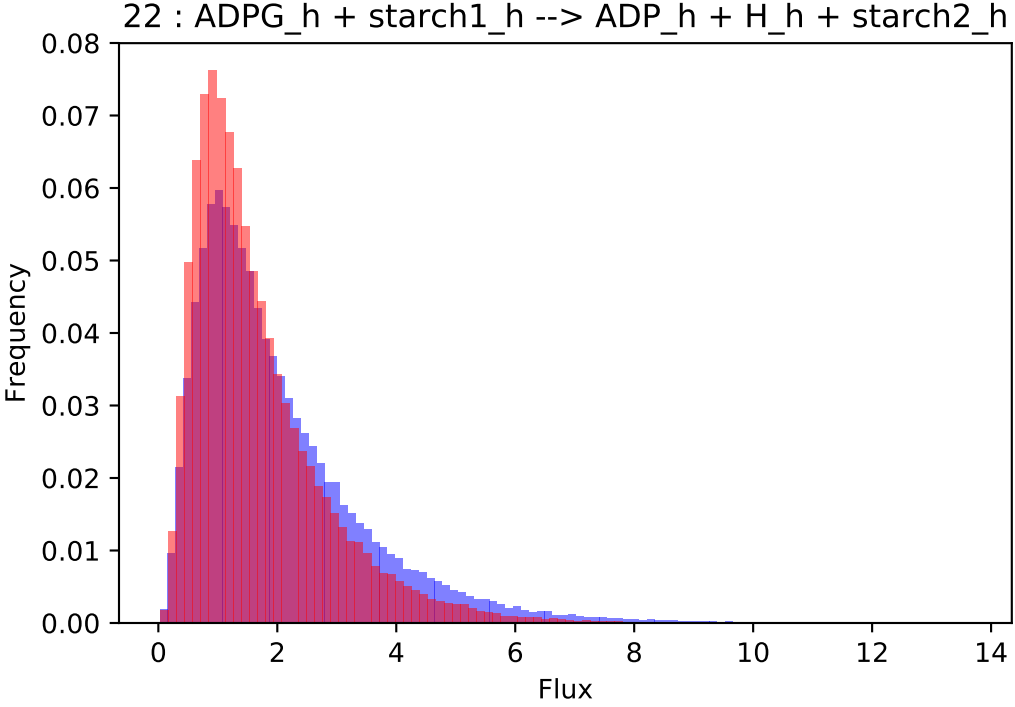

17 : ATP_h + Ru5P_h --> ADP_h + H_h + RuBP_h
Frequency
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
92
94
96
98
100
102
104
106
Flux

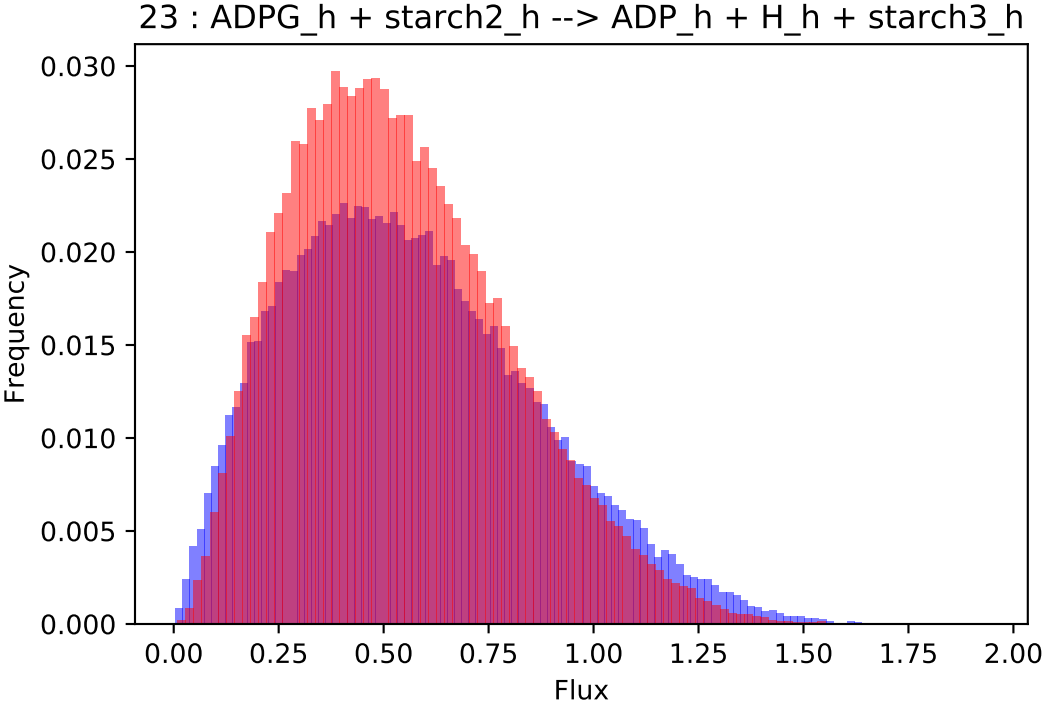

18 : F6P_h <=> G6P_h
0.016
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Frequency
−60
−40
−20
0
20
Flux

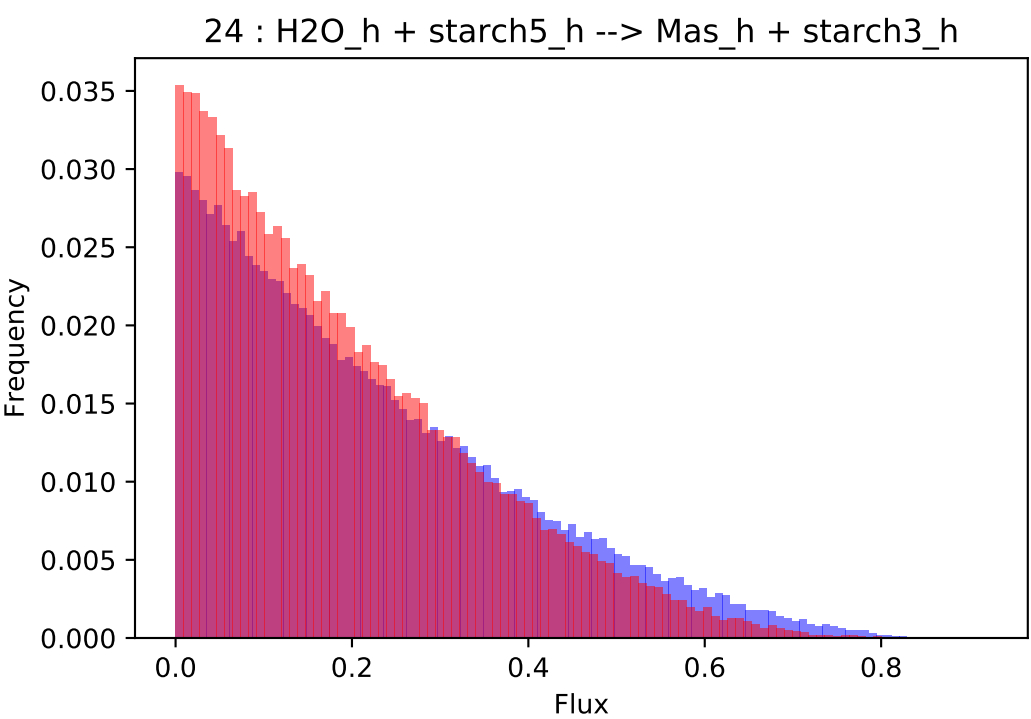

19 : G6P_h <=> G1P_h
Frequency
0.030
0.025
0.020
0.015
0.010
0.005
0.000
8
9
10
11
12
13
14
15
Flux

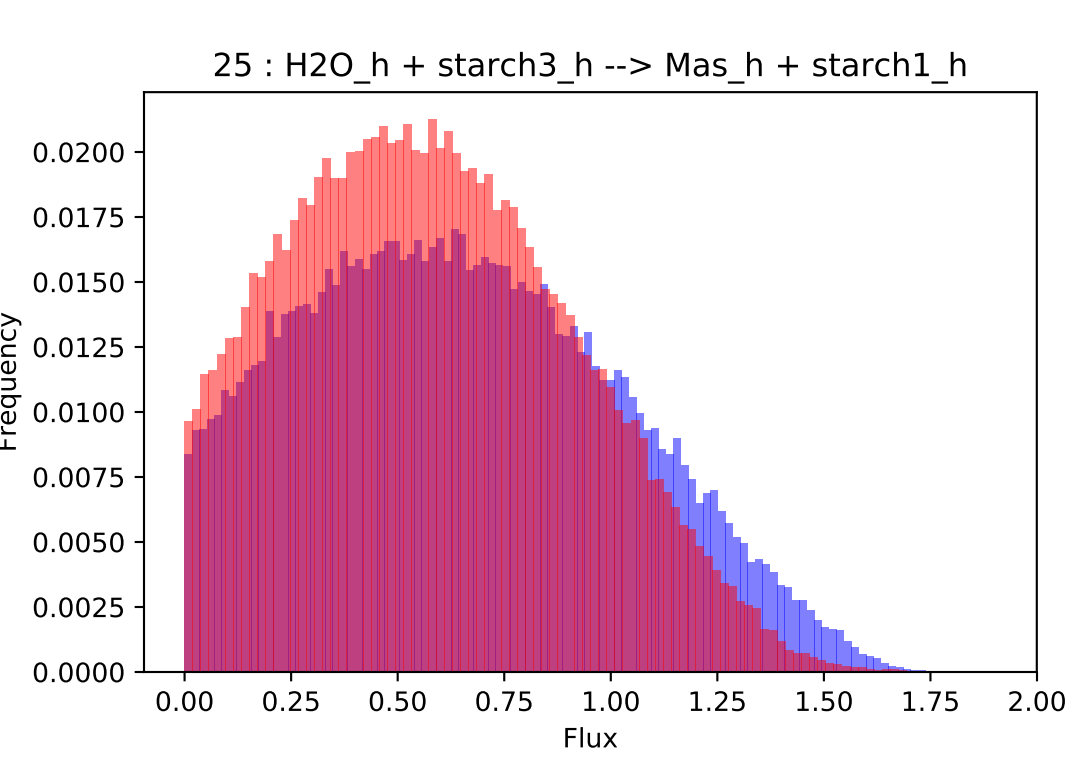

20 : ATP_h + G1P_h --> ADPG_h + PPi_h
Frequency
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
7.5
10.0
12.5
15.0
17.5
20.0
22.5
25.0
Flux

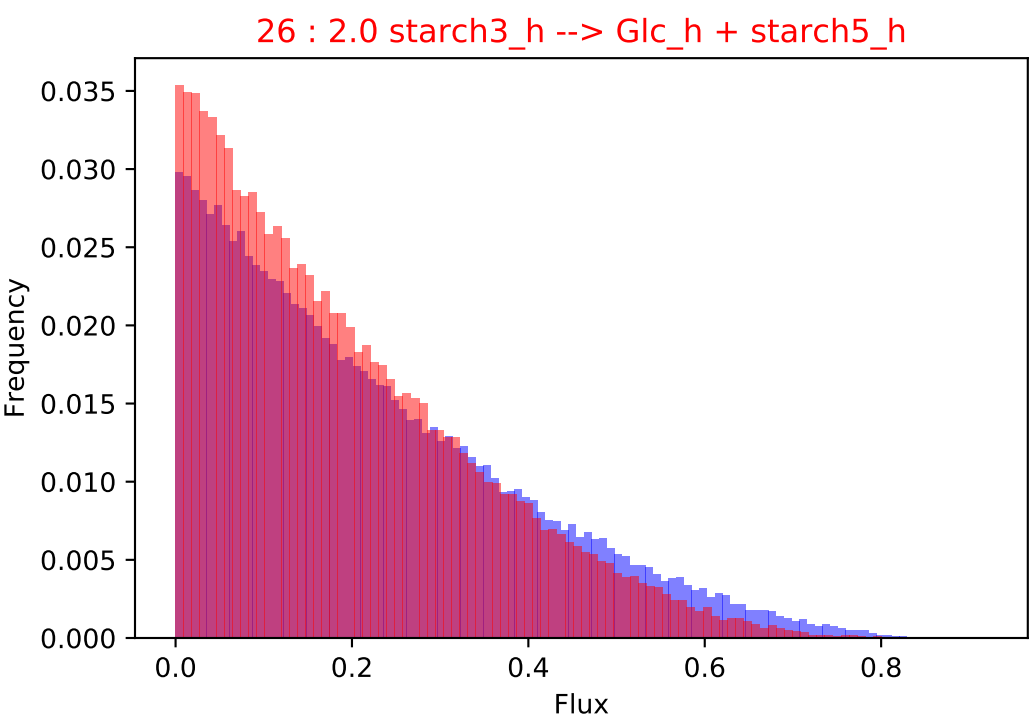

21 : ADPG_h + H2O_h --> ADP_h + H_h + starch1_h
0.030
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
8
9
10
11
12
13
Flux

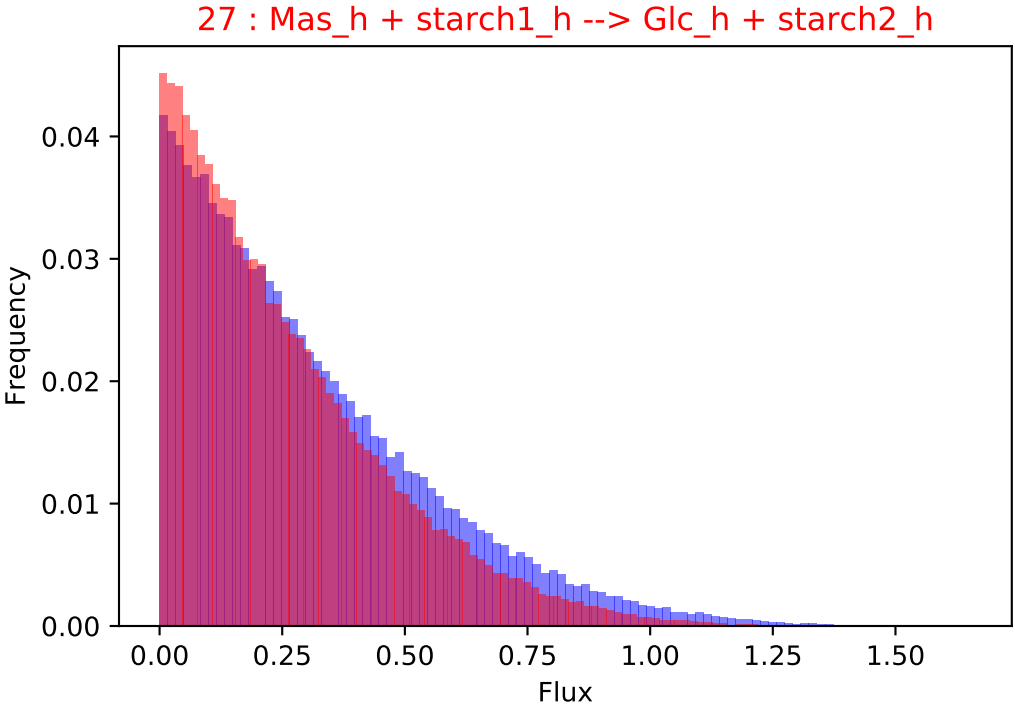

22 : ADPG_h + starch1_h --> ADP_h + H_h + starch2_h
Frequency
Flux
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0
2
4
6
8
10
12
14

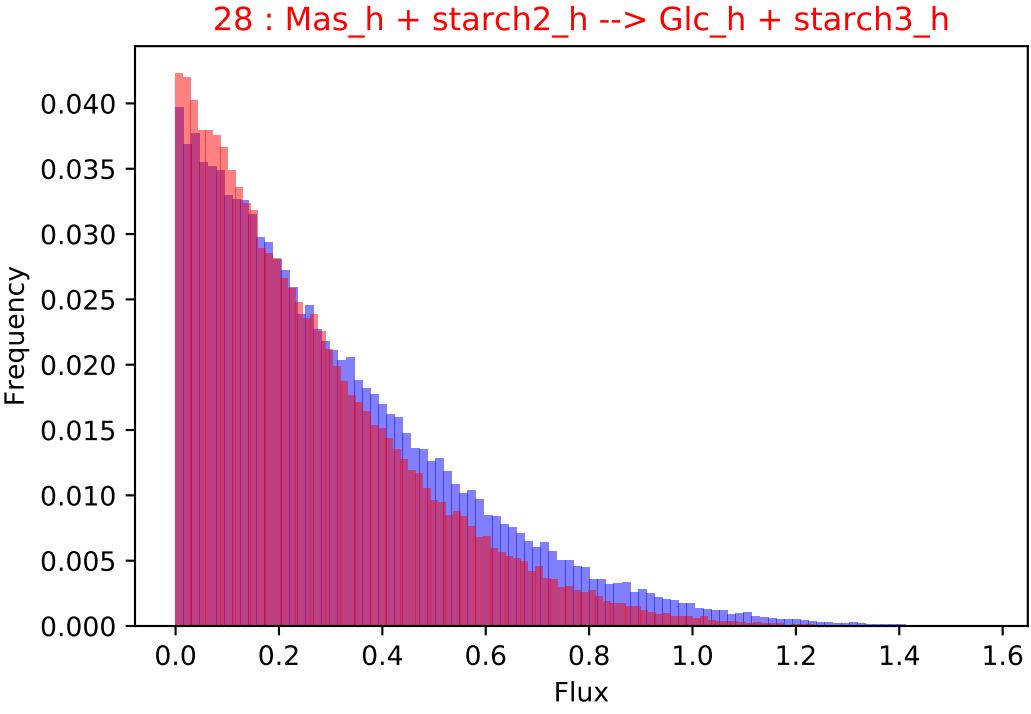

23 : ADPG_h + starch2_h --> ADP_h + H_h + starch3_h
0.030
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
Flux

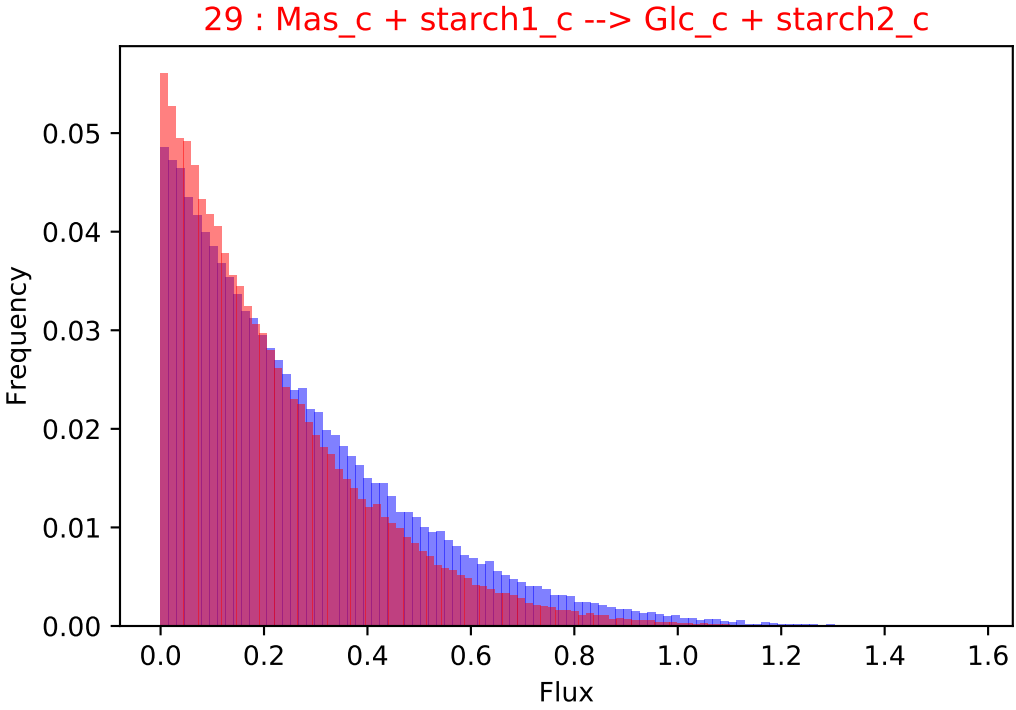

24 : H2O_h + starch5_h --> Mas_h + starch3_h
Frequency
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.2
0.4
0.6
0.8
Flux

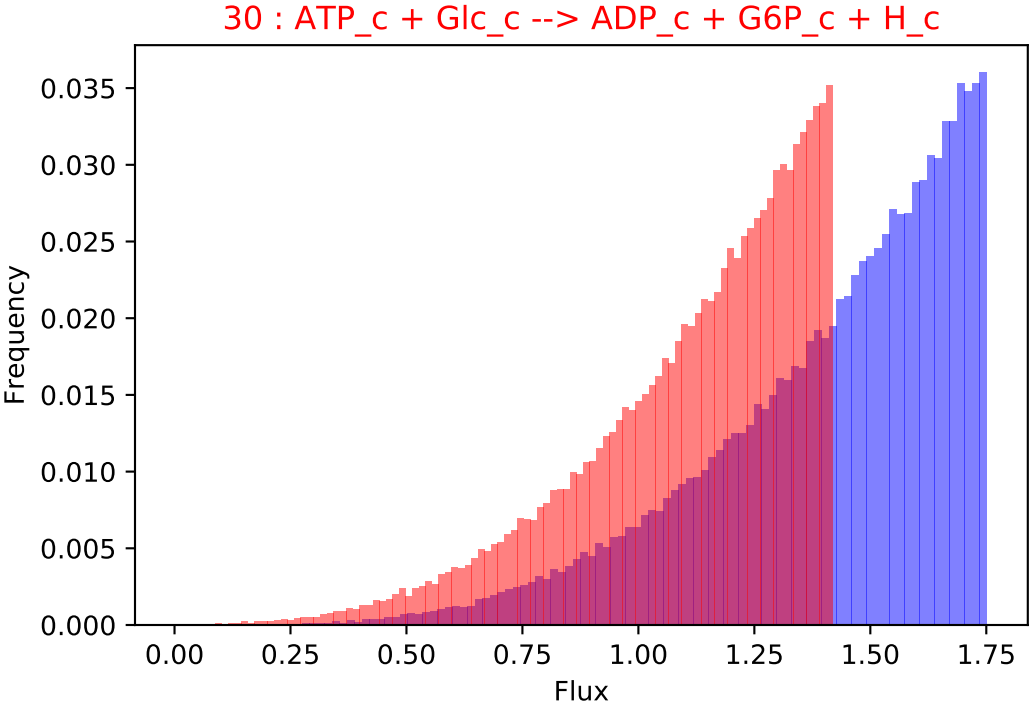

25 : H2O_h + starch3_h --> Mas_h + starch1_h
Frequency
0.0200
0.0175
0.0150
0.0125
0.0100
0.0075
0.0050
0.0025
0.0000
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
Flux

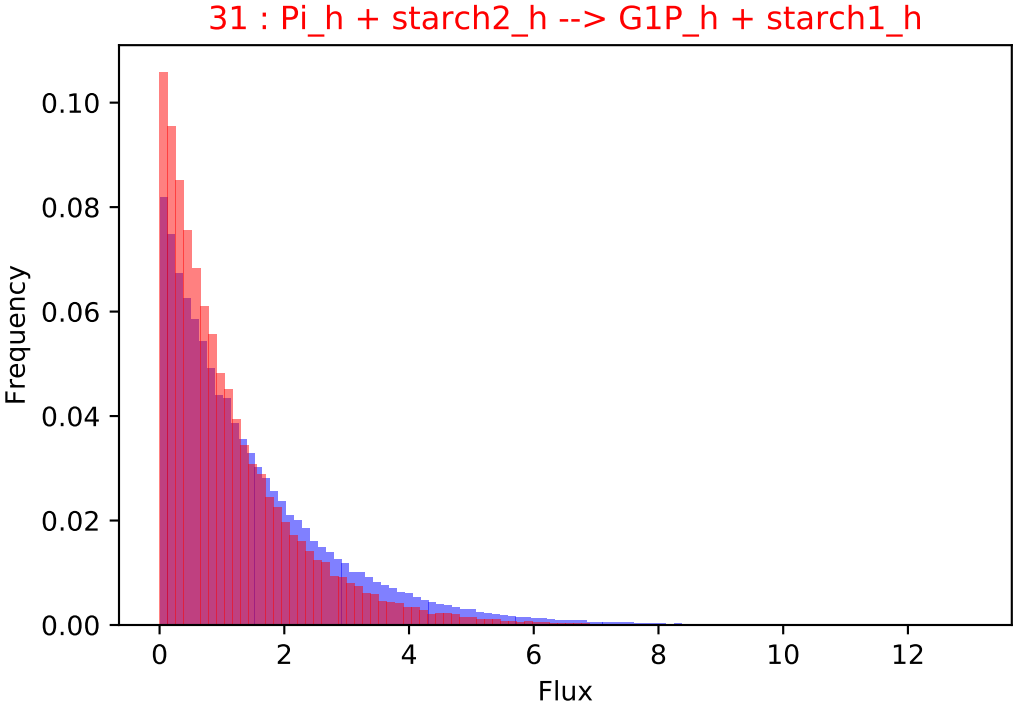

26 : 2.0 starch3_h --> Glc_h + starch5_h
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
0.0
0.2
0.4
0.6
0.8
Flux

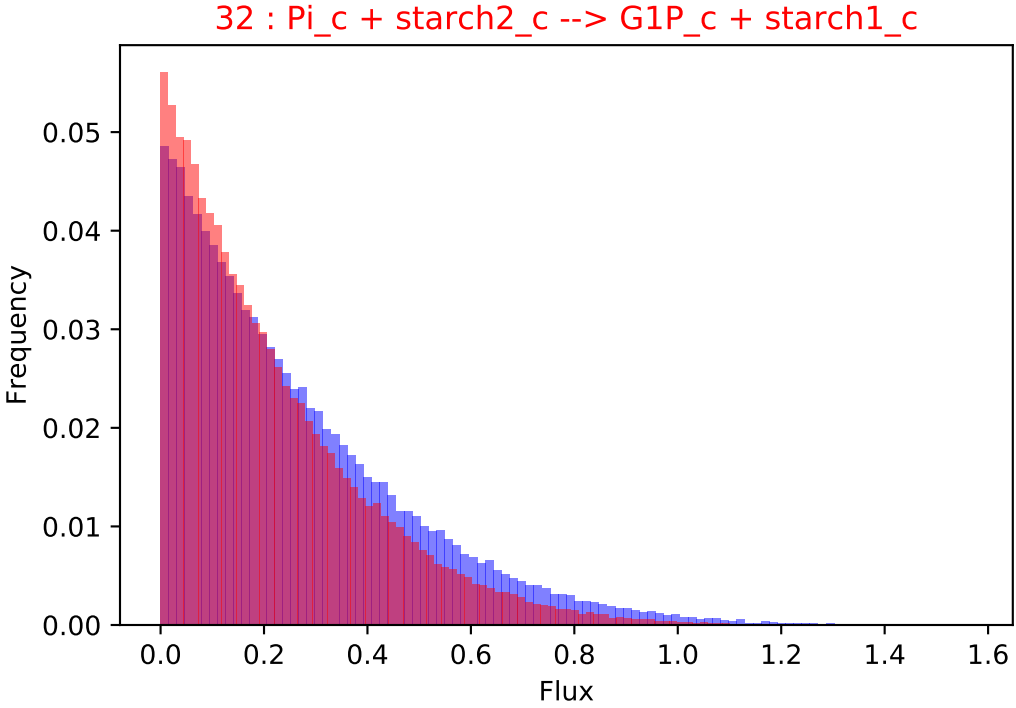

27 : Mas_h + starch1_h --> Glc_h + starch2_h
Frequency
0.00
0.01
0.02
0.03
0.04
0.00
0.25
0.50
0.75
1.00
1.25
1.50
Flux

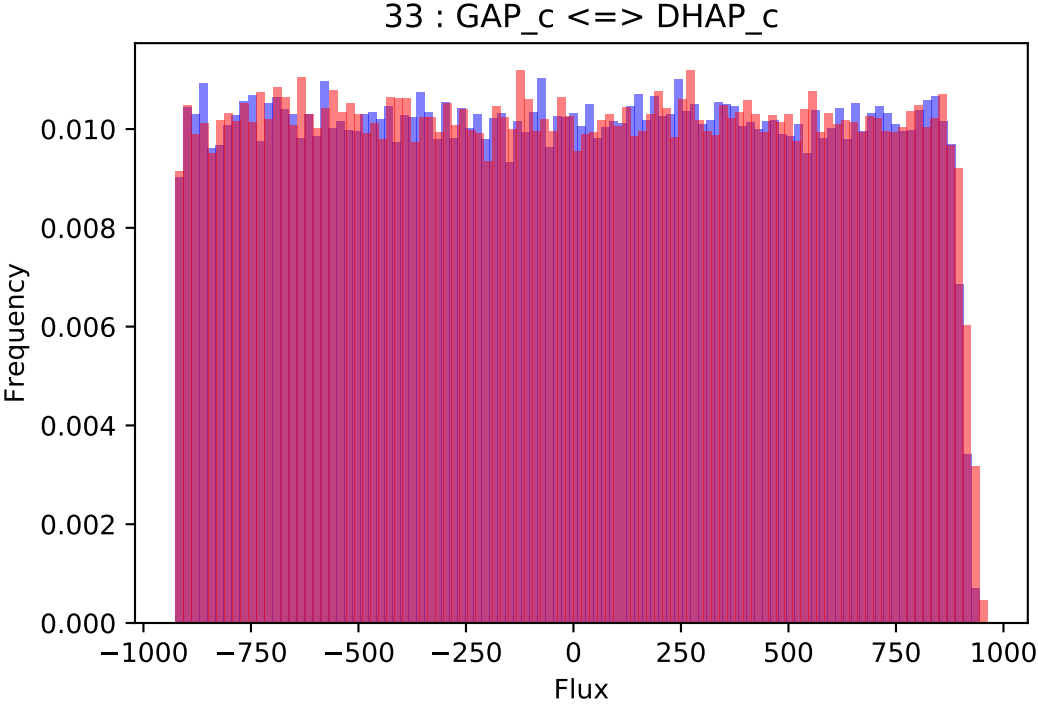

28 : Mas_h + starch2_h --> Glc_h + starch3_h
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
Flux

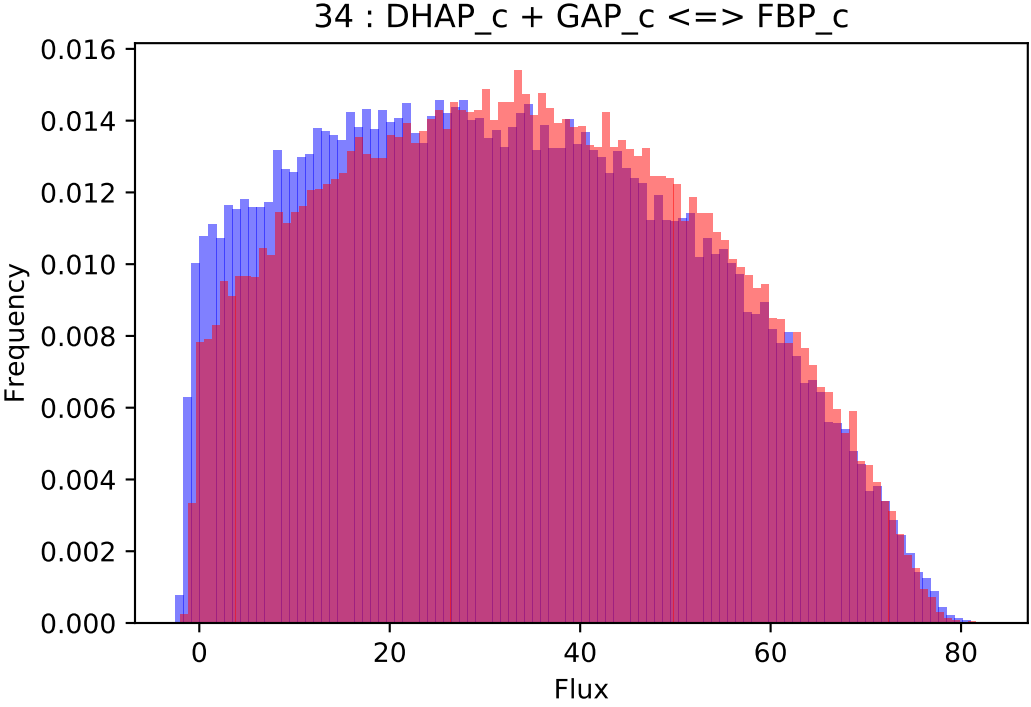

29 : Mas_c + starch1_c --> Glc_c + starch2_c
Frequency
0.00
0.01
0.02
0.03
0.04
0.05
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
Flux

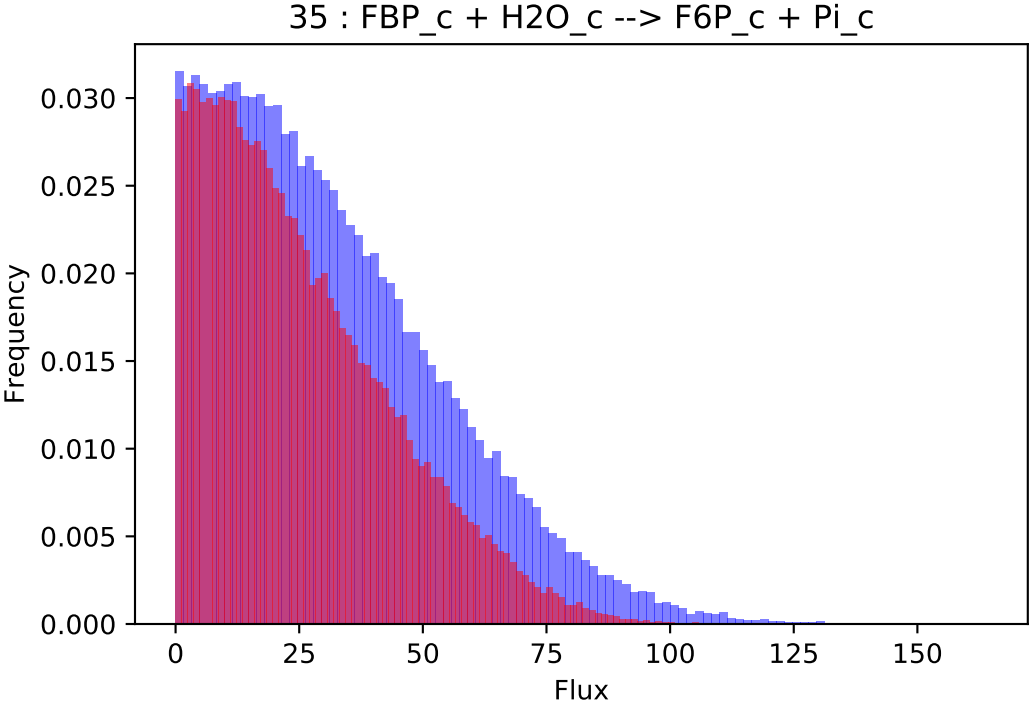

30 : ATP_c + Glc_c --> ADP_c + G6P_c + H_c
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
Flux

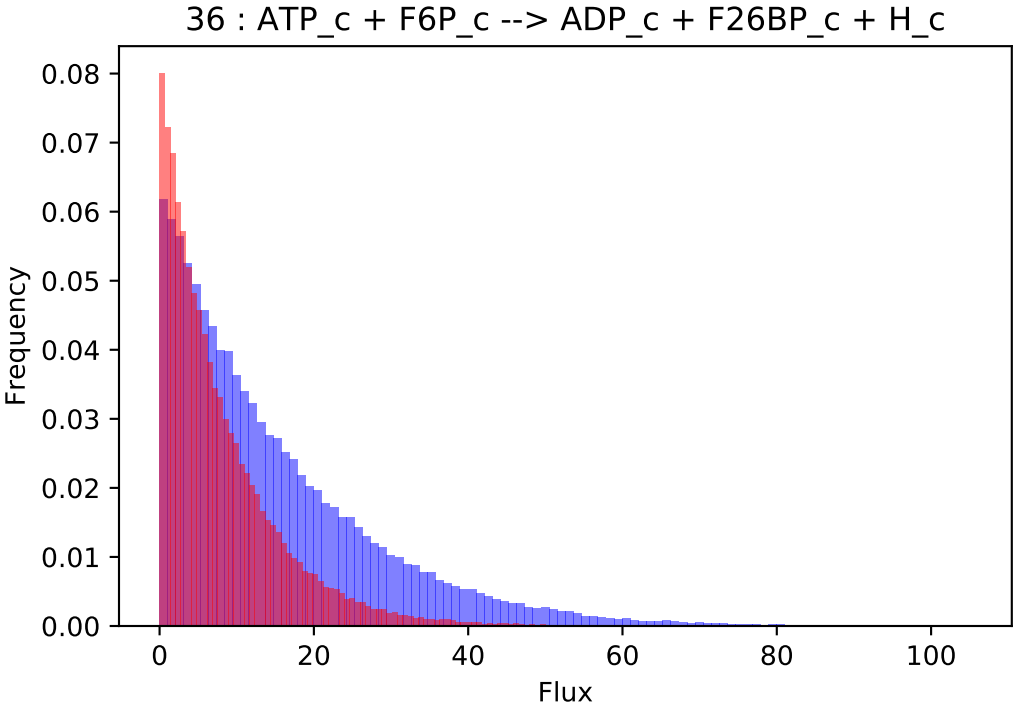

31 : Pi_h + starch2_h --> G1P_h + starch1_h
Frequency
0.00
0.02
0.04
0.06
0.08
0.10
0
2
4
6
8
10
12
Flux

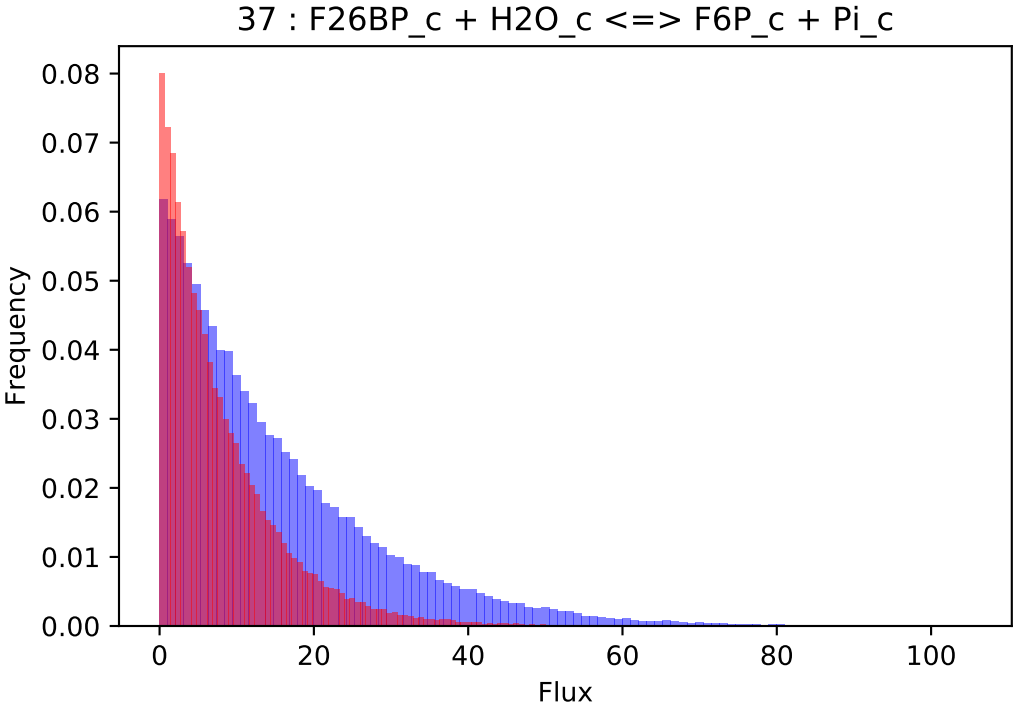

32 : Pi_c + starch2_c --> G1P_c + starch1_c
Frequency
0.00
0.01
0.02
0.03
0.04
0.05
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
Flux

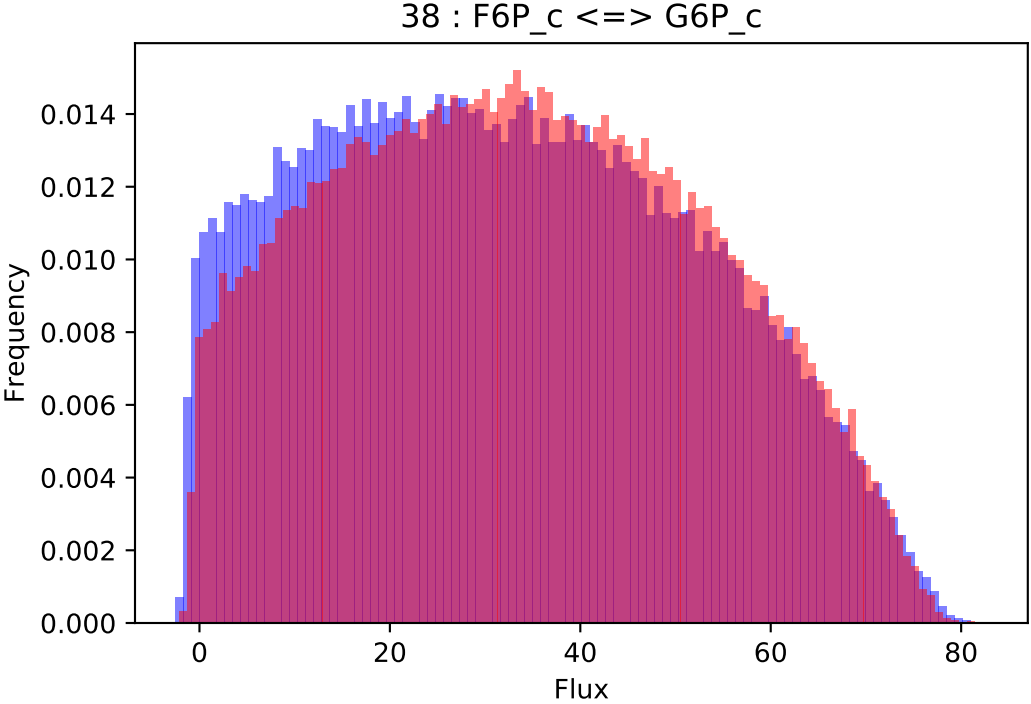

33 : GAP_c <=> DHAP_c
0.010
0.008
0.006
0.004
0.002
0.000
Frequency
−1000
−750
−500
−250
0
250
500
750
1000
Flux

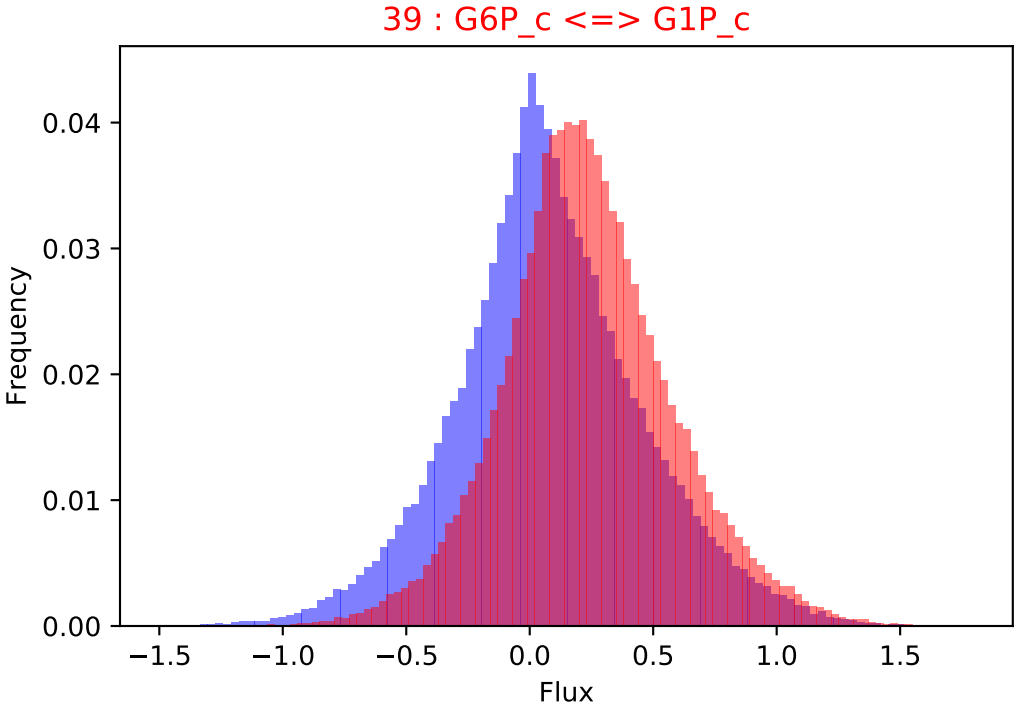

34 : DHAP_c + GAP_c <=> FBP_c
0.016
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Frequency
0
20
40
60
80
Flux

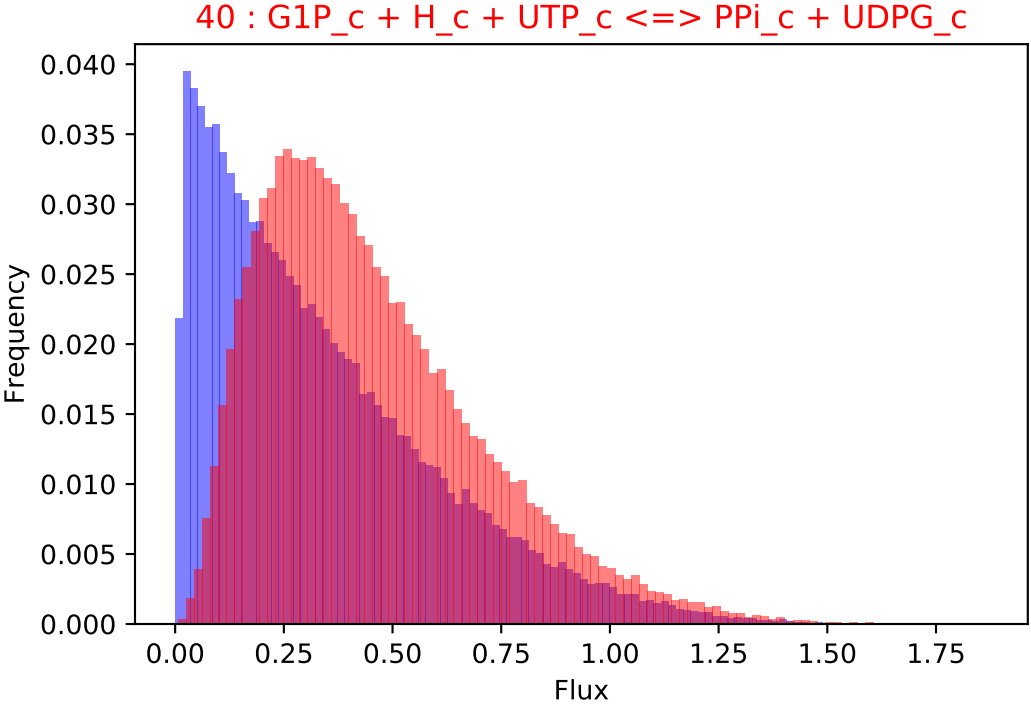

35 : FBP_c + H2O_c --> F6P_c + Pi_c
Frequency
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0
25
50
75
100
125
150
Flux

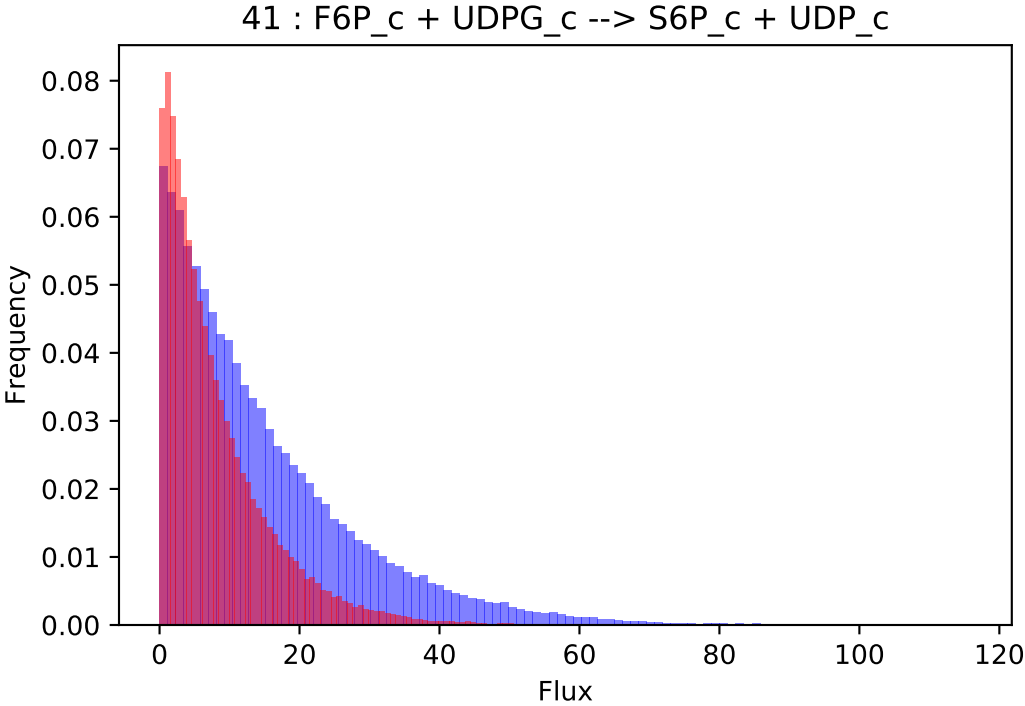

36 : ATP_c + F6P_c --> ADP_c + F26BP_c + H_c
Frequency
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0
20
40
60
80
100
Flux

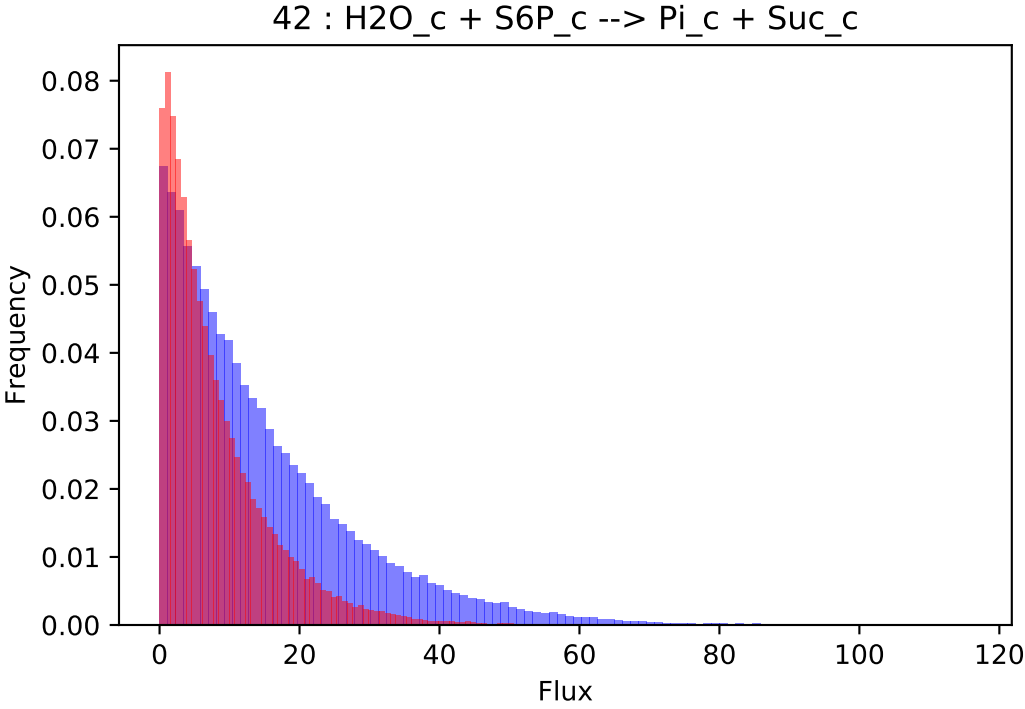

37 : F26BP_c + H2O_c <=> F6P_c + Pi_c
Frequency
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
0
20
40
60
80
100
Flux

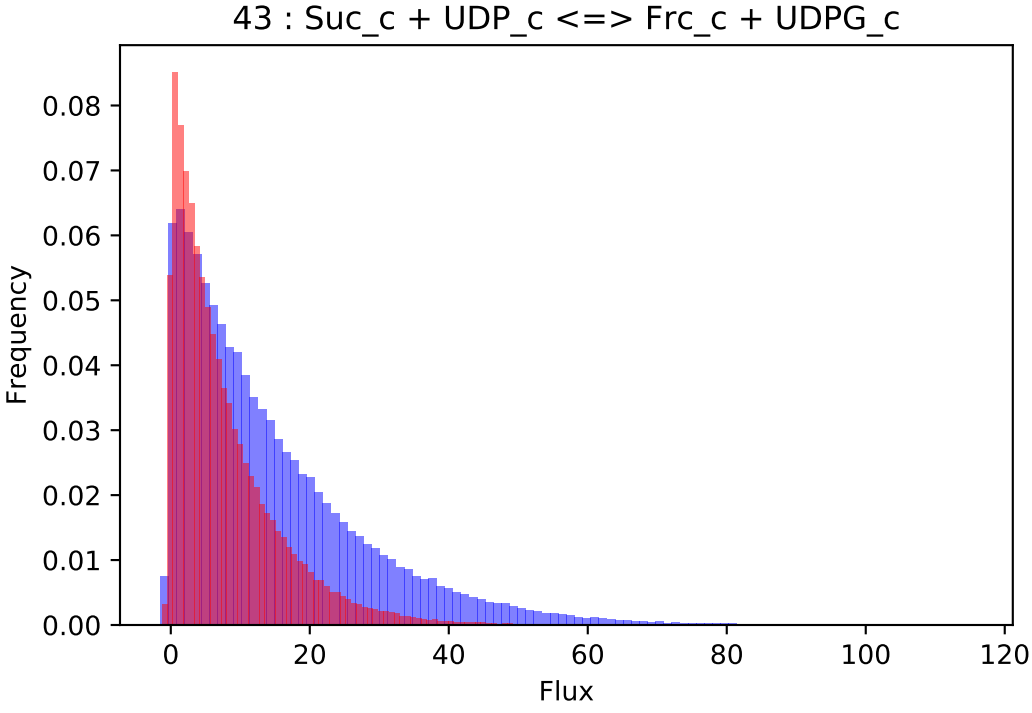

38 : F6P_c <=> G6P_c
Frequency
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
0
20
40
60
80
Flux

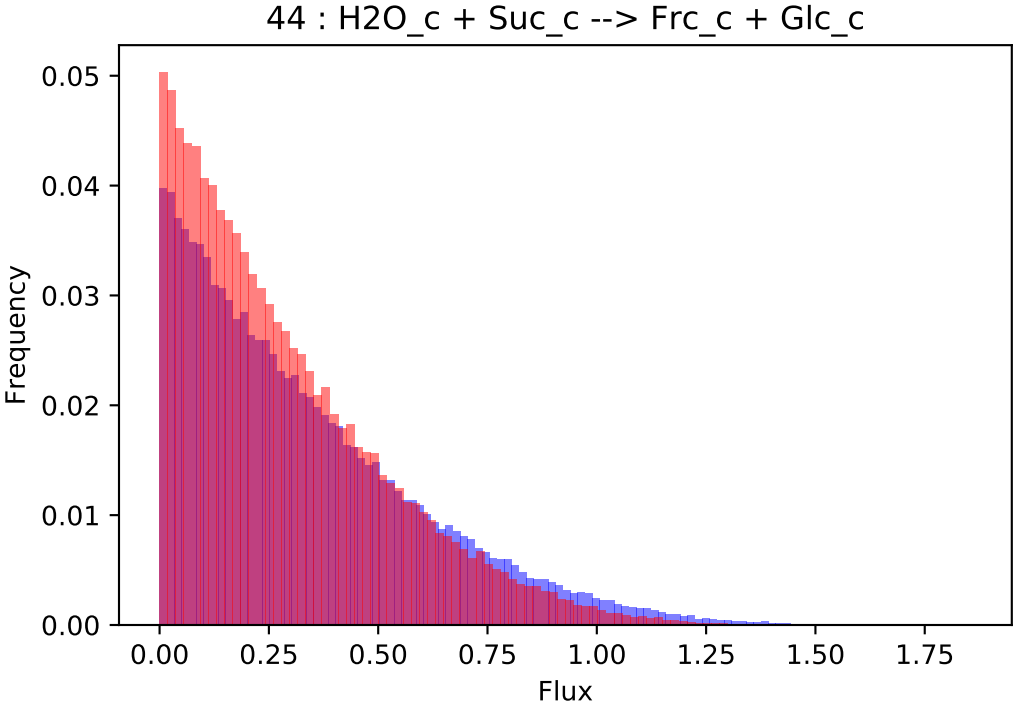

39 : G6P_c <=> G1P_c
0.04
0.03
0.02
0.01
0.00
Frequency
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
Flux

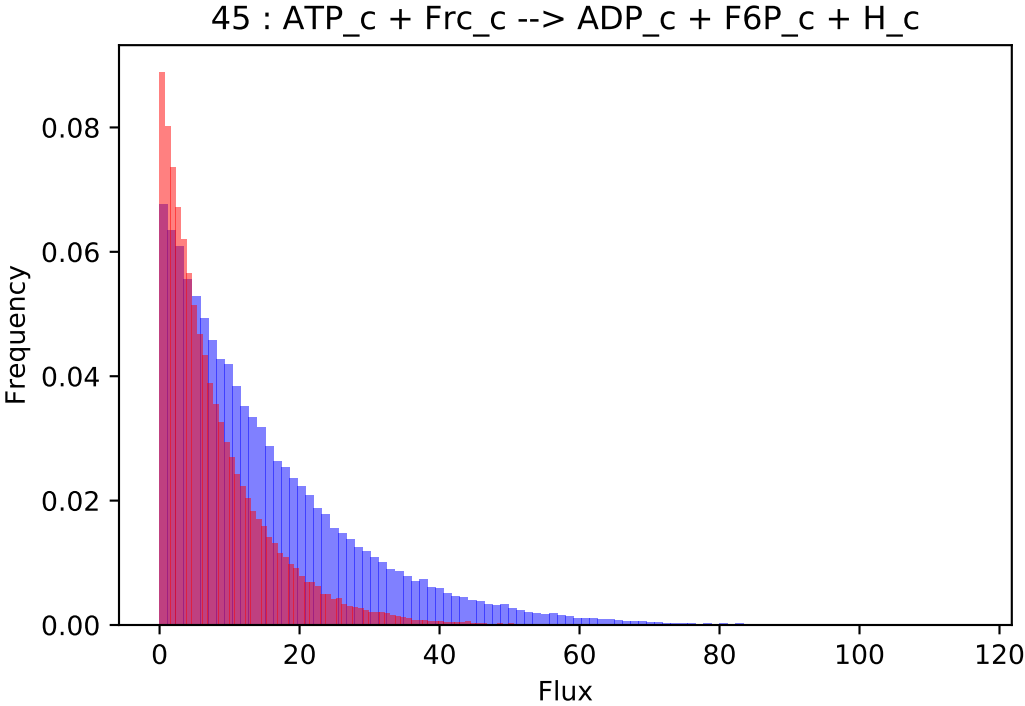

40 : G1P_c + H_c + UTP_c <=> PPi_c + UDPG_c
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
Flux

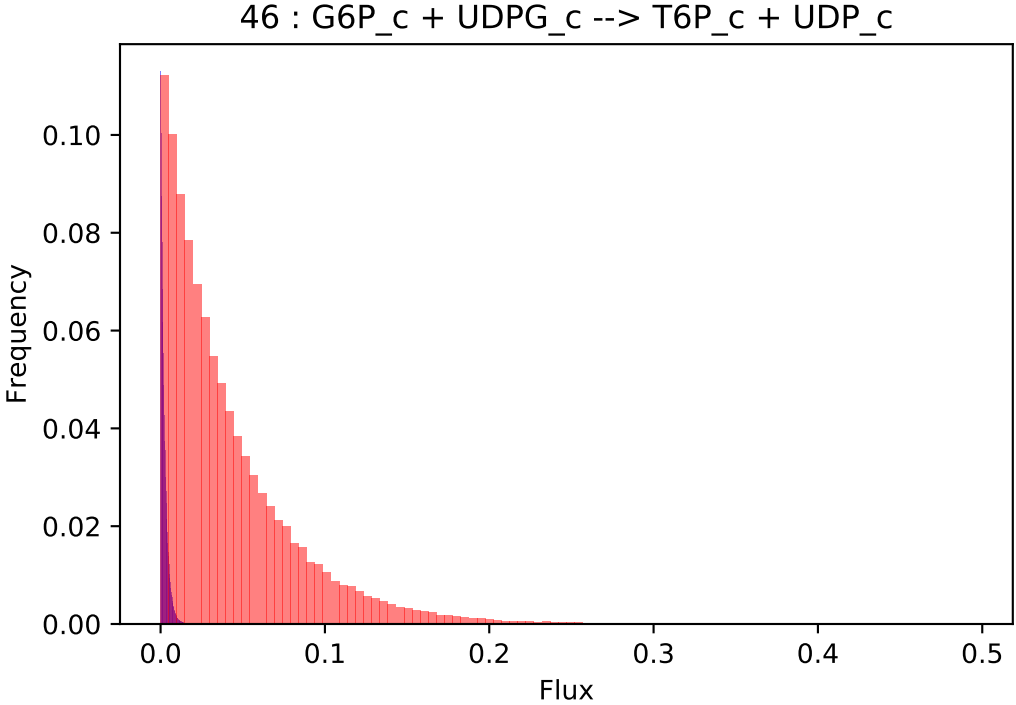

41 : F6P_c + UDPG_c --> S6P_c + UDP_c
Frequency
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0
20
40
60
80
100
120
Flux

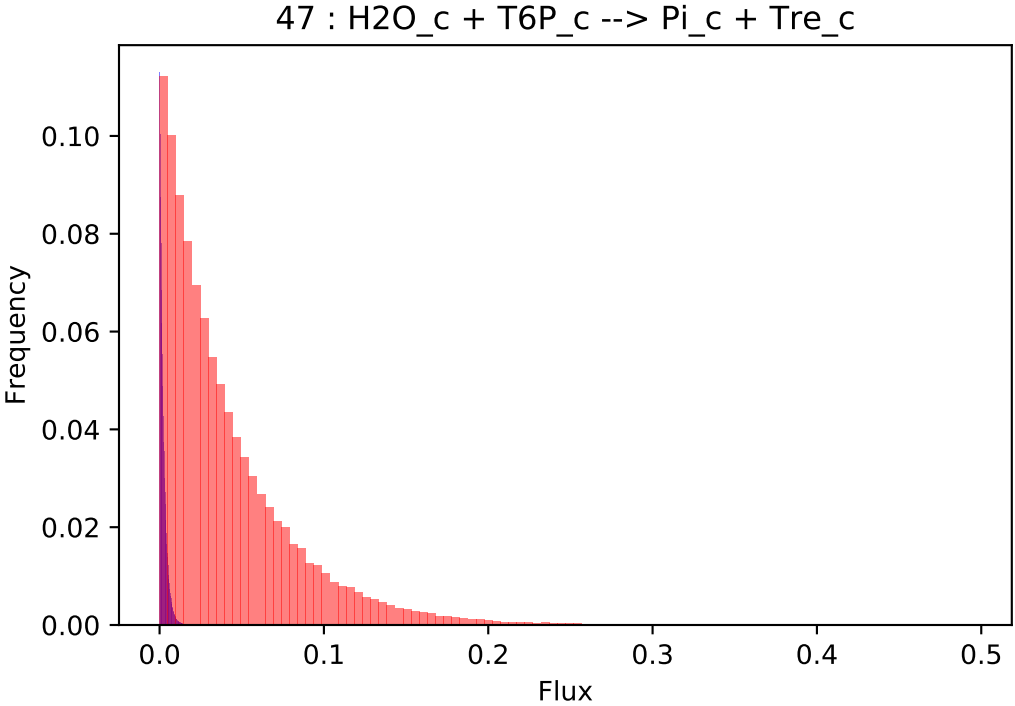

42 : H2O_c + S6P_c --> Pi_c + Suc_c
Frequency
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0
20
40
60
80
100
120
Flux

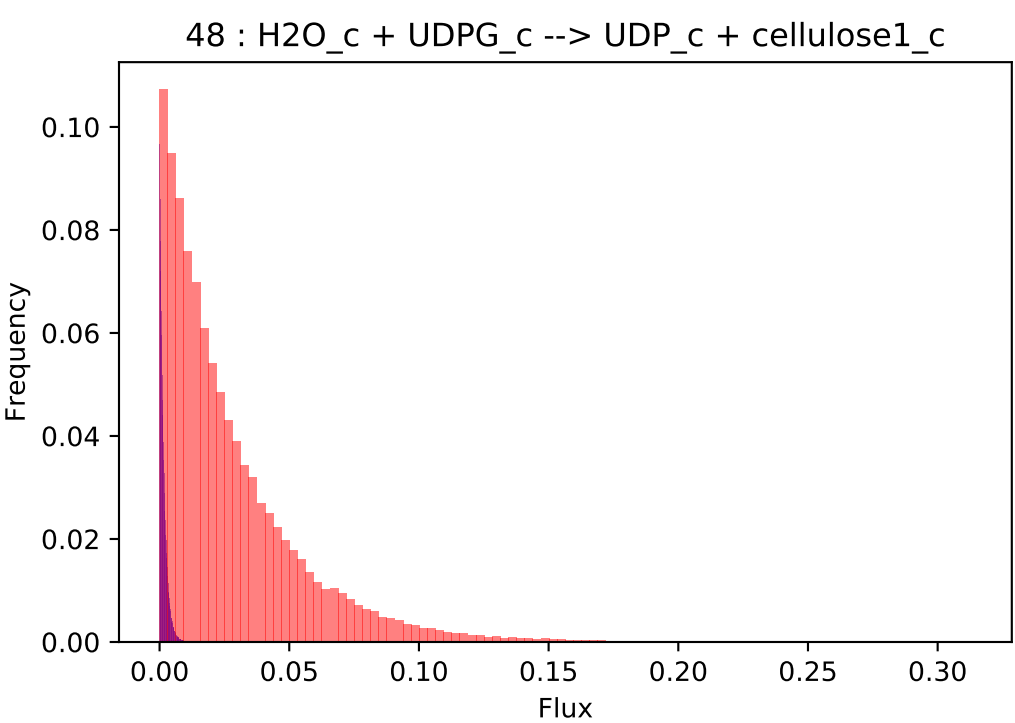

43 : Suc_c + UDP_c <=> Frc_c + UDPG_c
Frequency
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0
20
40
60
80
100
120
Flux

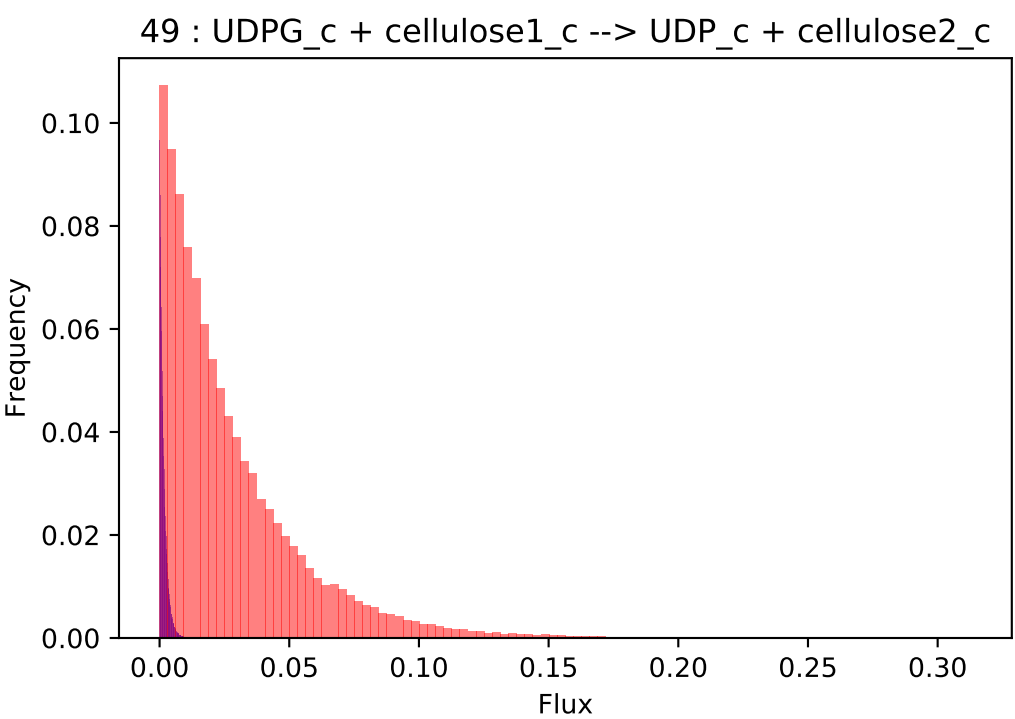

44 : H2O_c + Suc_c --> Frc_c + Glc_c
Frequency
0.05
0.04
0.03
0.02
0.01
0.00
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
Flux

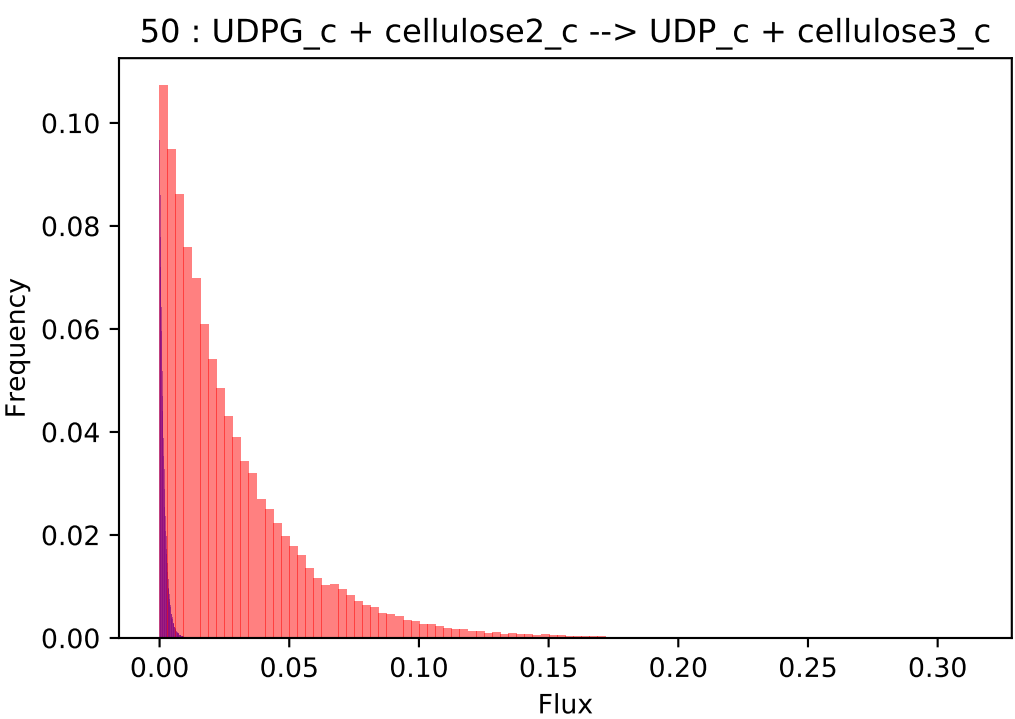

45 : ATP_c + Frc_c --> ADP_c + F6P_c + H_c
Frequency
0.00
0.02
0.04
0.06
0.08
0
20
40
60
80
100
120
Flux

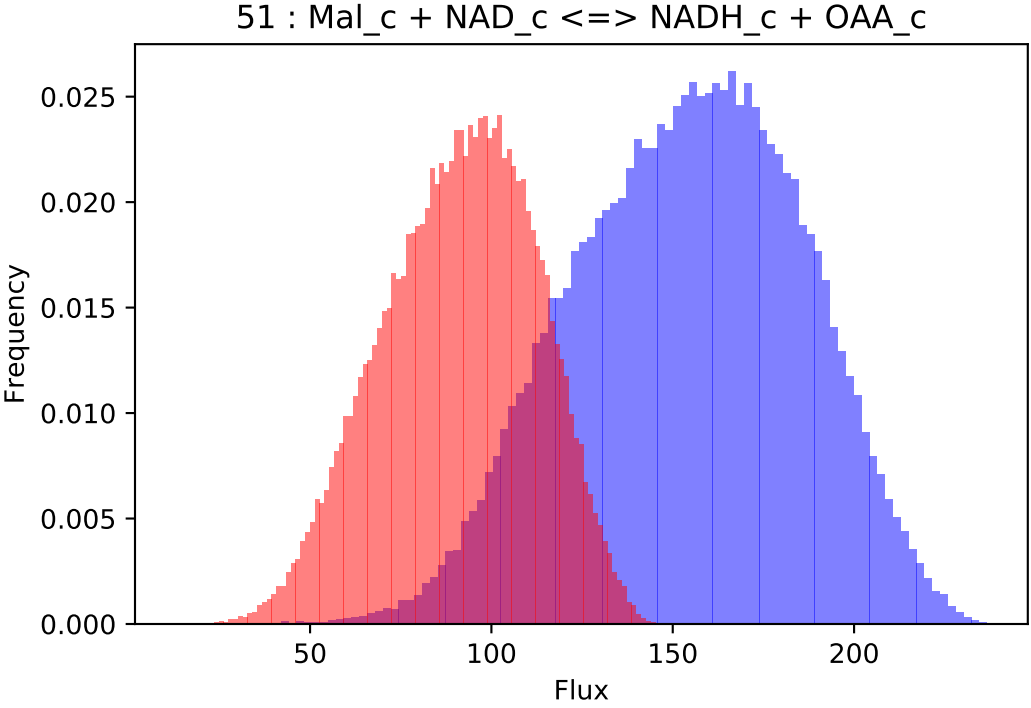

46 : G6P_c + UDPG_c --> T6P_c + UDP_c
Frequency
0.00
0.02
0.04
0.06
0.08
0.10
0.0
0.1
0.2
0.3
0.4
0.5
Flux

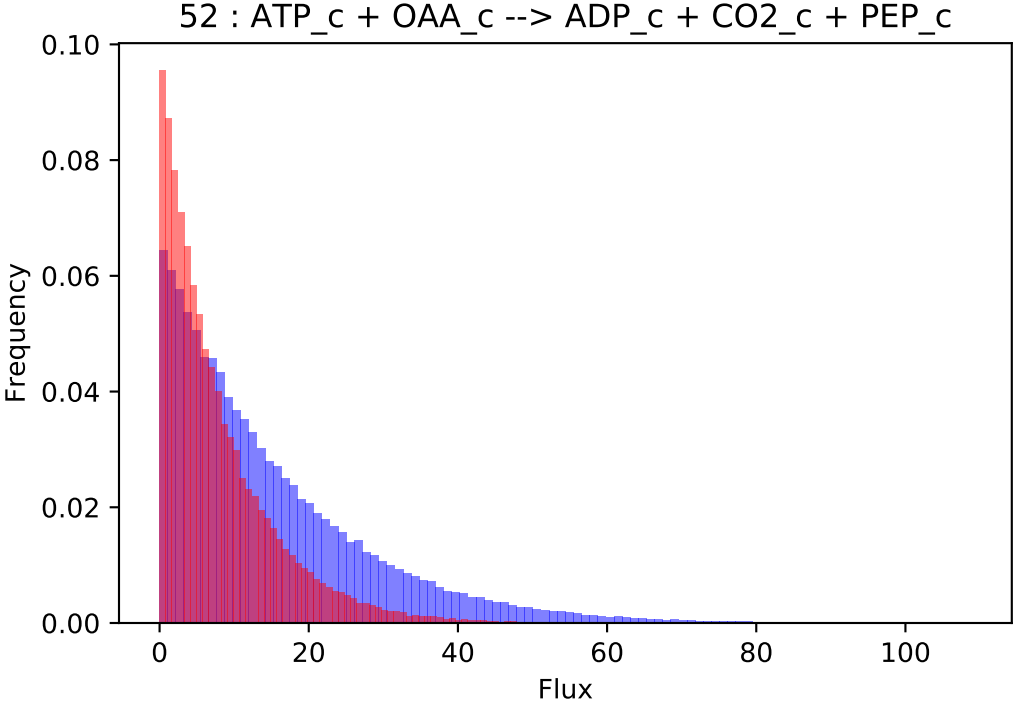

47 : H2O_c + T6P_c --> Pi_c + Tre_c
Frequency
0.00
0.02
0.04
0.06
0.08
0.10
0.0
0.1
0.2
0.3
0.4
0.5
Flux

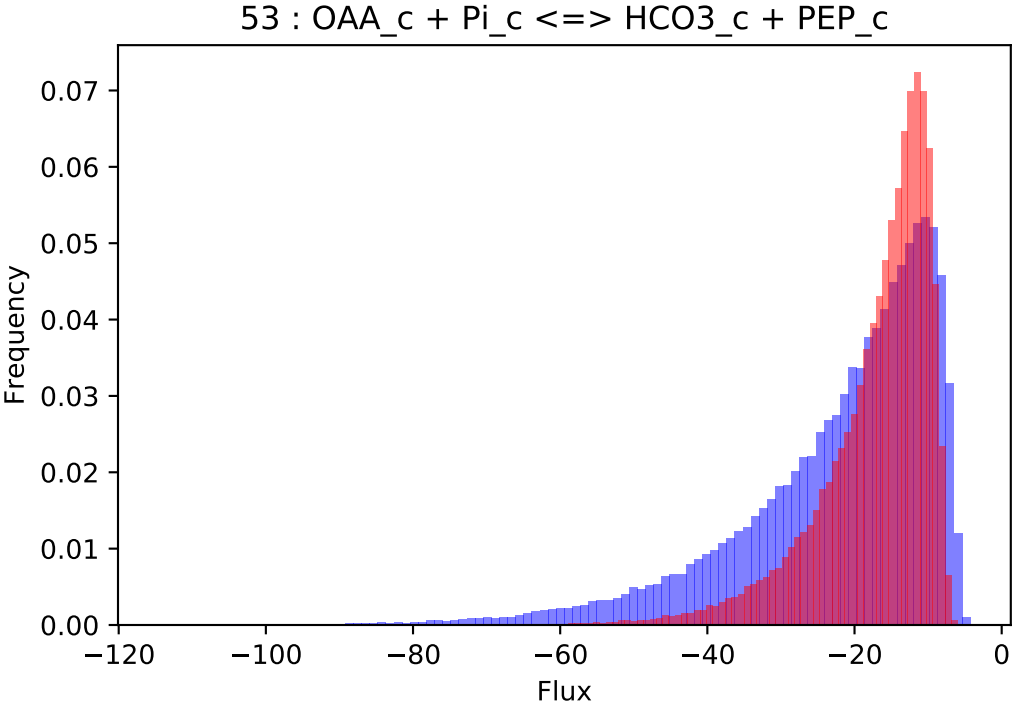

48 : H2O_c + UDPG_c --> UDP_c + cellulose1_c
Frequency
0.00
0.02
0.04
0.06
0.08
0.10
0.00
0.05
0.10
0.15
0.20
0.25
0.30
Flux

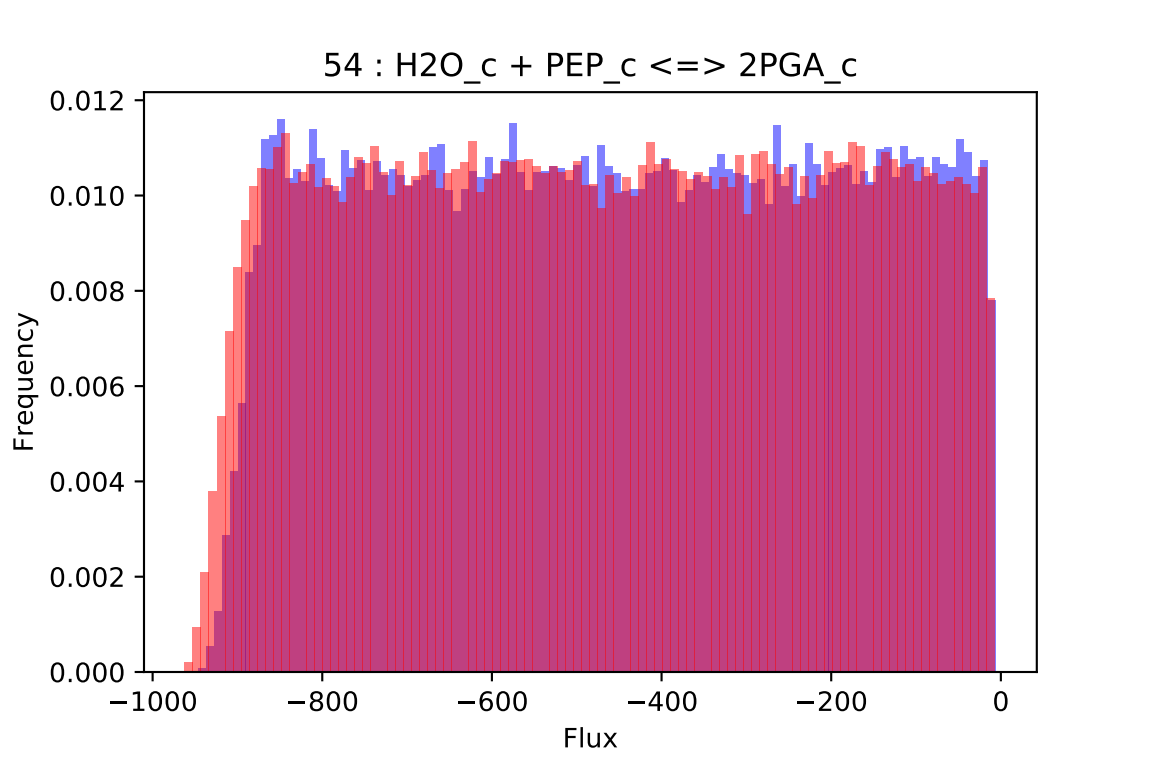

49 : UDPG_c + cellulose1_c --> UDP_c + cellulose2_c
Frequency
0.00
0.02
0.04
0.06
0.08
0.10
0.00
0.05
0.10
0.15
0.20
0.25
0.30
Flux

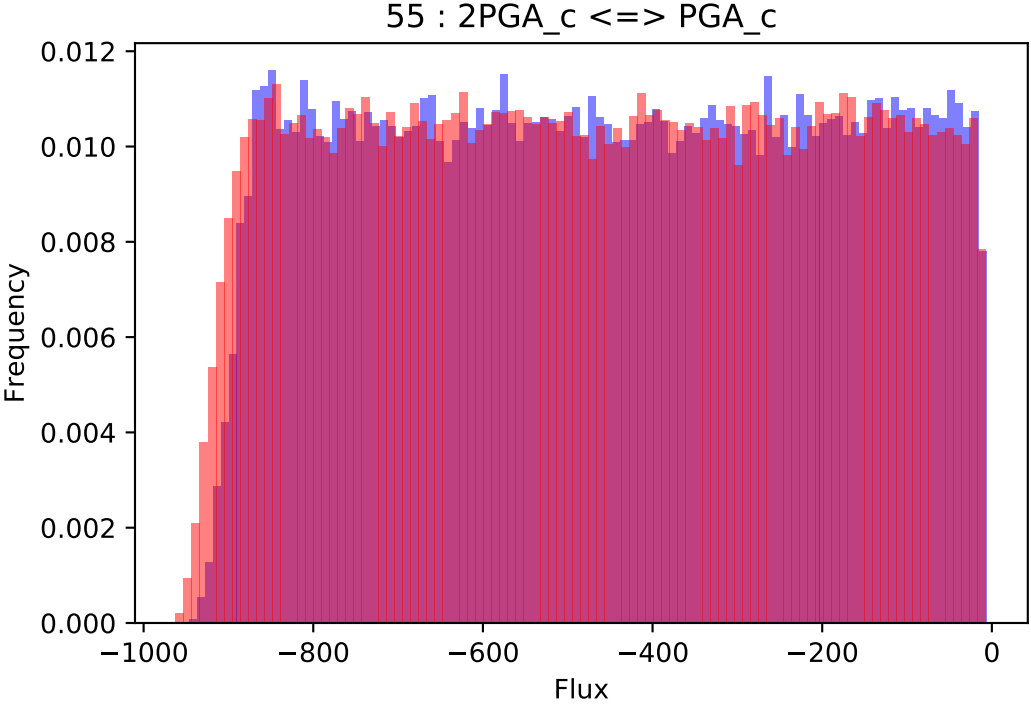

50 : UDPG_c + cellulose2_c --> UDP_c + cellulose3_c
Frequency
0.00
0.02
0.04
0.06
0.08
0.10
0.00
0.05
0.10
0.15
0.20
0.25
0.30
Flux

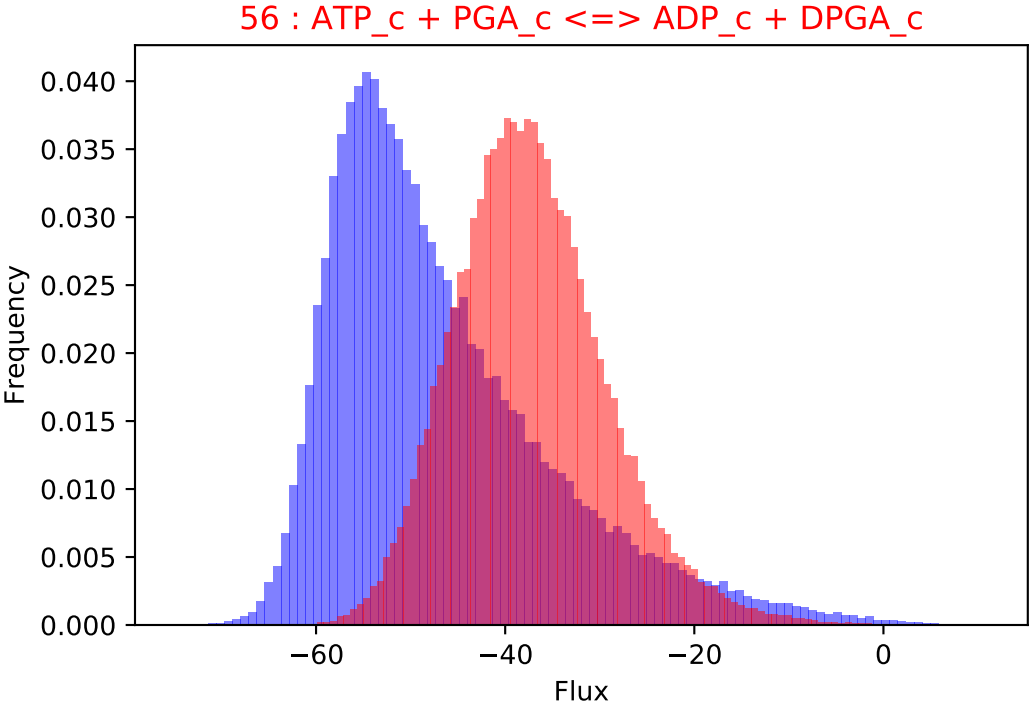

51 : Mal_c + NAD_c <=> NADH_c + OAA_c
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
50
100
150
200
Flux

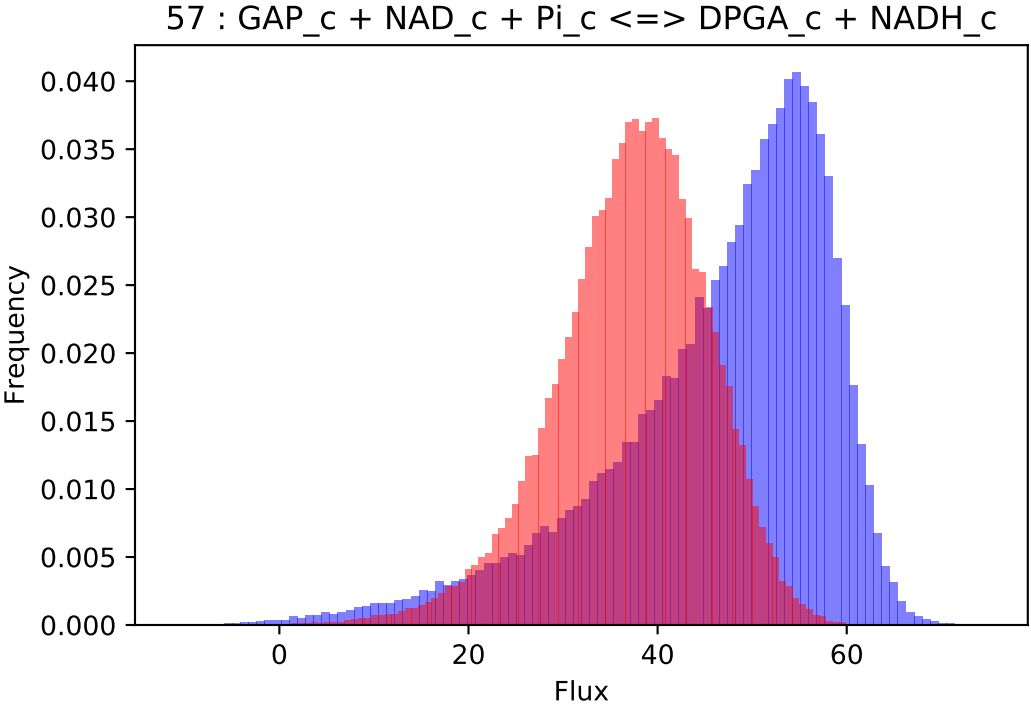

52 : ATP_c + OAA_c --> ADP_c + CO2_c + PEP_c
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0
20
40
60
80
100
Flux

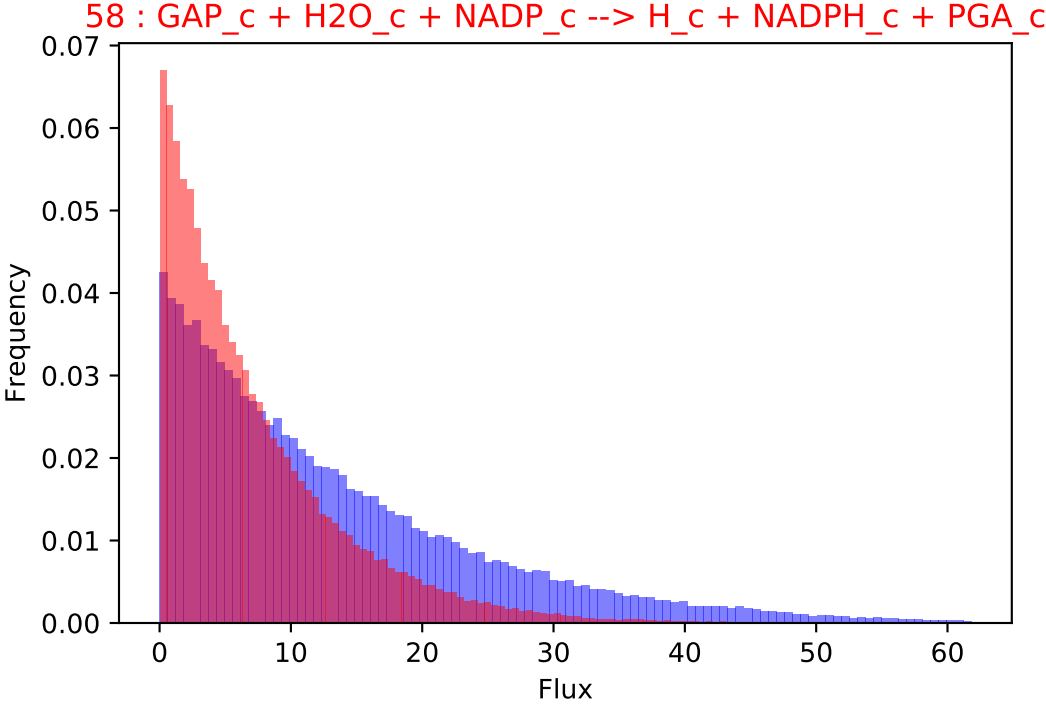

53 : OAA_c + Pi_c <=> HCO3_c + PEP_c
Frequency
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
−120
−100
−80
−60
−40
−20
0
Flux

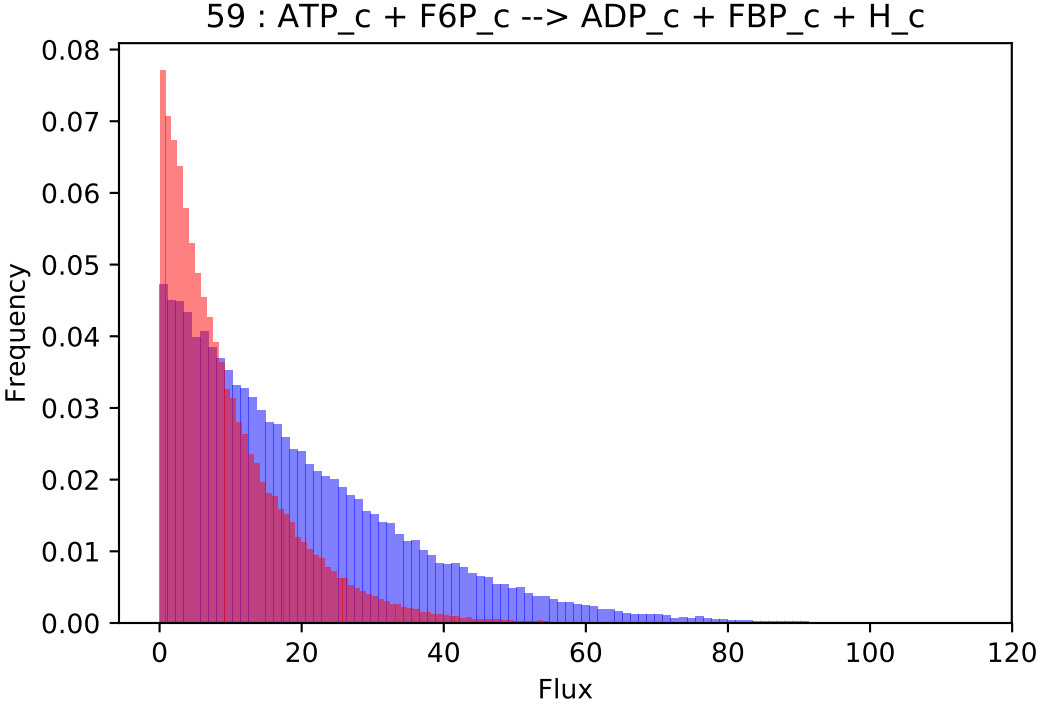

54 : H2O_c + PEP_c <=> 2PGA_c
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Frequency
−1000
−800
−600
−400
−200
0
Flux

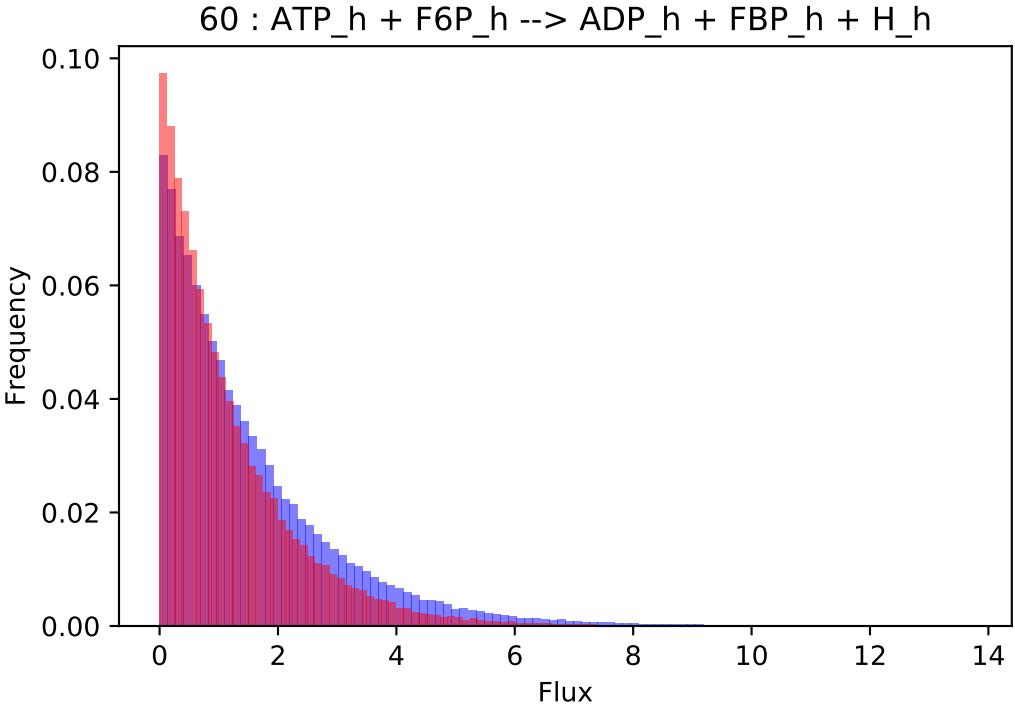

55 : 2PGA_c <=> PGA_c
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Frequency
−1000
−800
−600
−400
−200
0
Flux

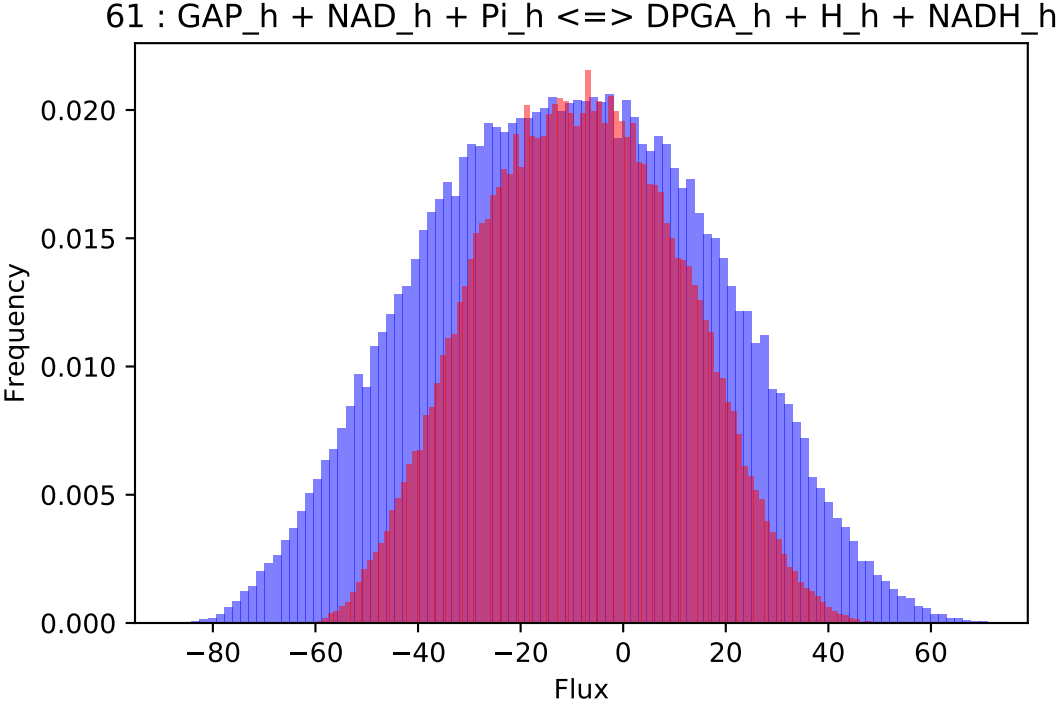

56 : ATP_c + PGA_c <=> ADP_c + DPGA_c
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
−60
−40
−20
0
Flux

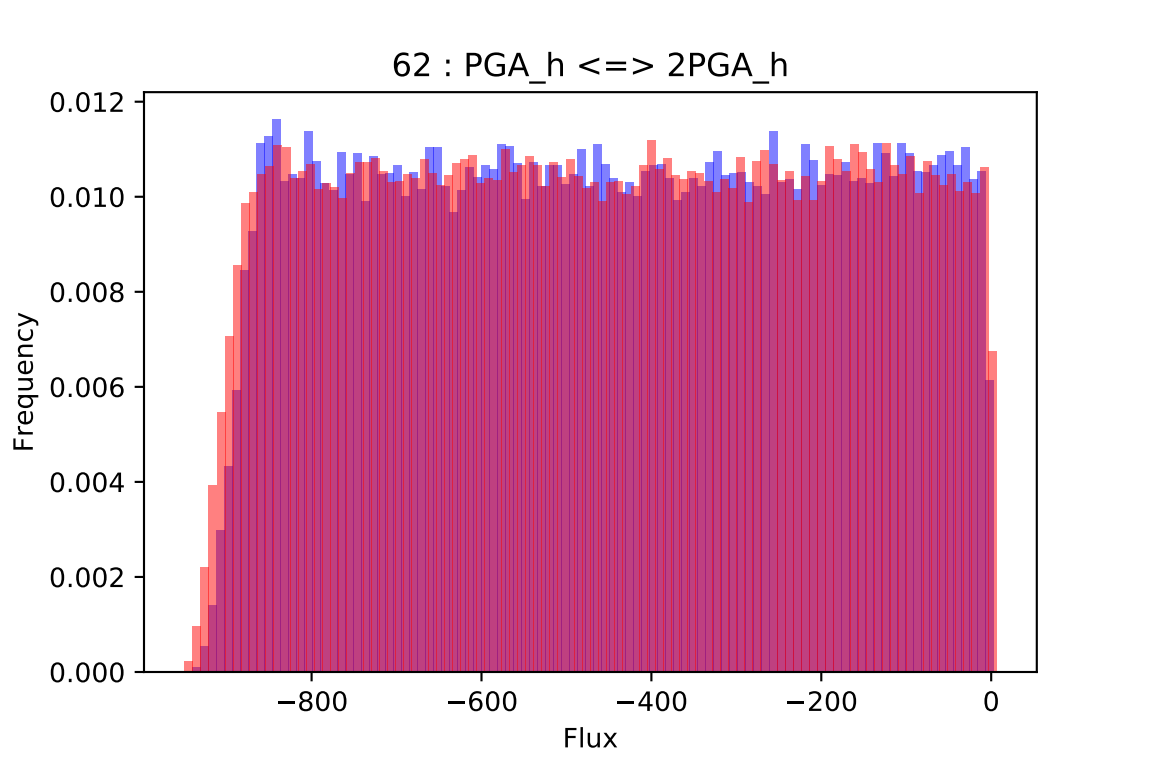

57 : GAP_c + NAD_c + Pi_c <=> DPGA_c + NADH_c
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
0
20
40
60
Flux

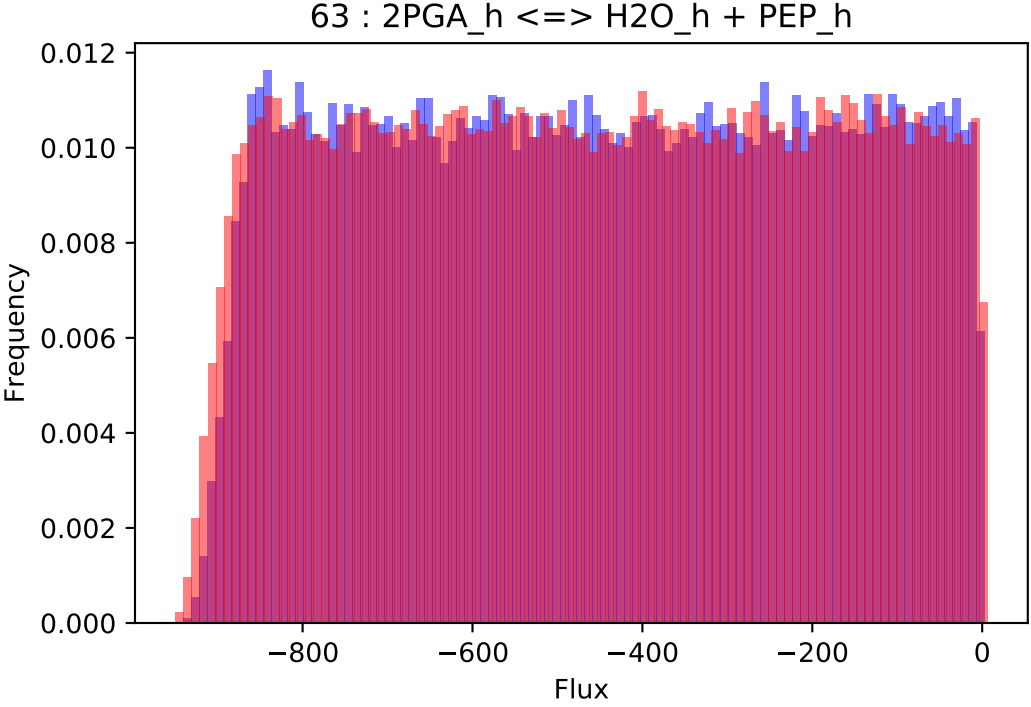

58 : GAP_c + H2O_c + NADP_c --> H_c + NADPH_c + PGA_c
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
0
10
20
30
40
50
60
Flux

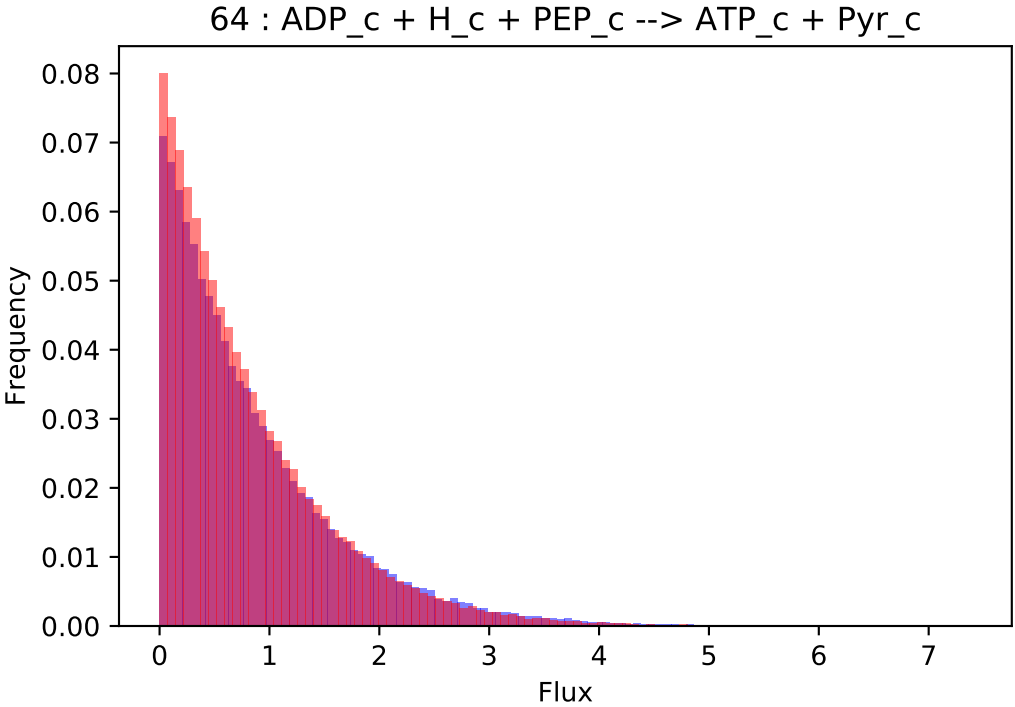

59 : ATP_c + F6P_c --> ADP_c + FBP_c + H_c
Frequency
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
0
20
40
60
80
100
120
Flux

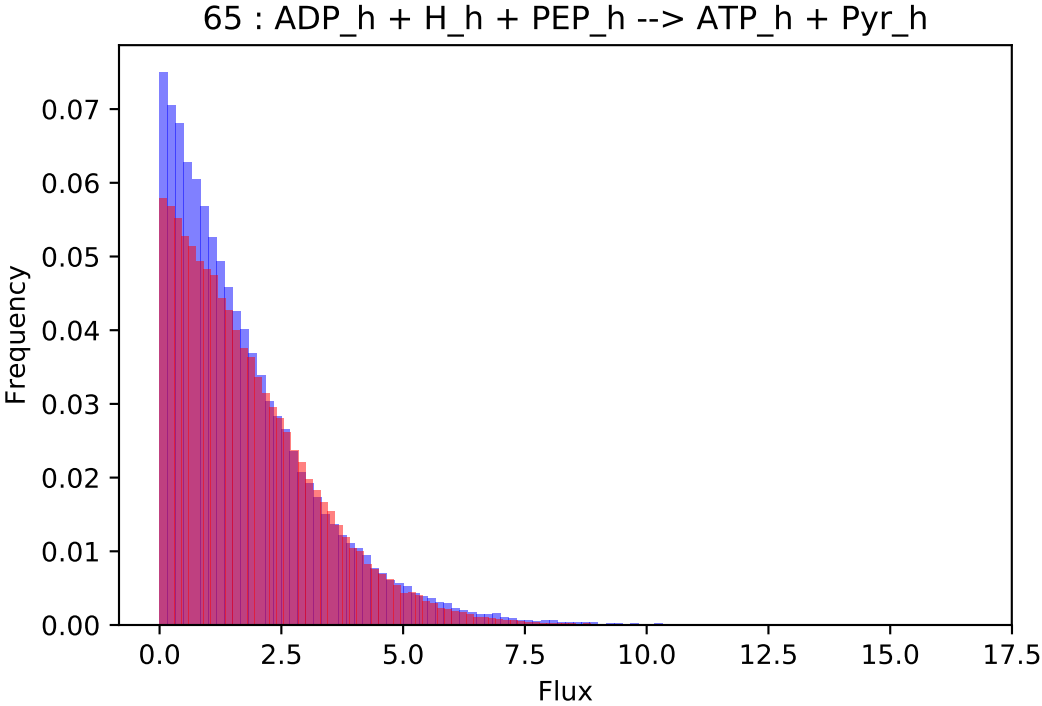

60 : ATP_h + F6P_h --> ADP_h + FBP_h + H_h
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0
2
4
6
8
10
12
14
Flux

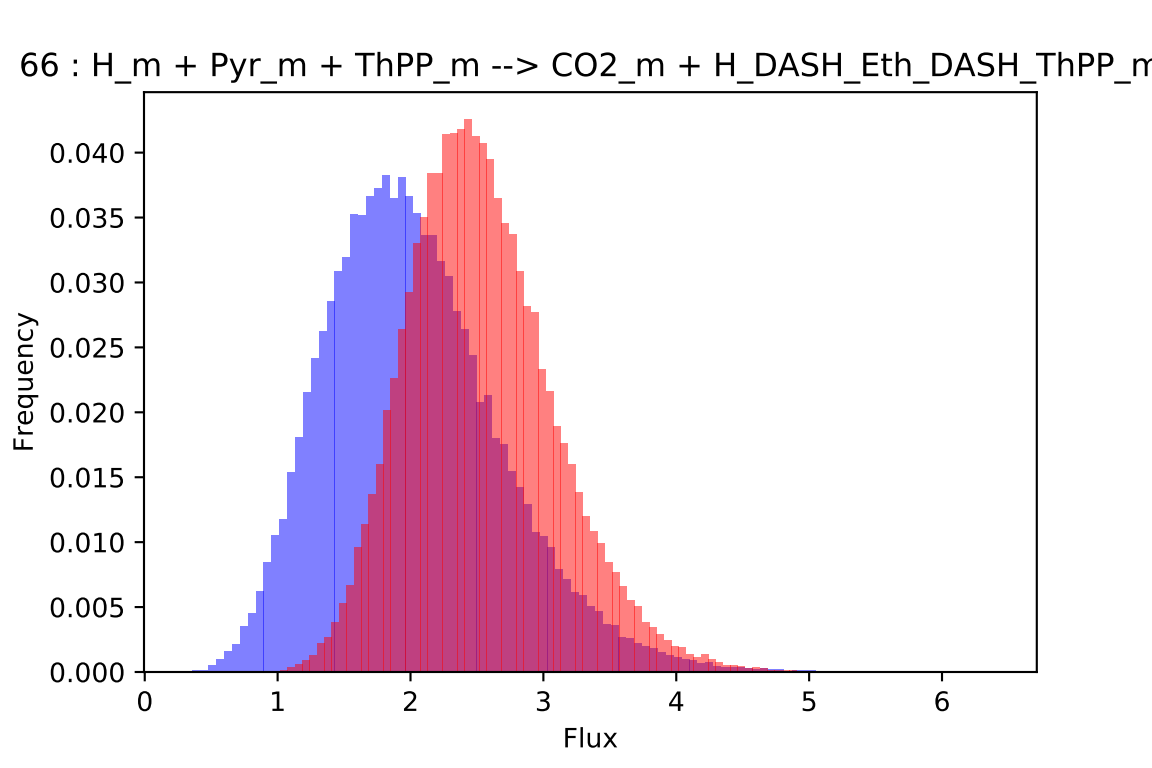

61 : GAP_h + NAD_h + Pi_h <=> DPGA_h + H_h + NADH_h
0.020
0.015
0.010
0.005
0.000
Frequency
−80
−60
−40
−20
0
20
40
60
Flux

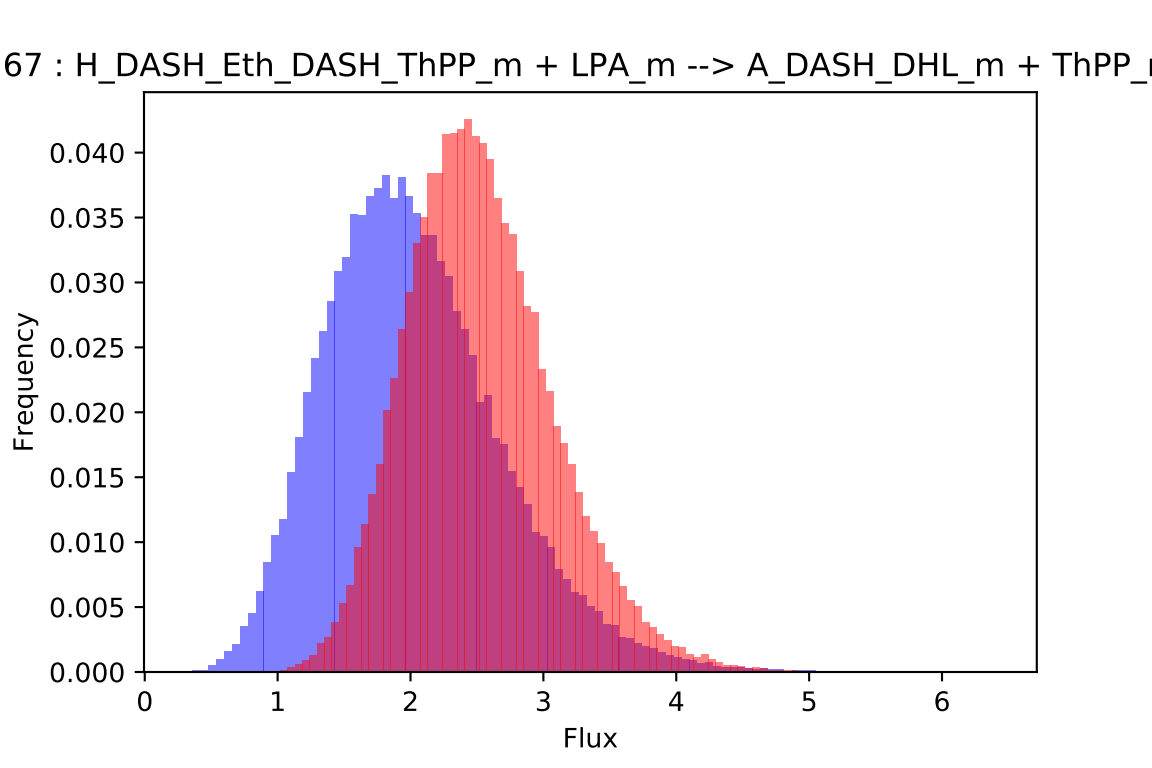

62 : PGA_h <=> 2PGA_h
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Frequency
−800
−600
−400
−200
0
Flux

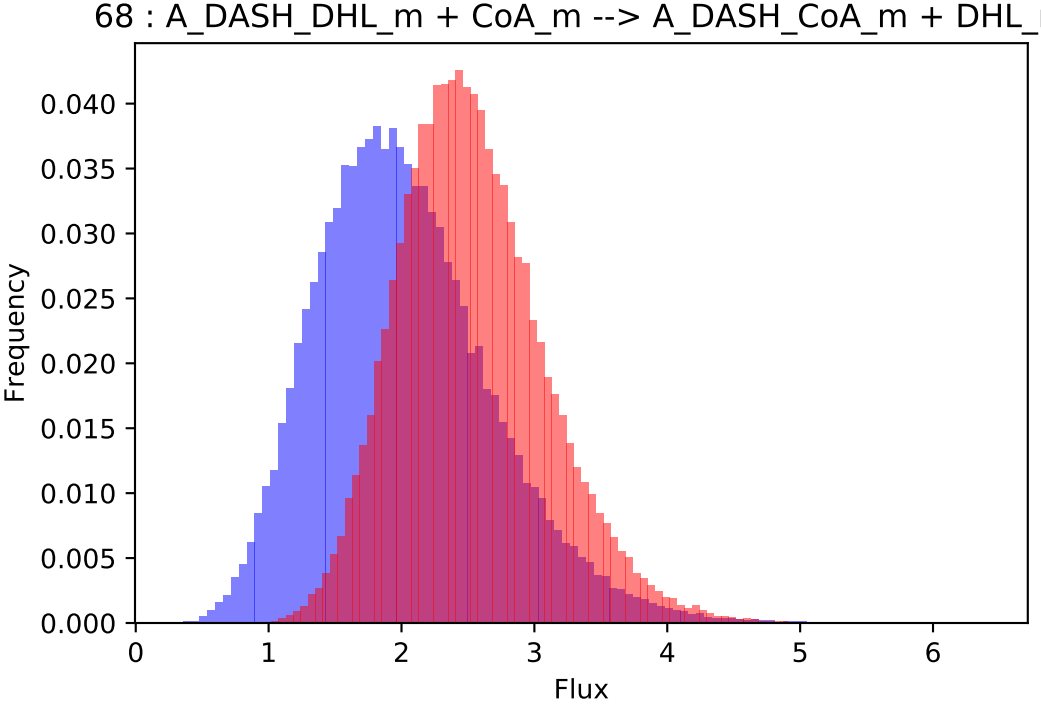

63 : 2PGA_h <=> H2O_h + PEP_h
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Frequency
−800
−600
−400
−200
0
Flux

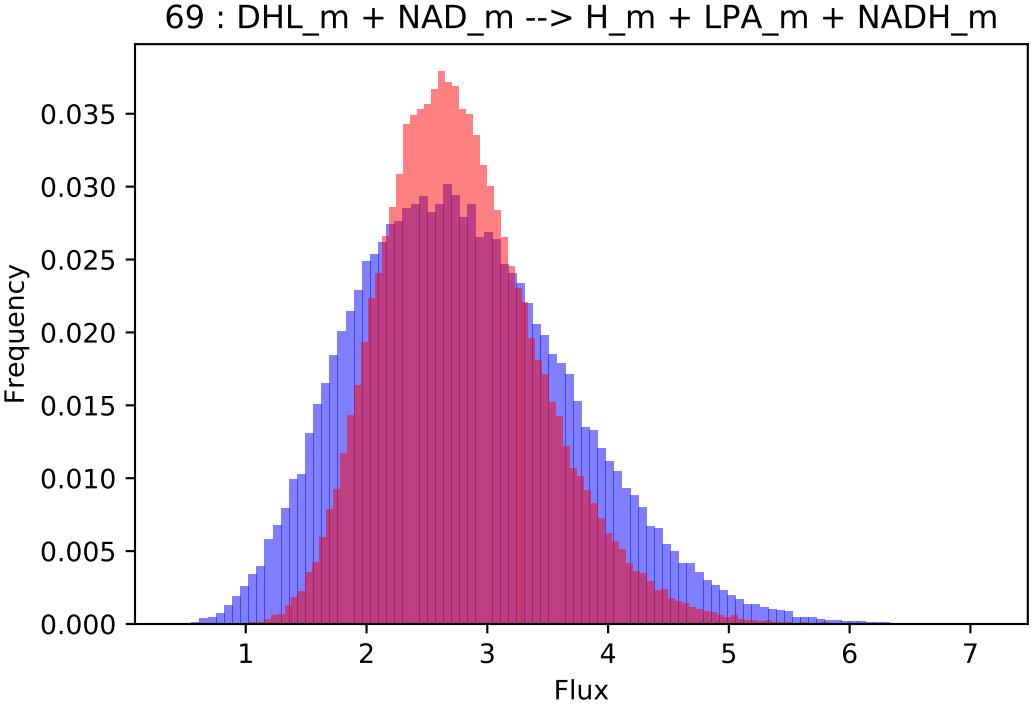

64 : ADP_c + H_c + PEP_c --> ATP_c + Pyr_c
Frequency
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0
1
2
3
4
5
6
7
Flux

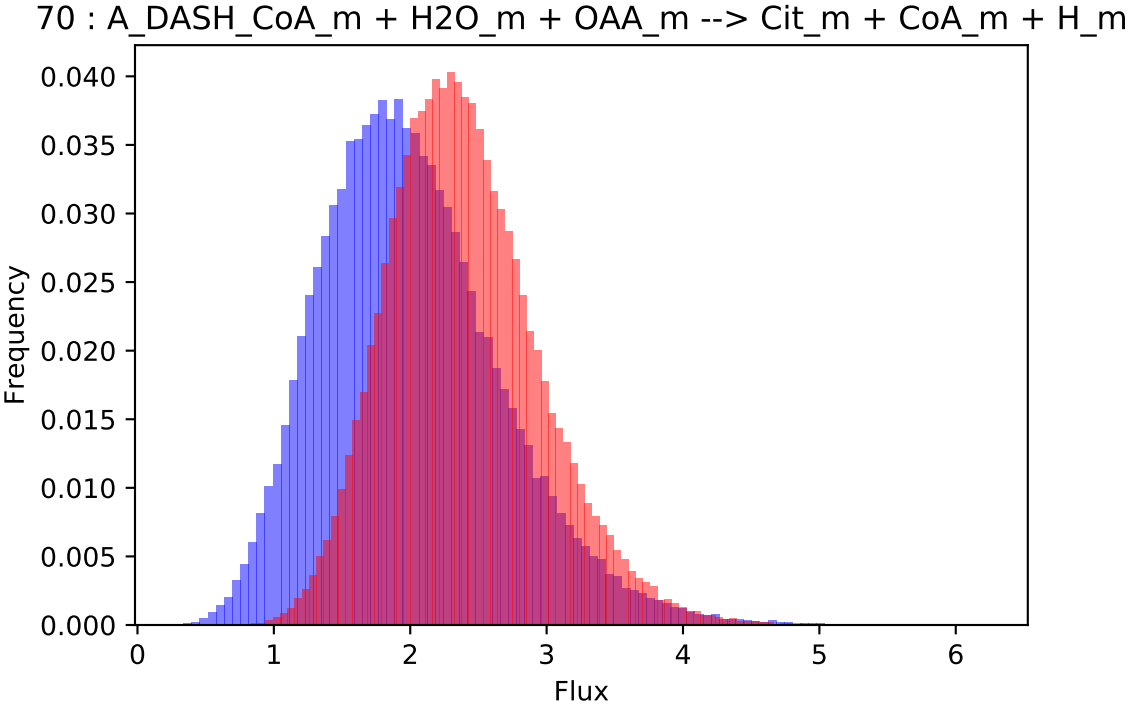

65 : ADP_h + H_h + PEP_h --> ATP_h + Pyr_h
Frequency
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
Flux

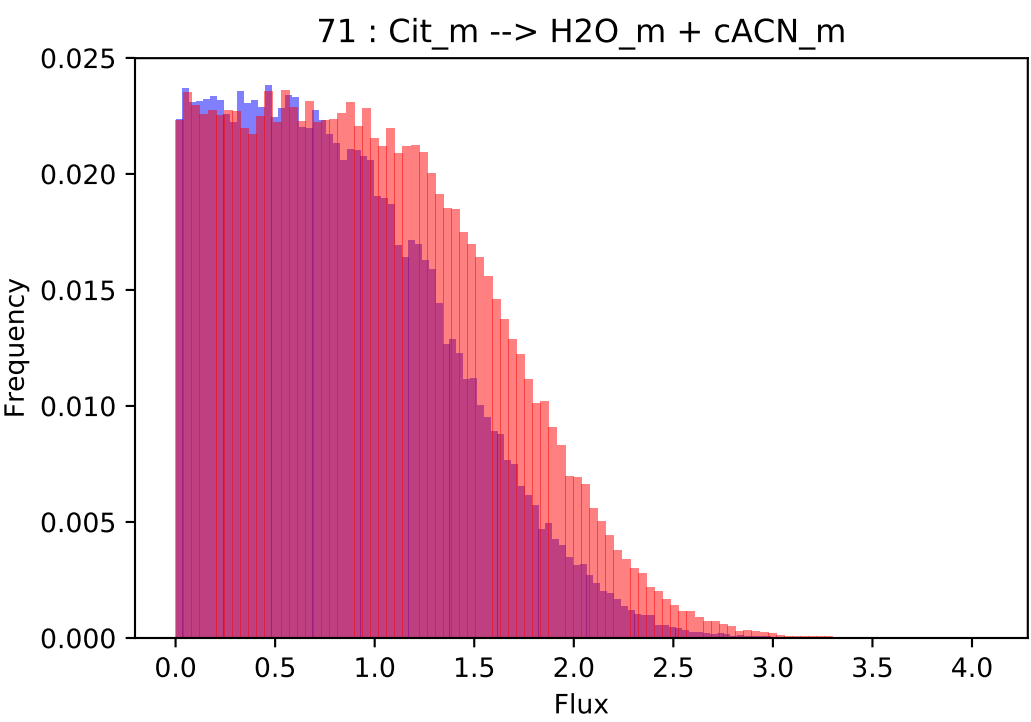

66 : H_m + Pyr_m + ThPP_m --> CO2_m + H_DASH_Eth_DASH_ThPP_m
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0
1
2
3
4
5
6
Flux

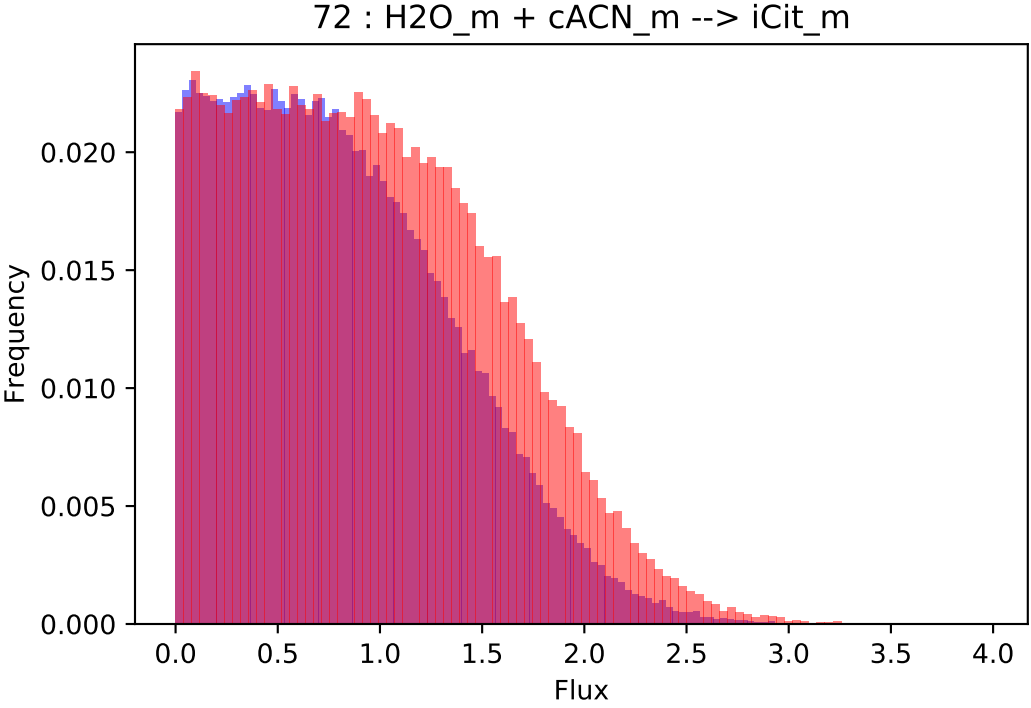

67 : H_DASH_Eth_DASH_ThPP_m + LPA_m --> A_DASH_DHL_m + ThPP_
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0
1
2
3
4
5
6
Flux

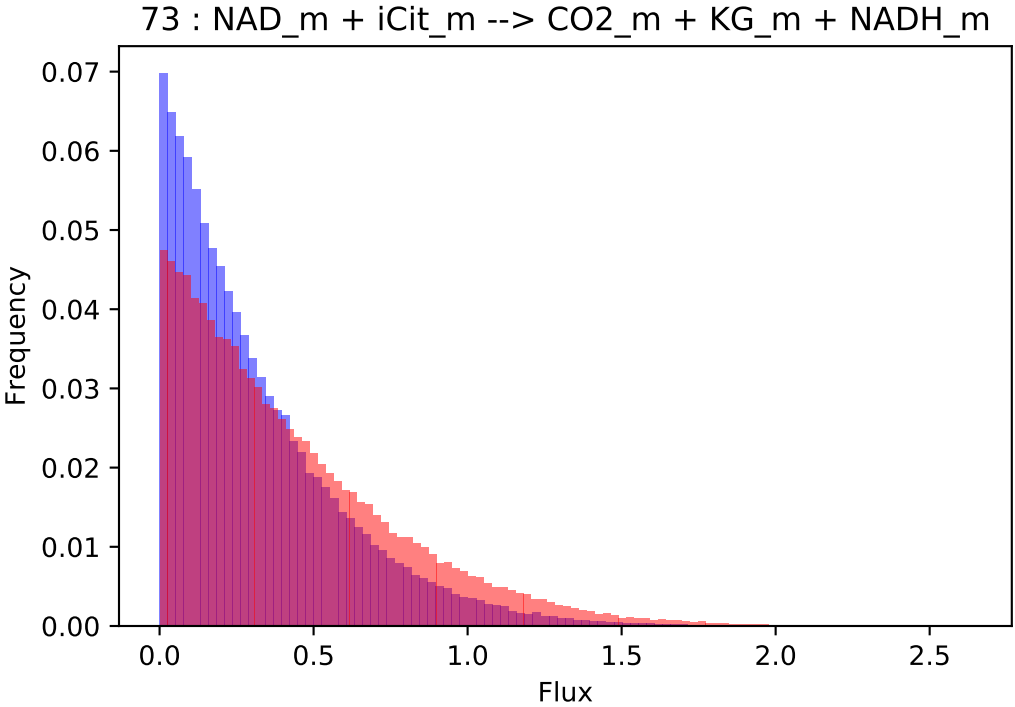

68 : A_DASH_DHL_m + CoA_m --> A_DASH_CoA_m + DHL_m
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0
1
2
3
4
5
6
Flux

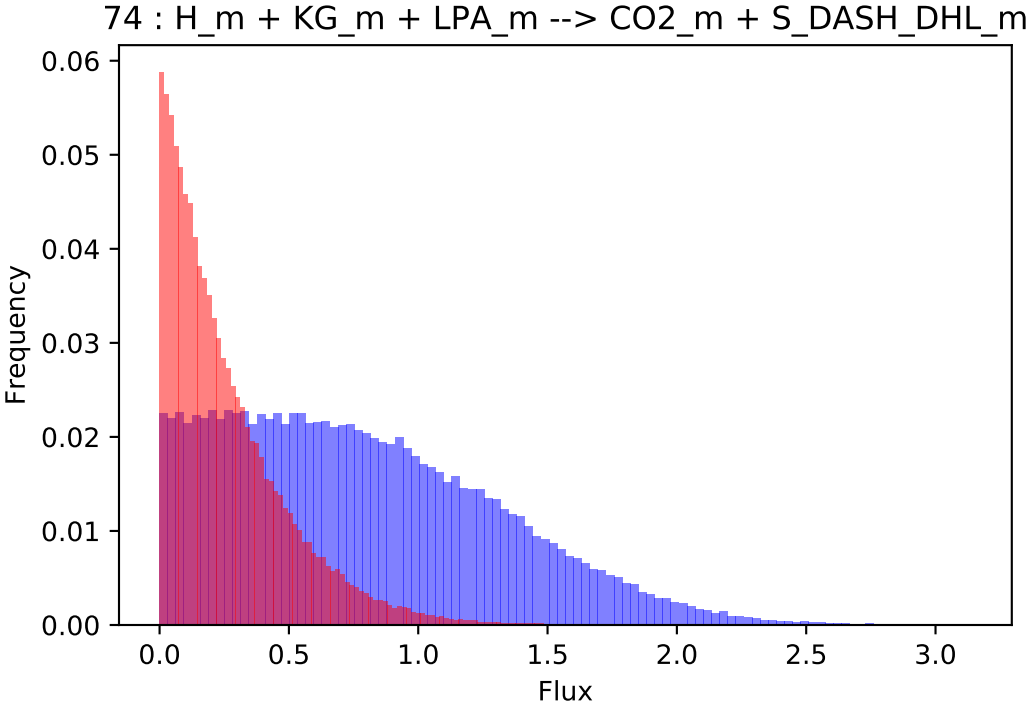

69 : DHL_m + NAD_m --> H_m + LPA_m + NADH_m
Frequency
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
1
2
3
4
5
6
7
Flux

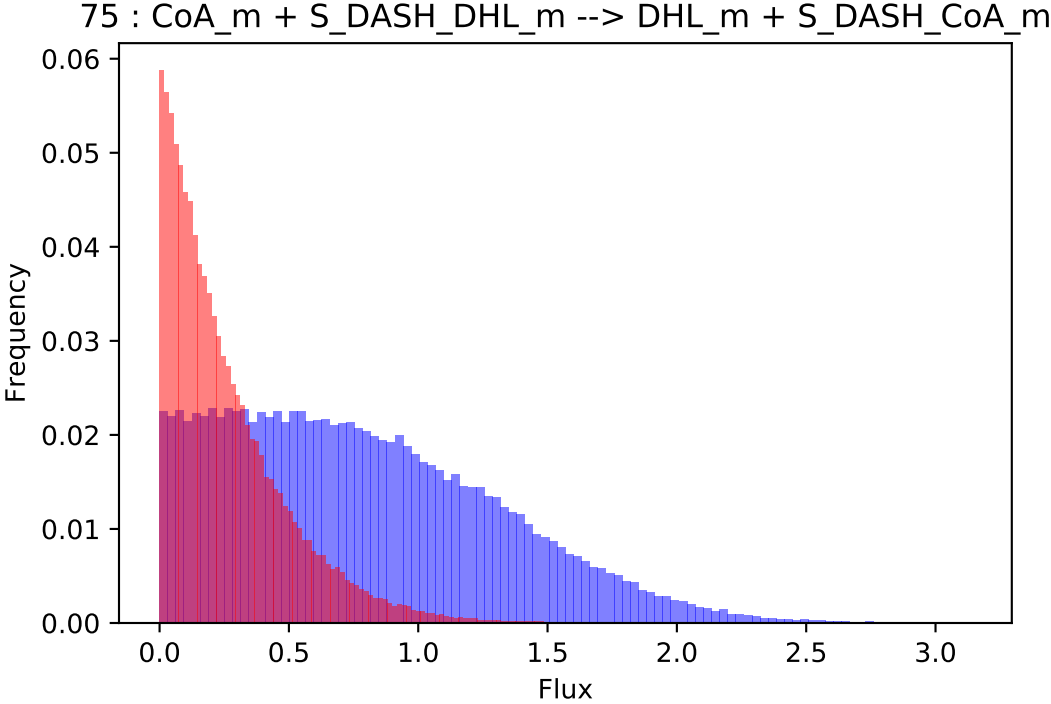

70 : A_DASH_CoA_m + H2O_m + OAA_m --> Cit_m + CoA_m + H_m
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0
1
2
3
4
5
6
Flux

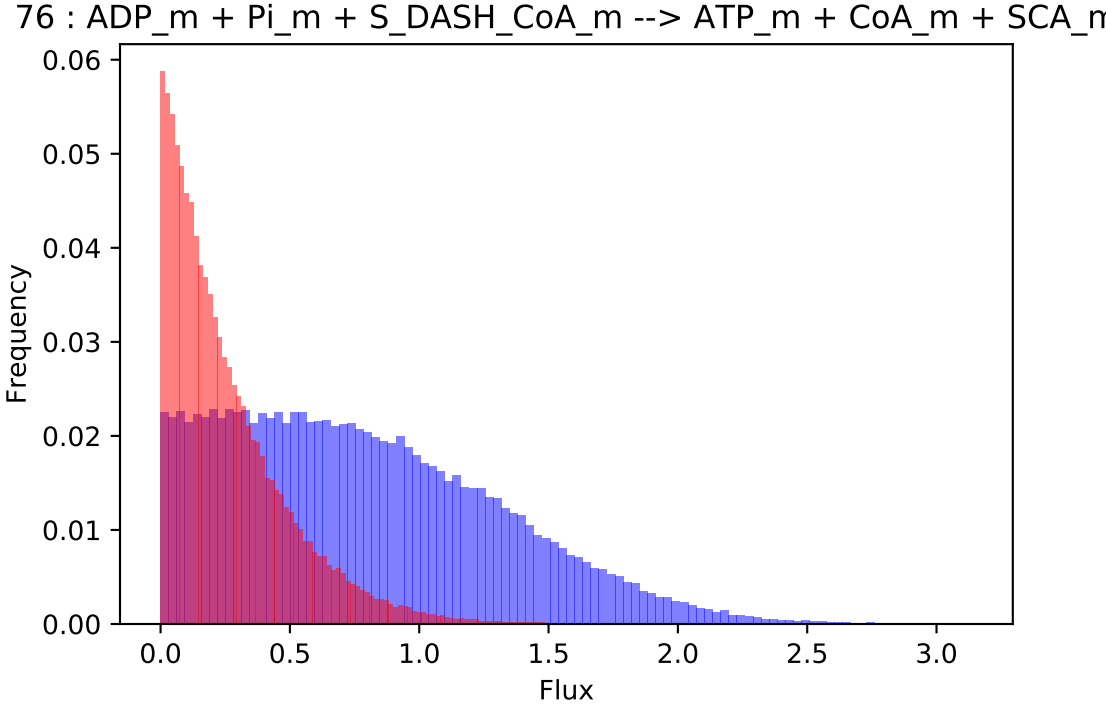

71 : Cit_m --> H2O_m + cACN_m
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Flux

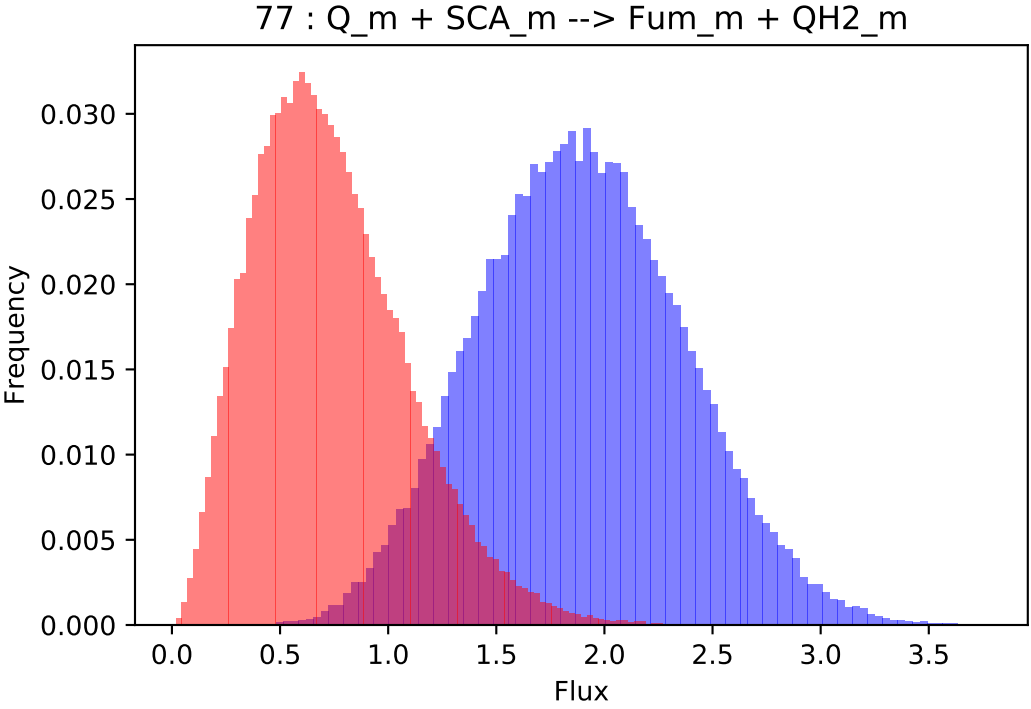

72 : H2O_m + cACN_m --> iCit_m
Frequency
0.000
0.005
0.010
0.015
0.020
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Flux

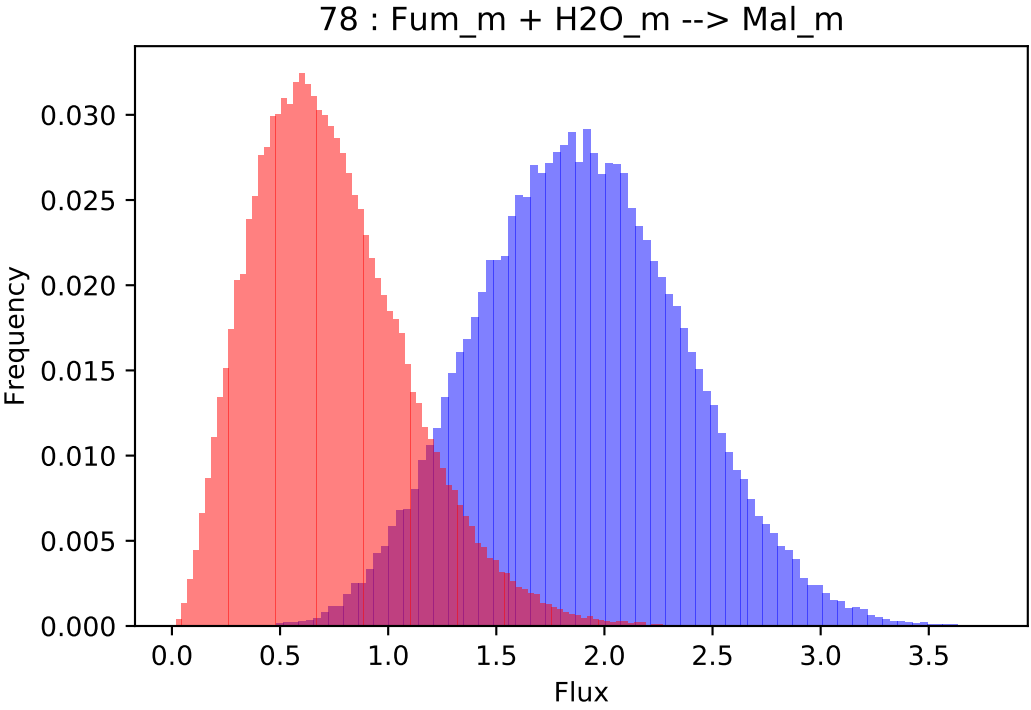

73 : NAD_m + iCit_m --> CO2_m + KG_m + NADH_m
Frequency
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.0
0.5
1.0
1.5
2.0
2.5
Flux

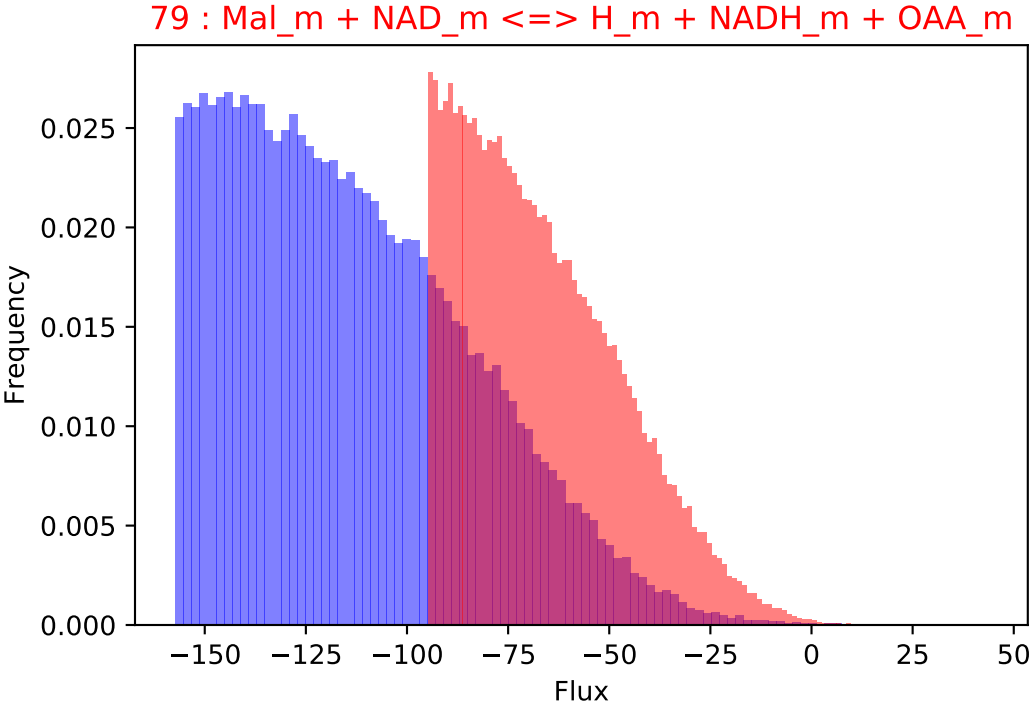

74 : H_m + KG_m + LPA_m --> CO2_m + S_DASH_DHL_m
Frequency
0.06
0.05
0.04
0.03
0.02
0.01
0.00
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Flux

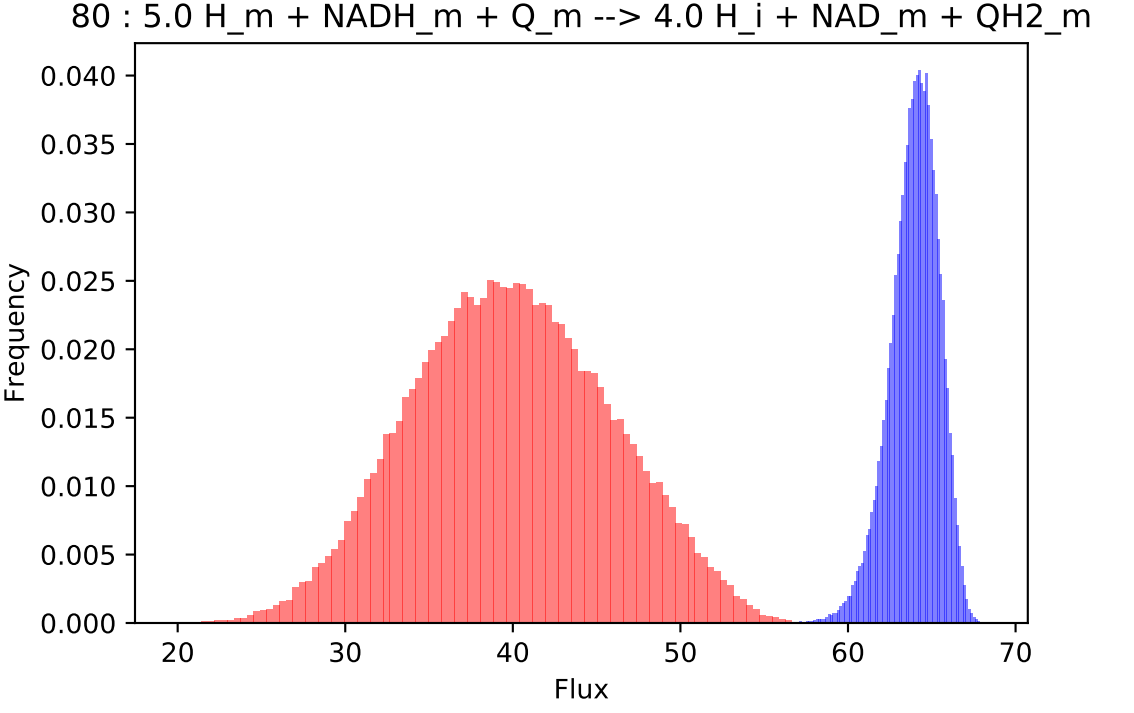

75 : CoA_m + S_DASH_DHL_m --> DHL_m + S_DASH_CoA_m
Frequency
0.06
0.05
0.04
0.03
0.02
0.01
0.00
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Flux

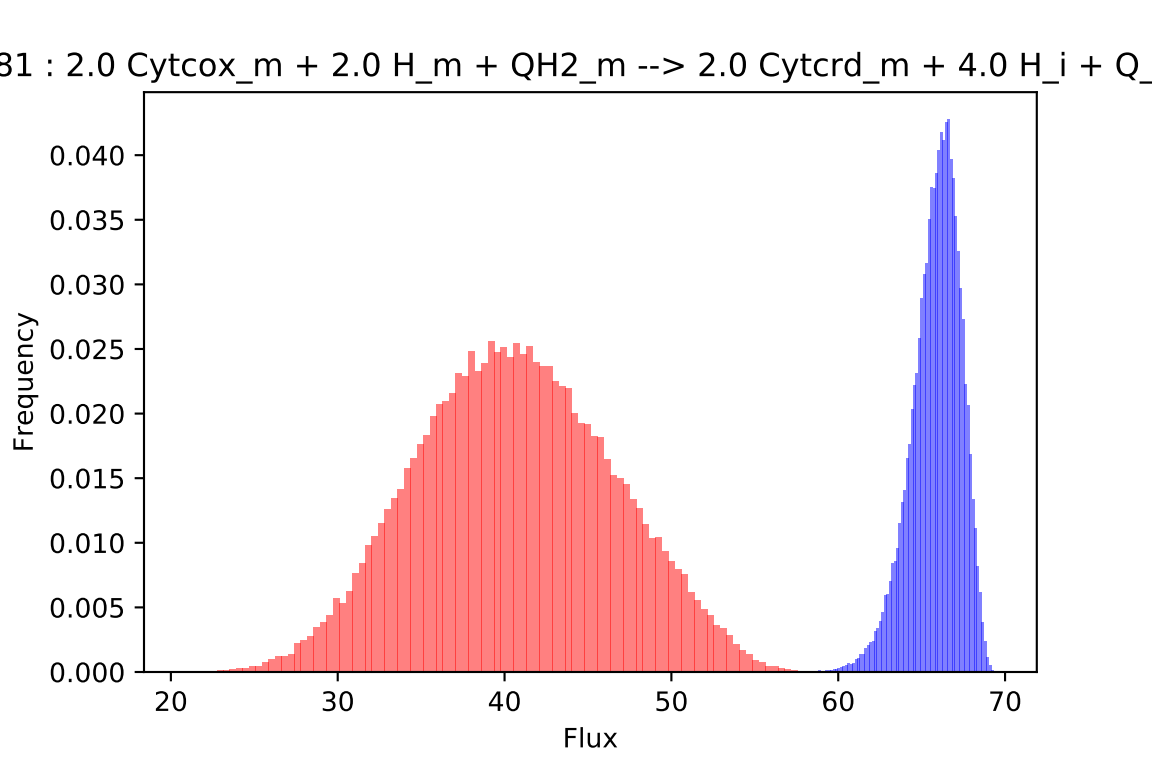

76 : ADP_m + Pi_m + S_DASH_CoA_m --> ATP_m + CoA_m + SCA_m
Frequency
0.06
0.05
0.04
0.03
0.02
0.01
0.00
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Flux

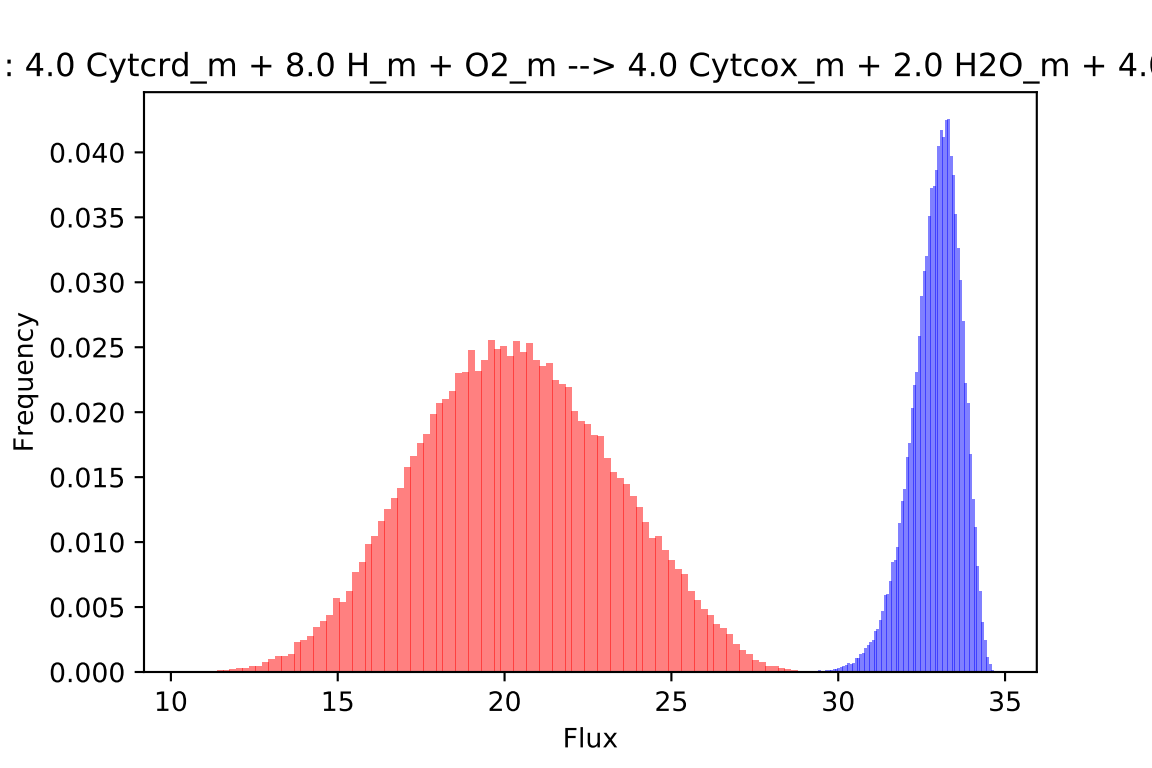

77 : Q_m + SCA_m --> Fum_m + QH2_m
Frequency
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
Flux

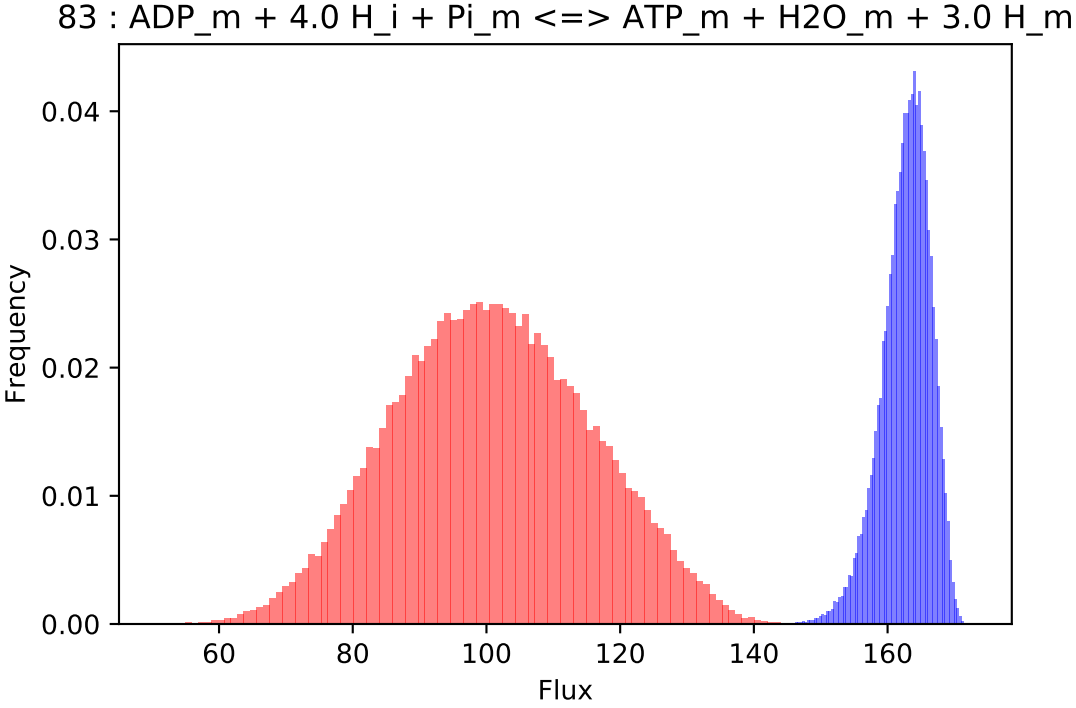

78 : Fum_m + H2O_m --> Mal_m
Frequency
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
Flux

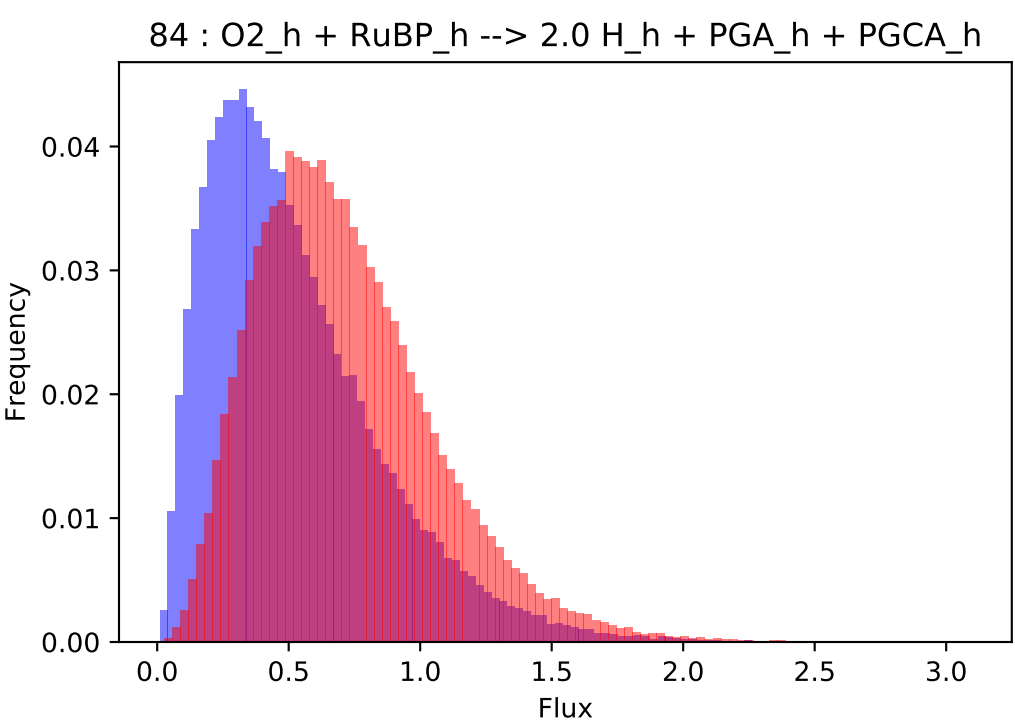

79 : Mal_m + NAD_m <=> H_m + NADH_m + OAA_m
Frequency
0.025
0.020
0.015
0.010
0.005
0.000
−150
−125
−100
−75
−50
−25
0
25
50
Flux

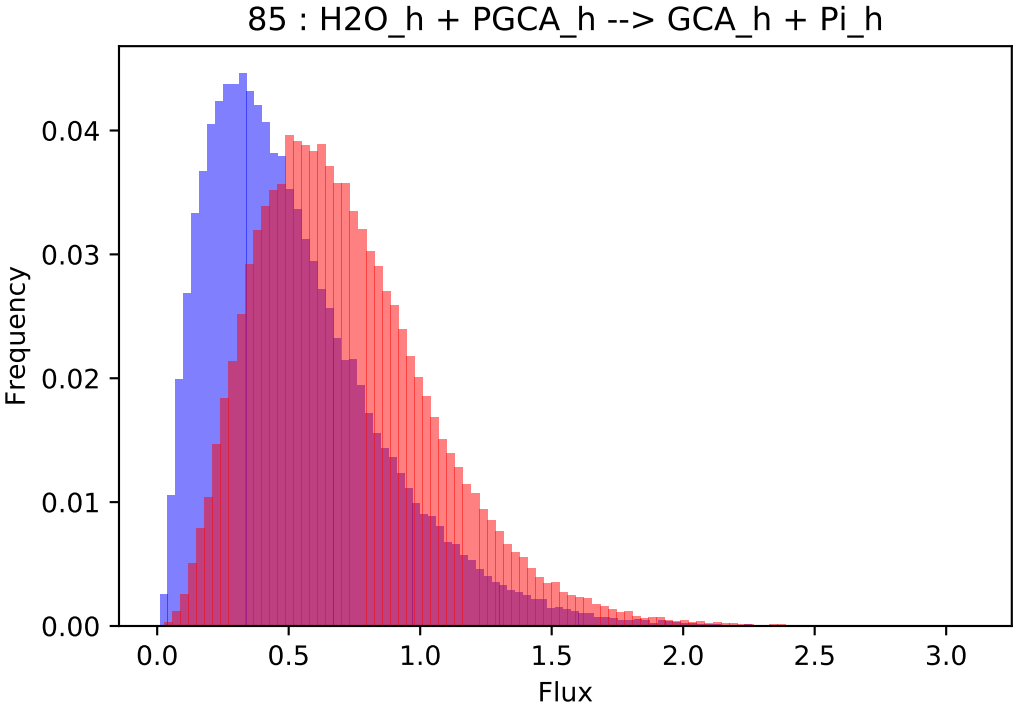

80 : 5.0 H_m + NADH_m + Q_m --> 4.0 H_i + NAD_m + QH2_m
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
20
30
40
50
60
70
Flux

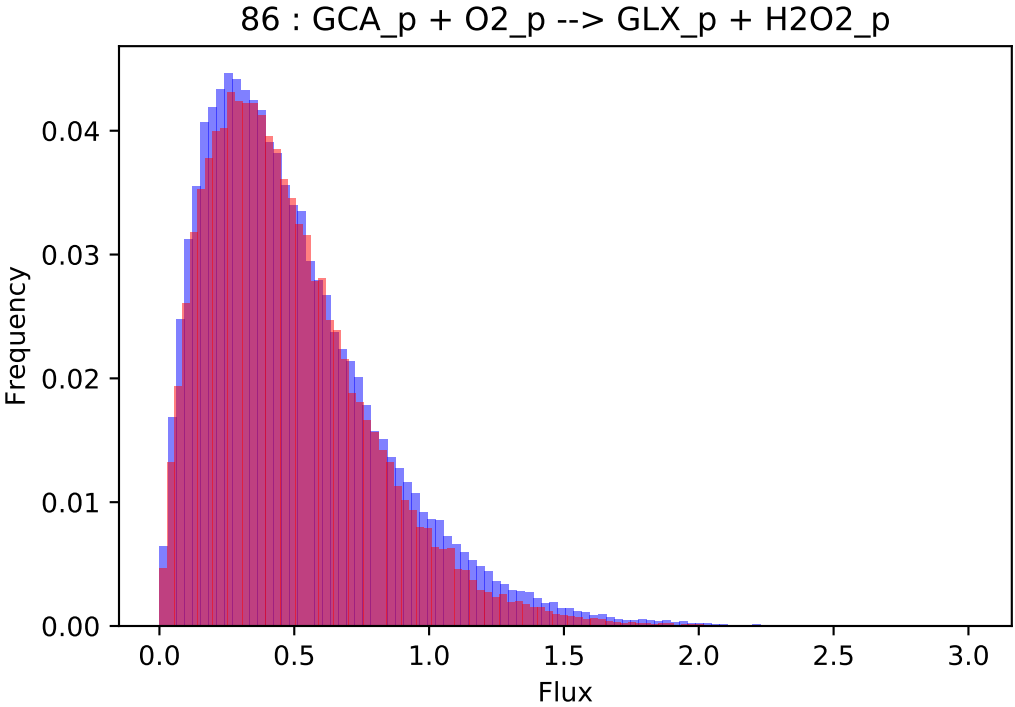

81 : 2.0 Cytcox_m + 2.0 H_m + QH2_m --> 2.0 Cytcrd_m + 4.0 H_i + Q_
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
20
30
40
50
60
70
Flux

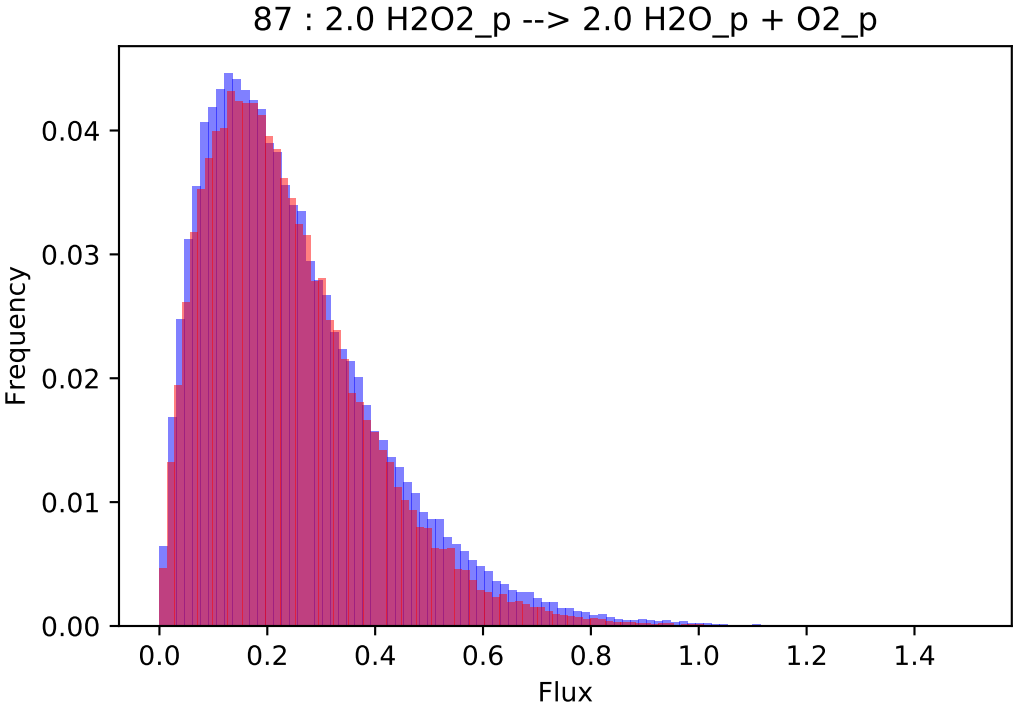

: 4.0 Cytcrd_m + 8.0 H_m + O2_m --> 4.0 Cytcox_m + 2.0 H2O_m + 4.0
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
10
15
20
25
30
35
Flux

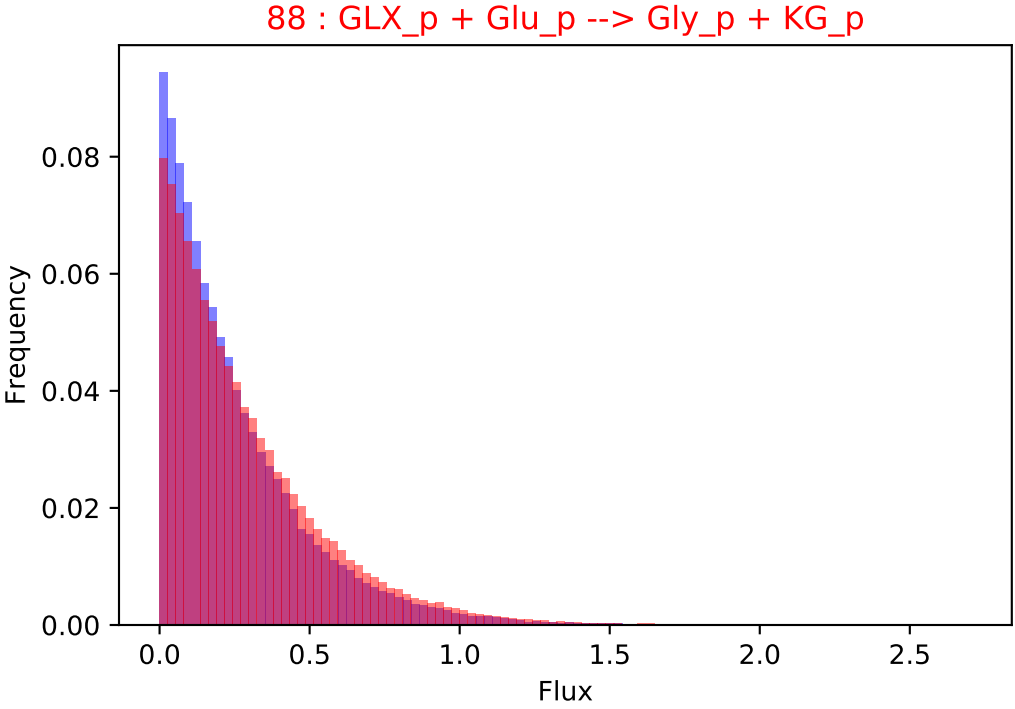

83 : ADP_m + 4.0 H_i + Pi_m <=> ATP_m + H2O_m + 3.0 H_m
Frequency
0.00
0.01
0.02
0.03
0.04
60
80
100
120
140
160
Flux

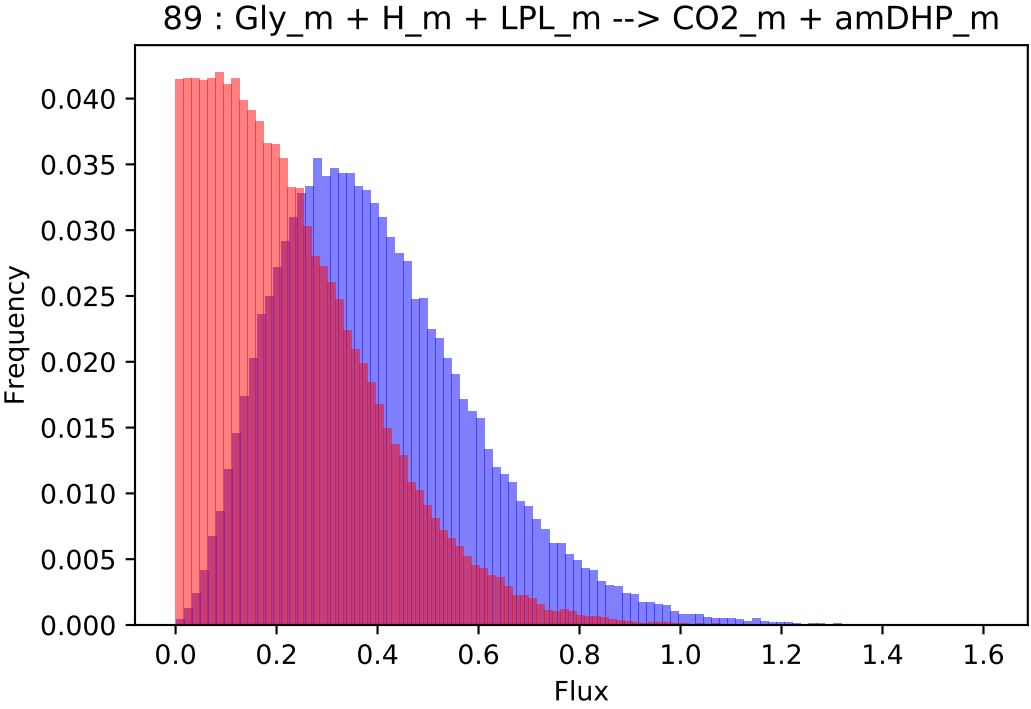

84 : O2_h + RuBP_h --> 2.0 H_h + PGA_h + PGCA_h
Frequency
0.00
0.01
0.02
0.03
0.04
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Flux

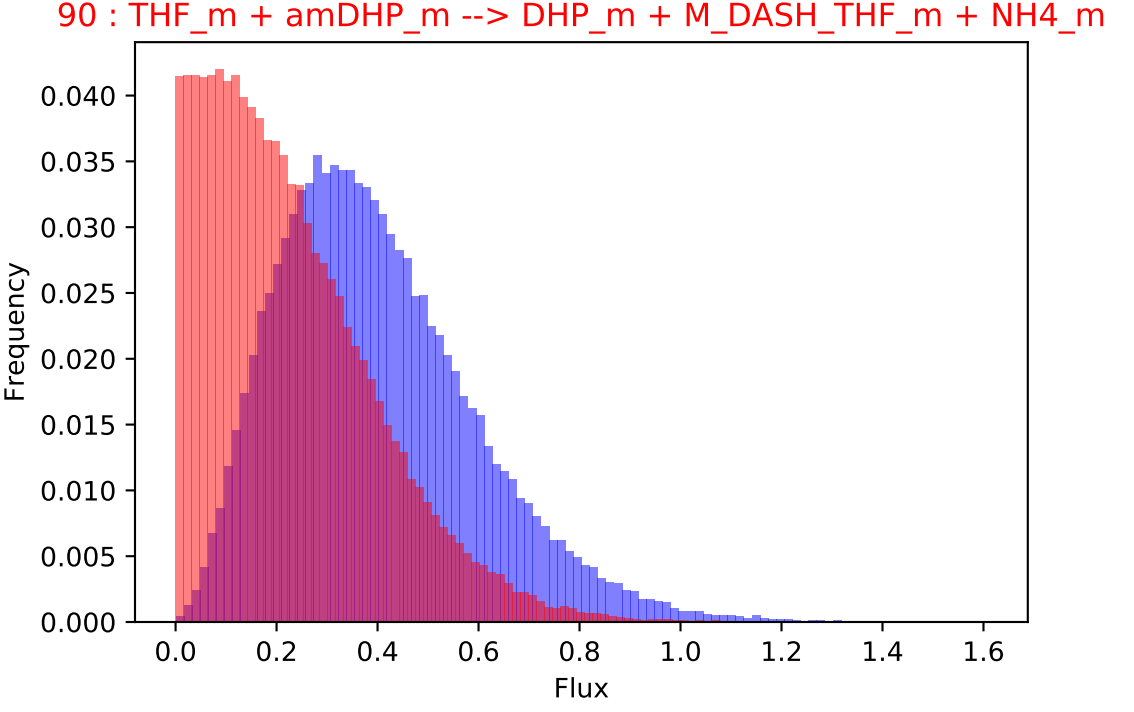

85 : H2O_h + PGCA_h --> GCA_h + Pi_h
Frequency
0.00
0.01
0.02
0.03
0.04
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Flux

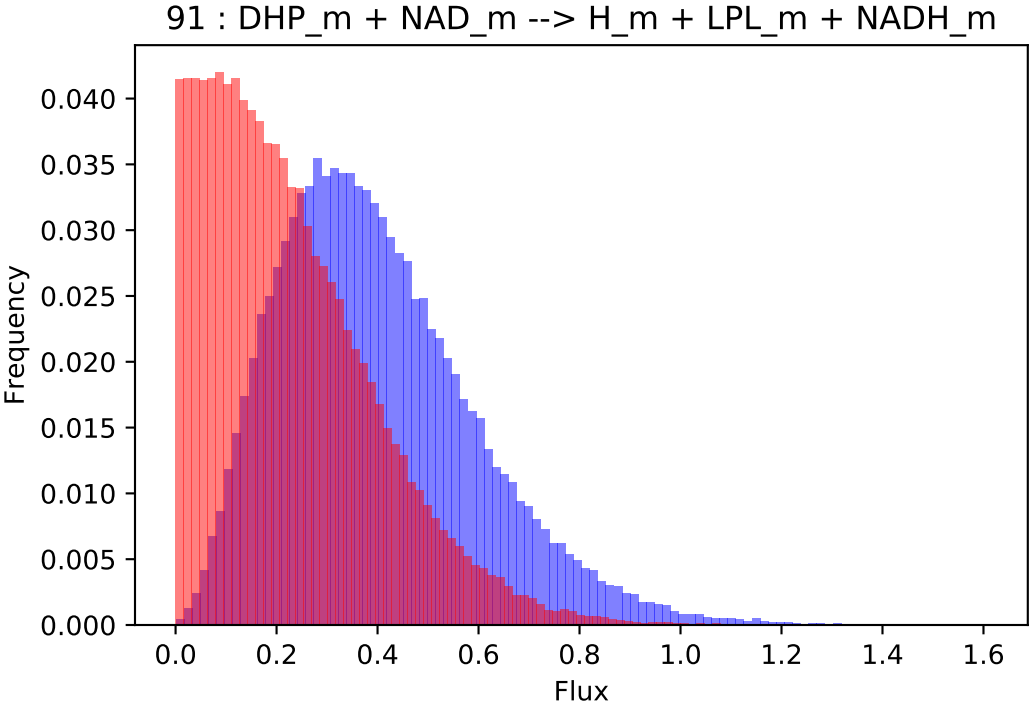

86 : GCA_p + O2_p --> GLX_p + H2O2_p
Frequency
0.00
0.01
0.02
0.03
0.04
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Flux

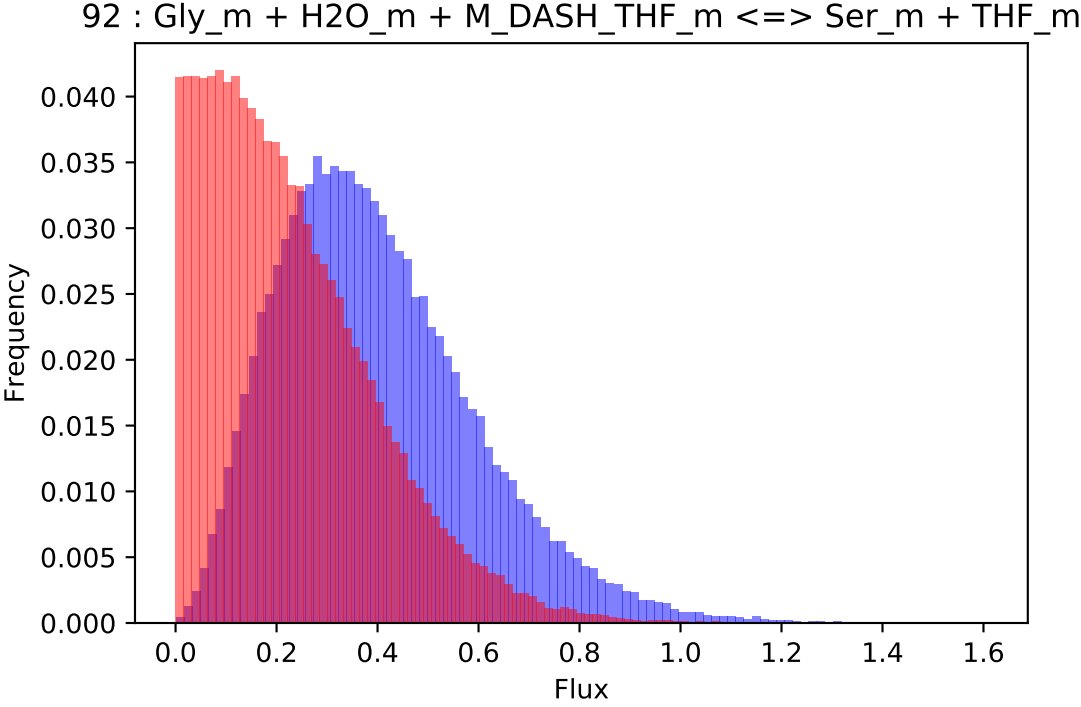

87 : 2.0 H2O2_p --> 2.0 H2O_p + O2_p
Frequency
0.00
0.01
0.02
0.03
0.04
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
Flux

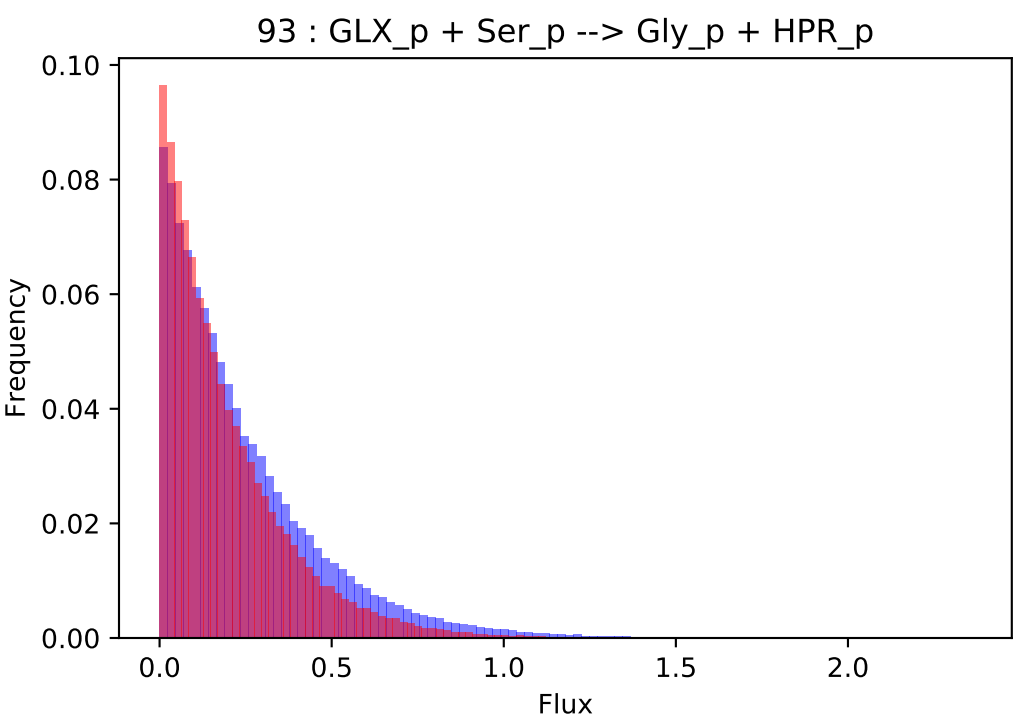

88 : GLX_p + Glu_p --> Gly_p + KG_p
Frequency
0.00
0.02
0.04
0.06
0.08
0.0
0.5
1.0
1.5
2.0
2.5
Flux

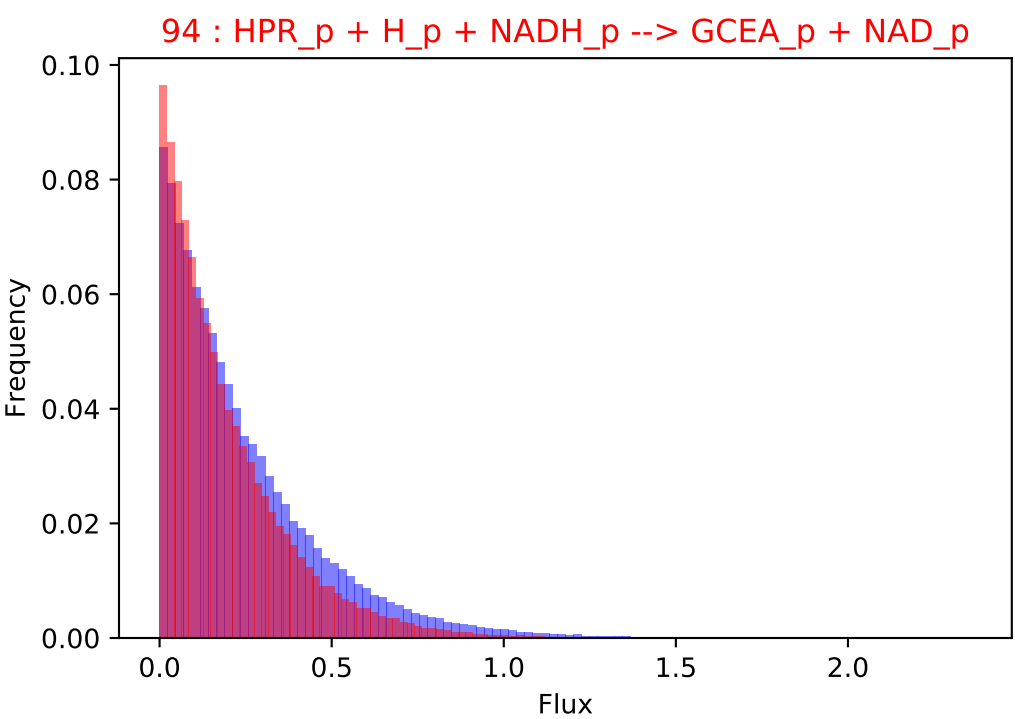

89 : Gly_m + H_m + LPL_m --> CO2_m + amDHP_m
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
Flux

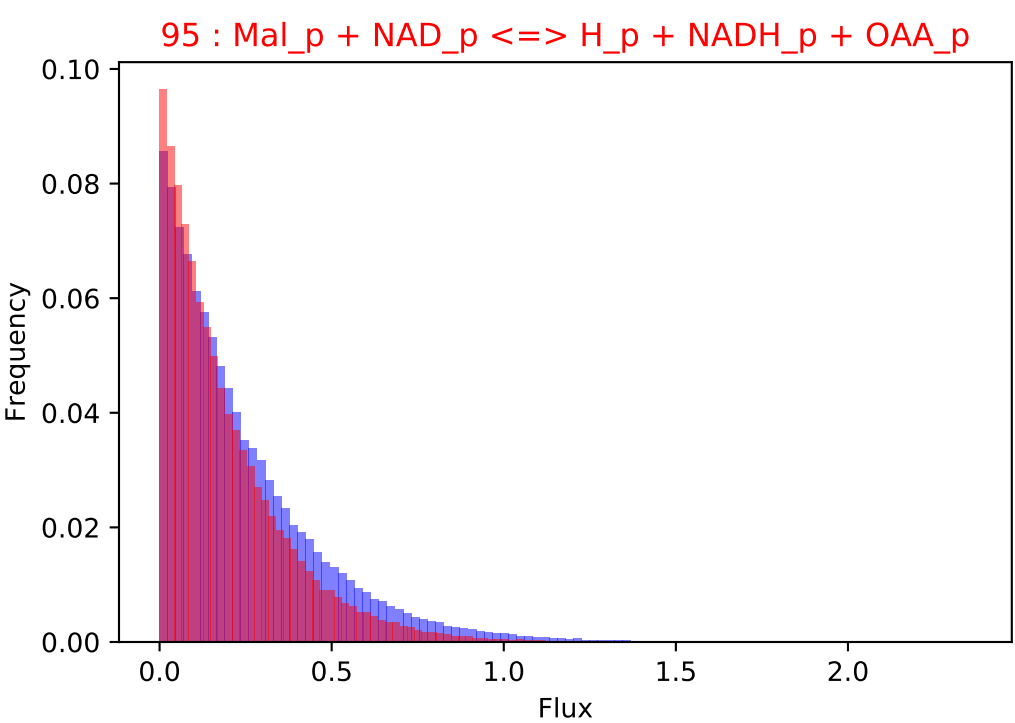

90 : THF_m + amDHP_m --> DHP_m + M_DASH_THF_m + NH4_m
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
Flux

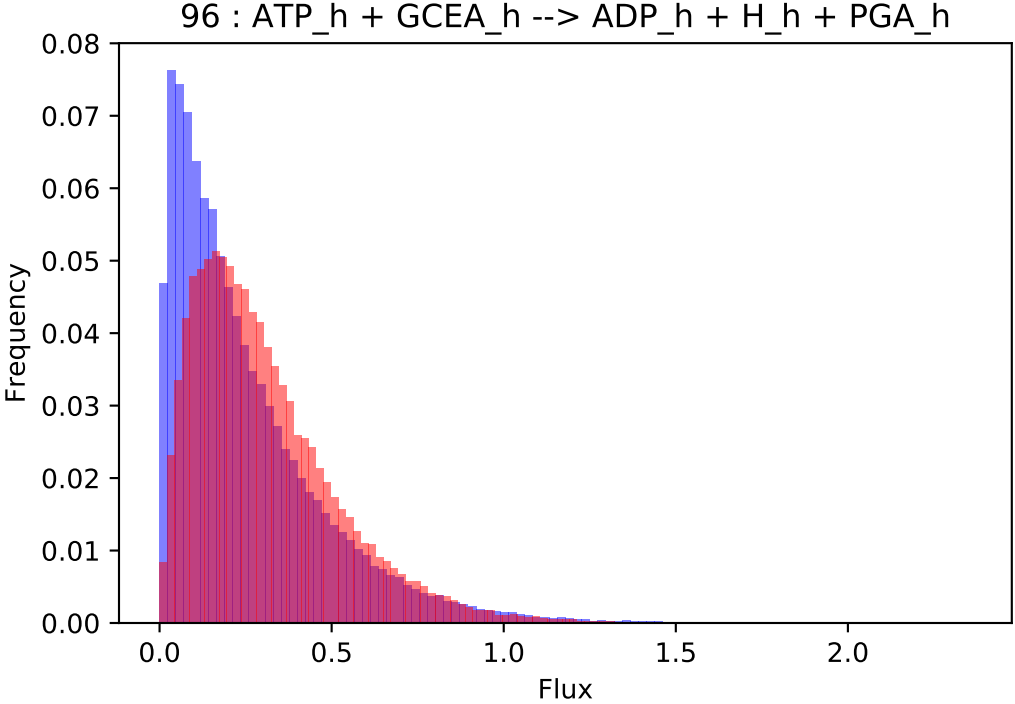

91 : DHP_m + NAD_m --> H_m + LPL_m + NADH_m
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
Flux

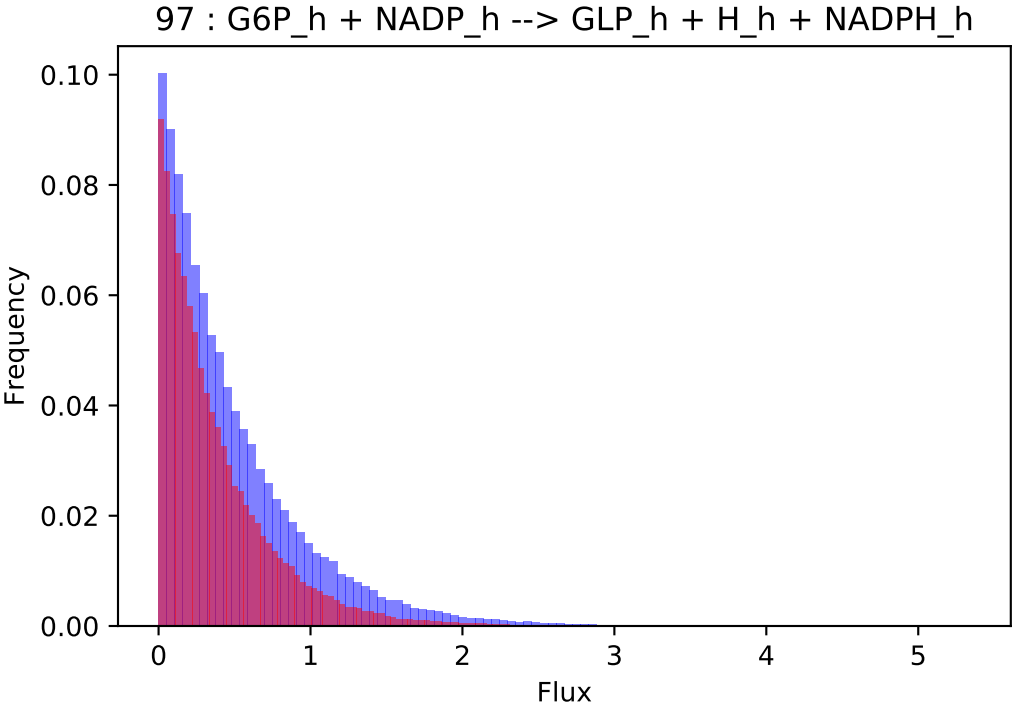

92 : Gly_m + H2O_m + M_DASH_THF_m <=> Ser_m + THF_m
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
Flux

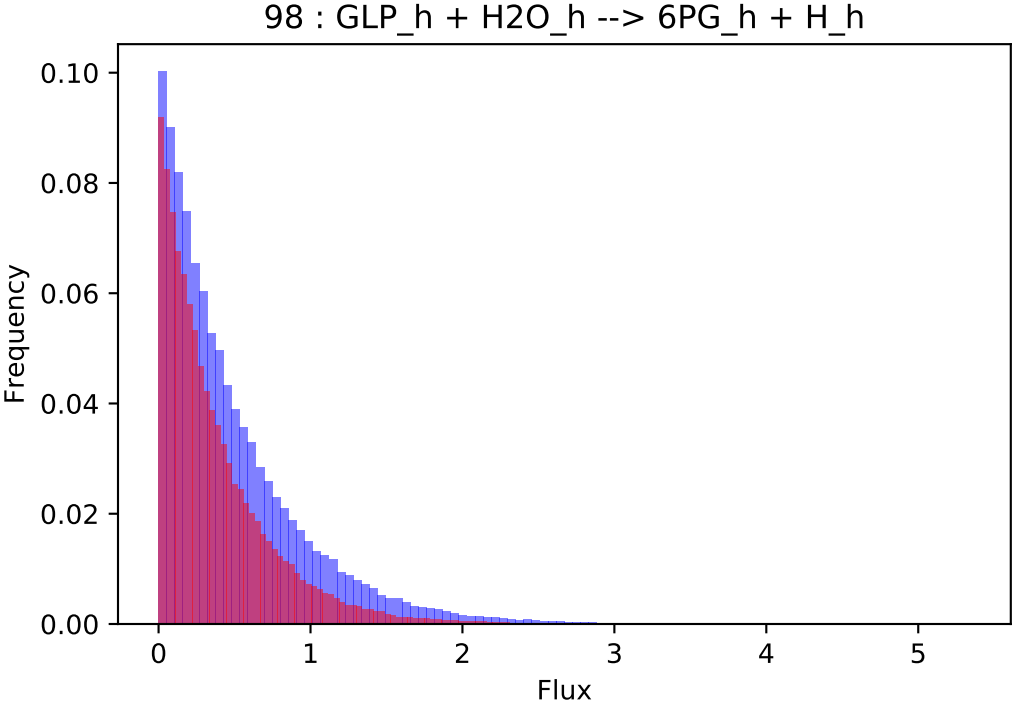

93 : GLX_p + Ser_p --> Gly_p + HPR_p
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.5
1.0
1.5
2.0
Flux

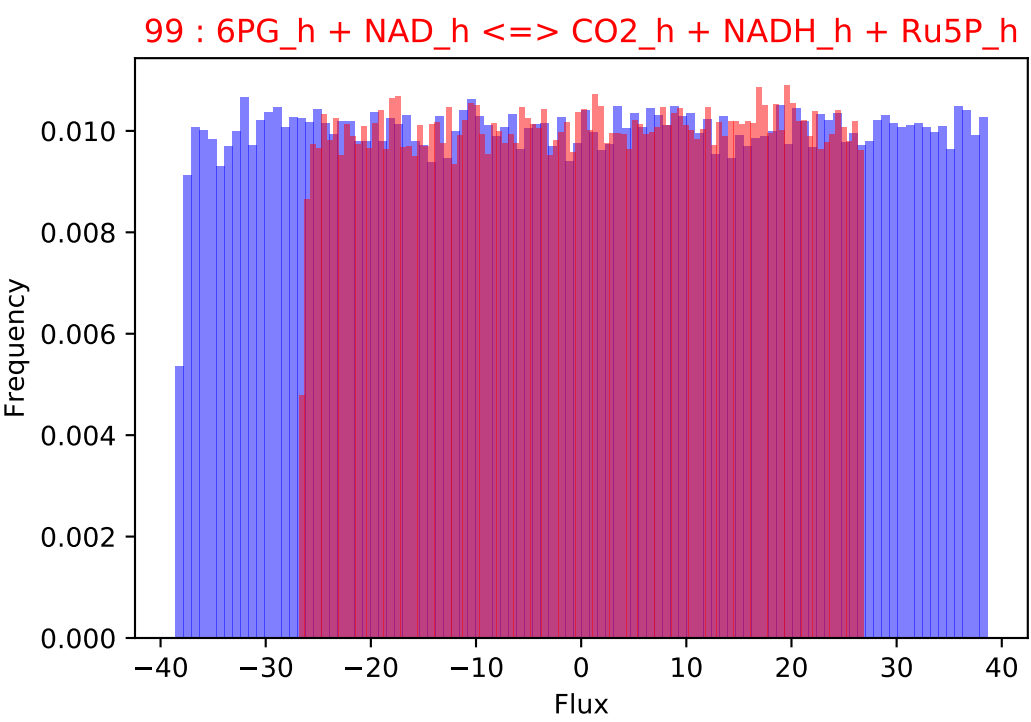

94 : HPR_p + H_p + NADH_p --> GCEA_p + NAD_p
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.5
1.0
1.5
2.0
Flux

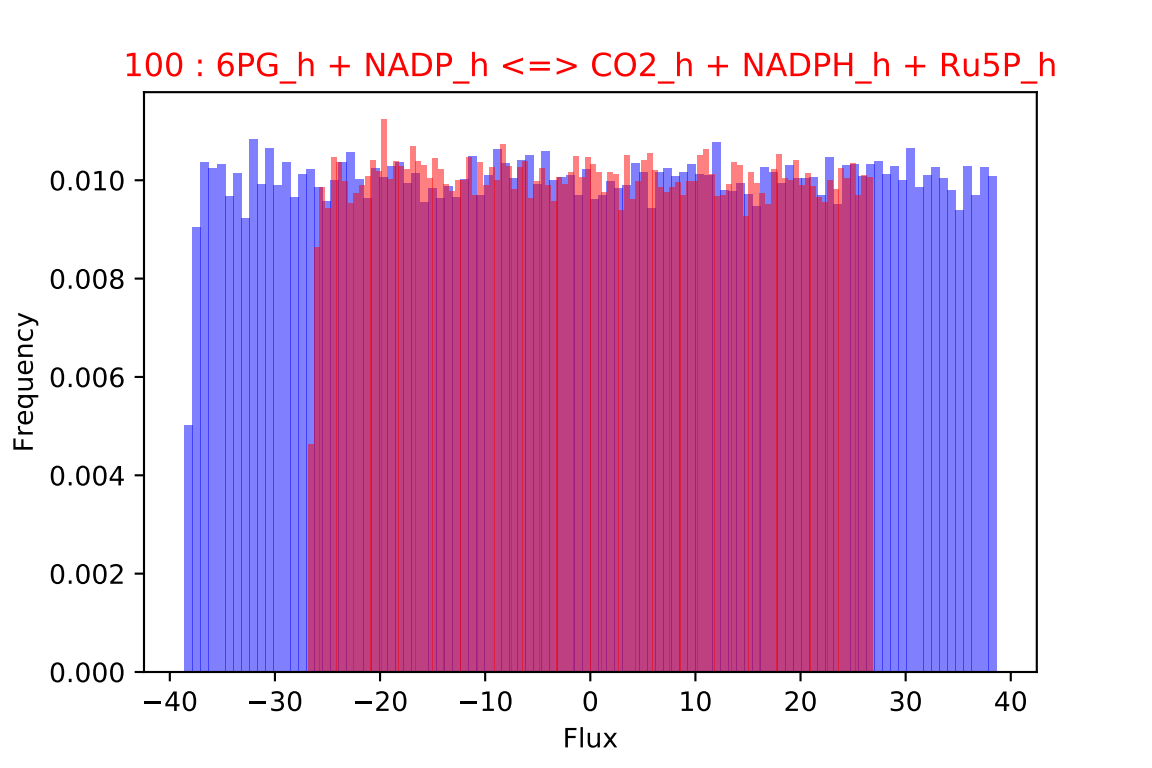

95 : Mal_p + NAD_p <=> H_p + NADH_p + OAA_p
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.5
1.0
1.5
2.0
Flux

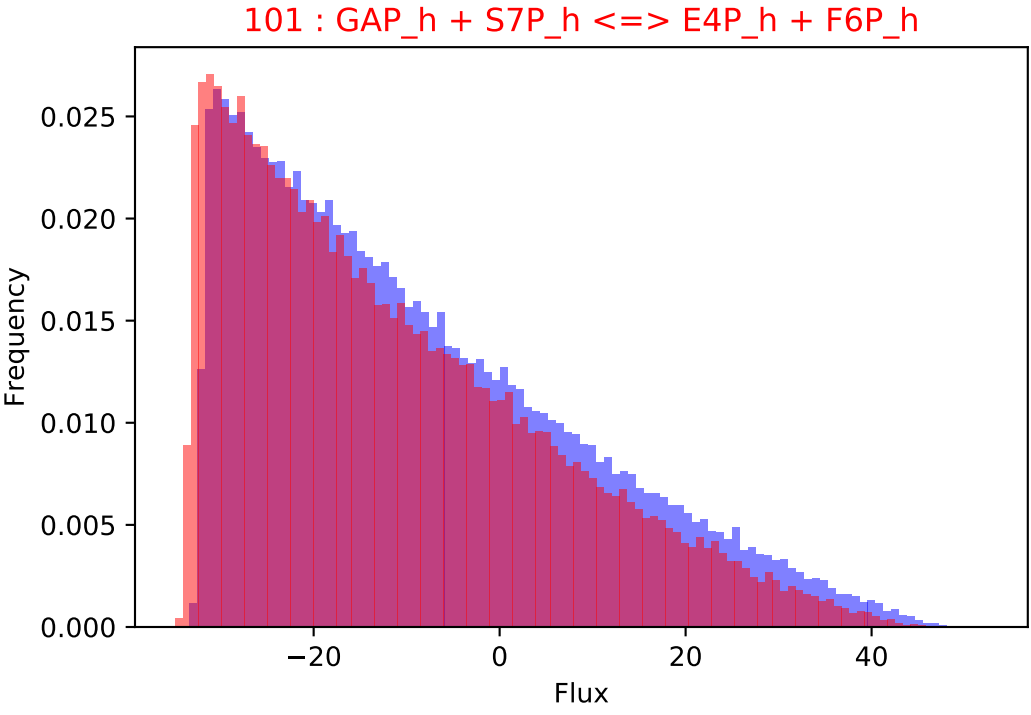

96 : ATP_h + GCEA_h --> ADP_h + H_h + PGA_h
Frequency
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.0
0.5
1.0
1.5
2.0
Flux

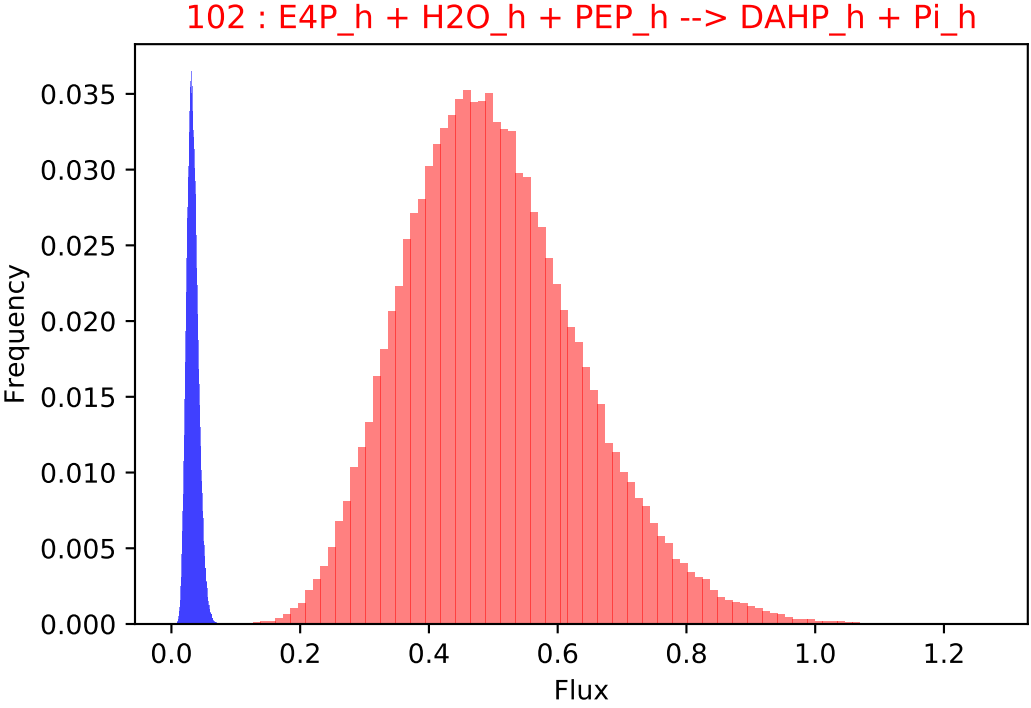

97 : G6P_h + NADP_h --> GLP_h + H_h + NADPH_h
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0
1
2
3
4
5
Flux

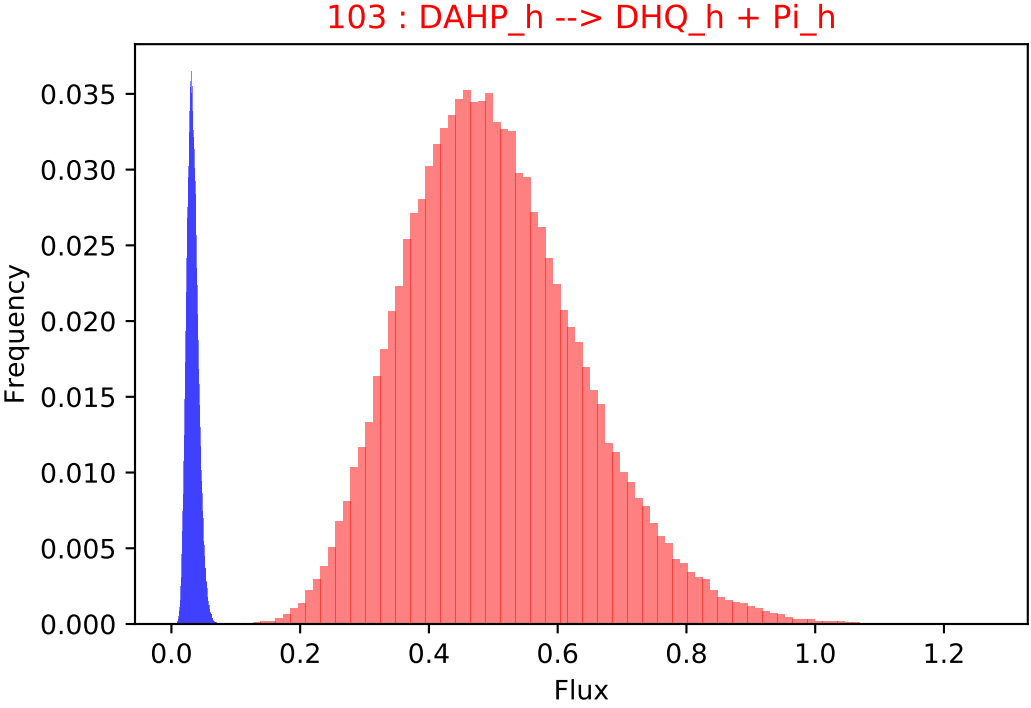

98 : GLP_h + H2O_h --> 6PG_h + H_h
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0
1
2
3
4
5
Flux

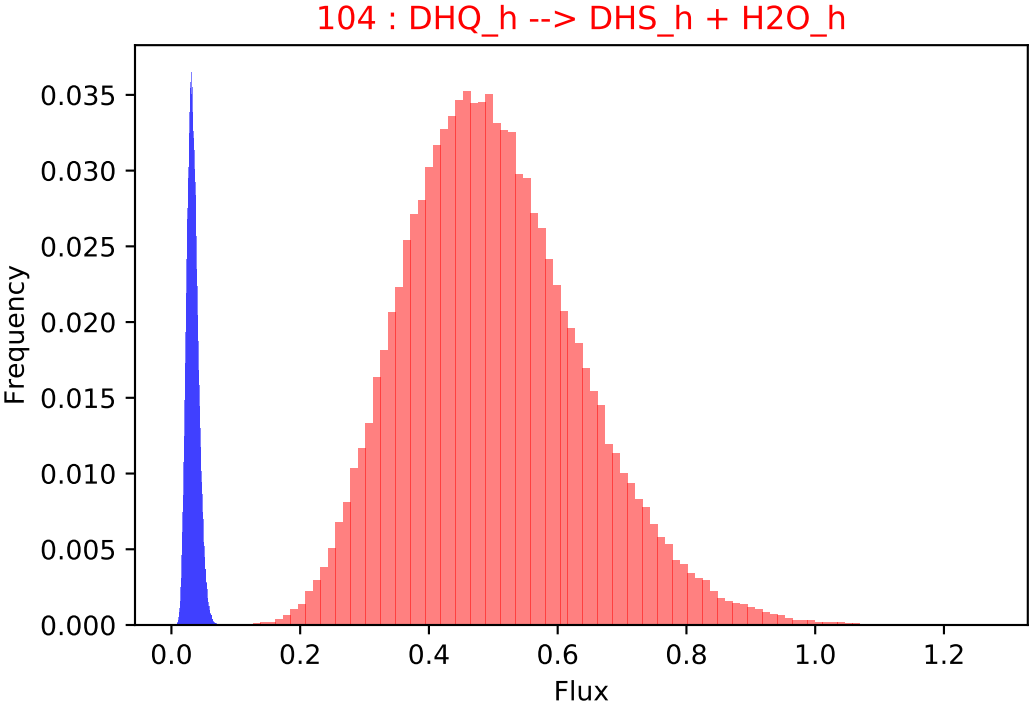

99 : 6PG_h + NAD_h <=> CO2_h + NADH_h + Ru5P_h
0.010
0.008
0.006
0.004
0.002
0.000
Frequency
−40
−30
−20
−10
0
10
20
30
40
Flux

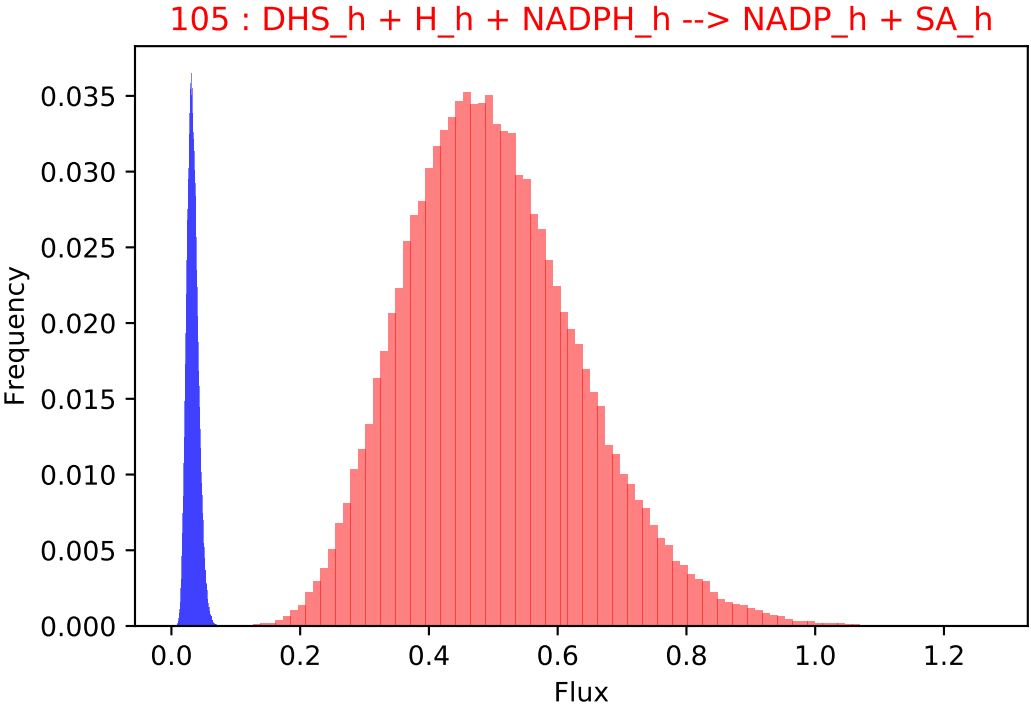

100 : 6PG_h + NADP_h <=> CO2_h + NADPH_h + Ru5P_h
Frequency
0.000
0.002
0.004
0.006
0.008
0.010
−40
−30
−20
−10
0
10
20
30
40
Flux

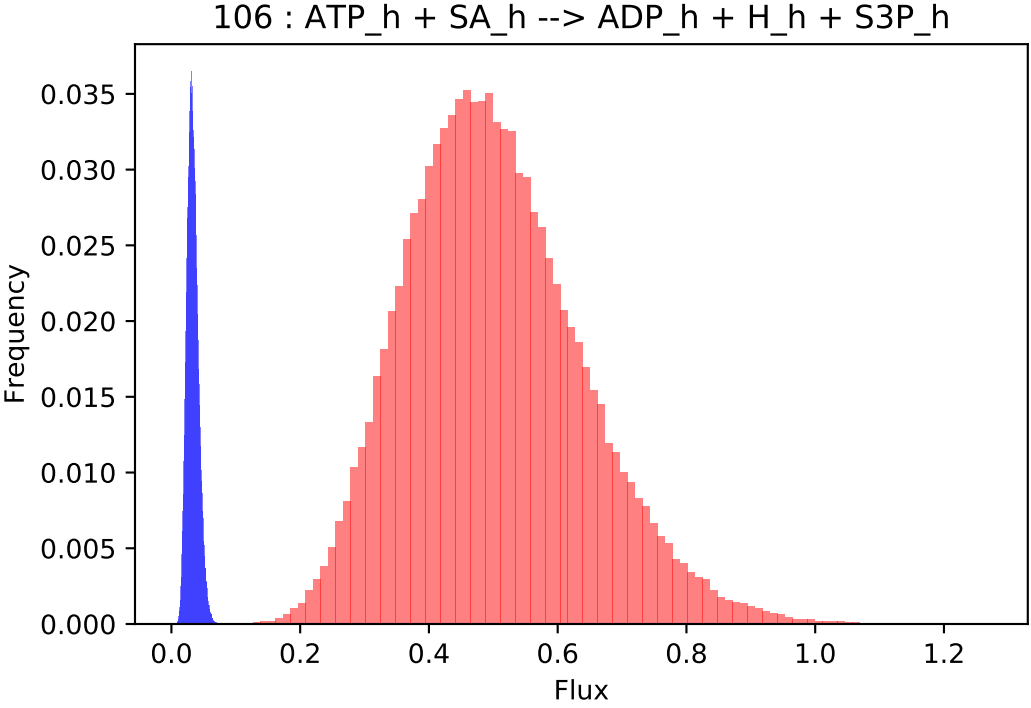

101 : GAP_h + S7P_h <=> E4P_h + F6P_h
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
−20
0
20
40
Flux

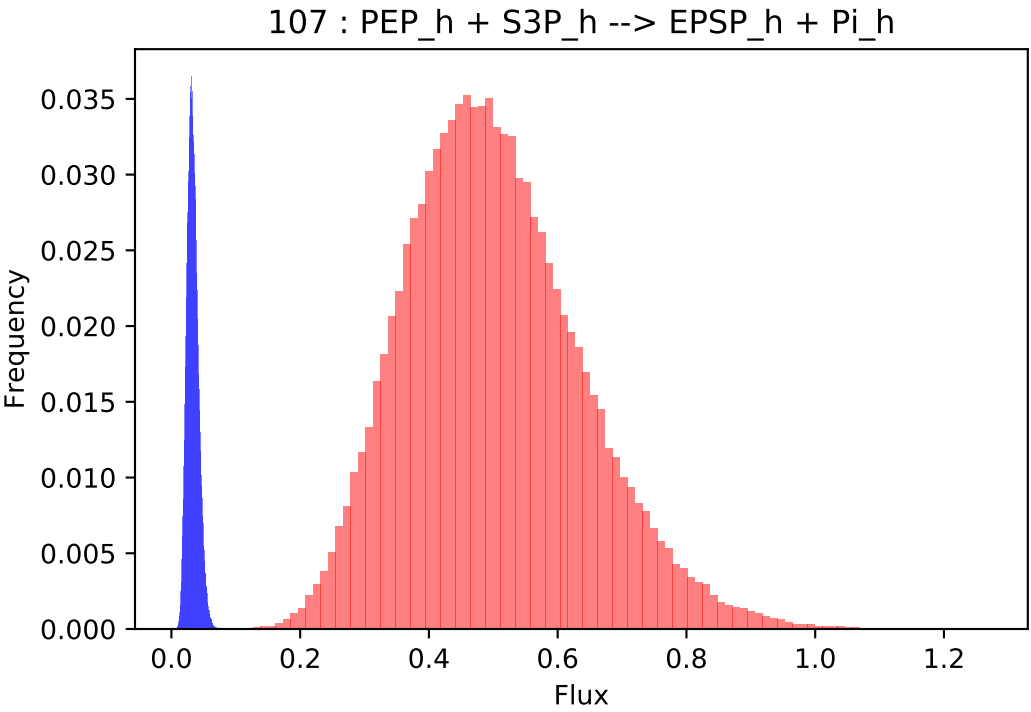

102 : E4P_h + H2O_h + PEP_h --> DAHP_h + Pi_h
Frequency
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

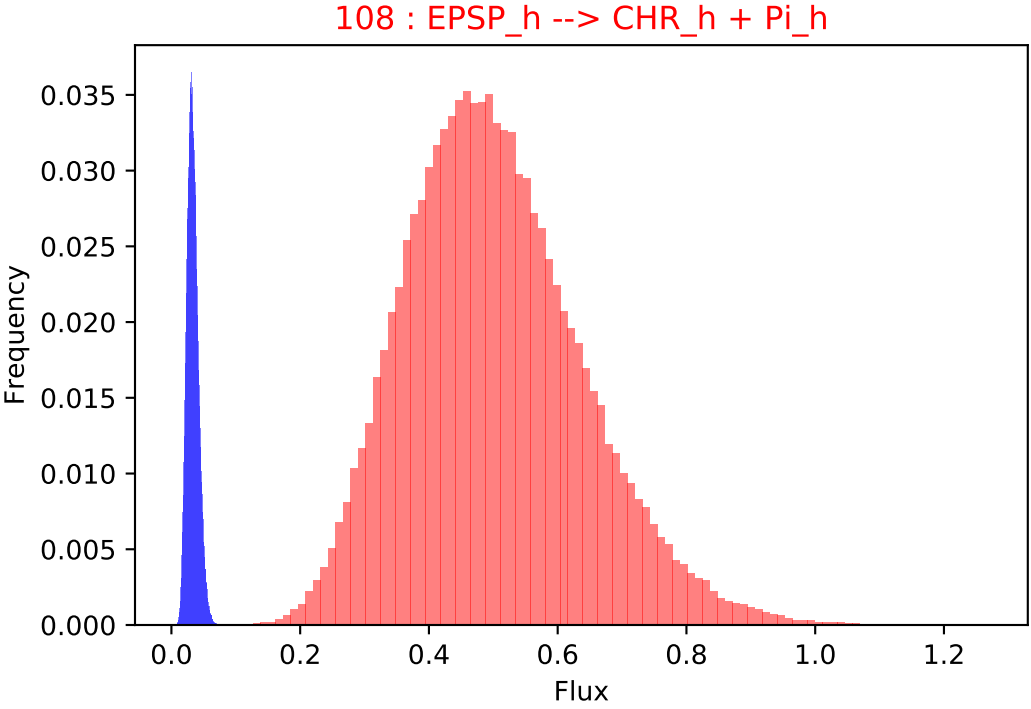

103 : DAHP_h --> DHQ_h + Pi_h
Frequency
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

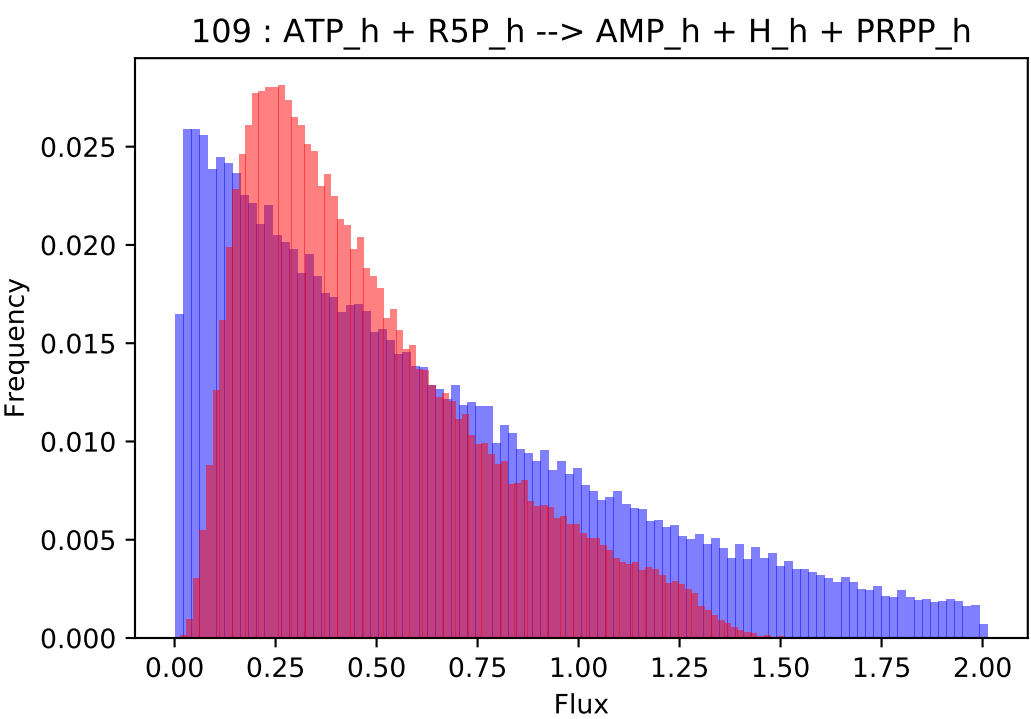

104 : DHQ_h --> DHS_h + H2O_h
Frequency
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

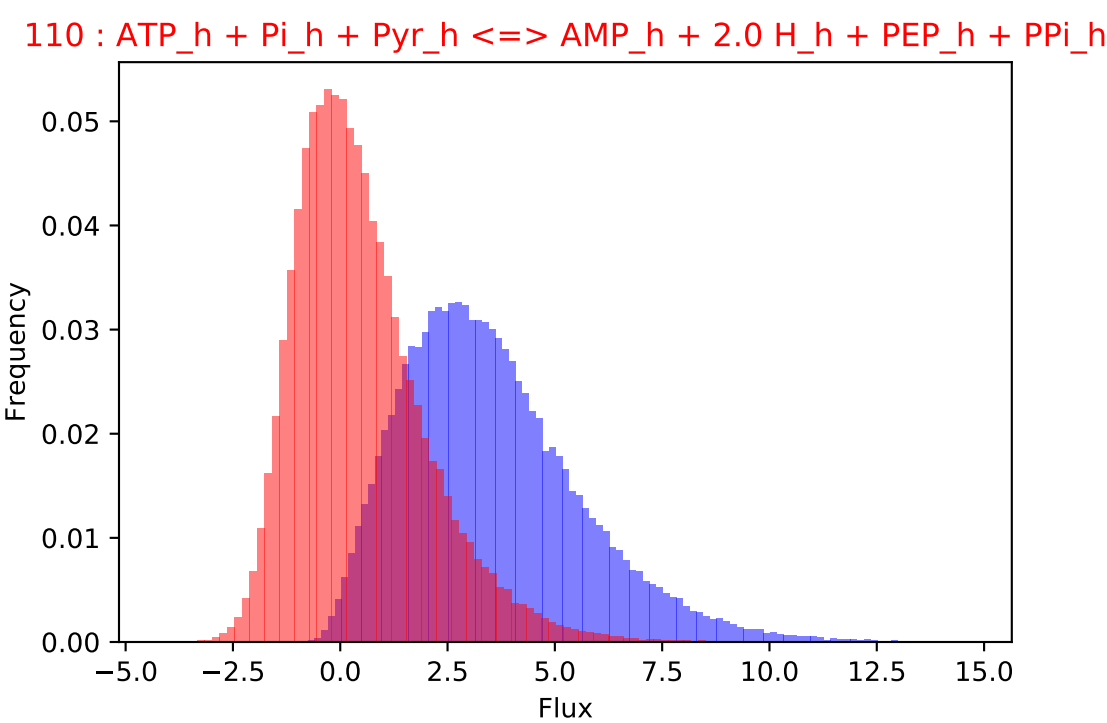

105 : DHS_h + H_h + NADPH_h --> NADP_h + SA_h
Frequency
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

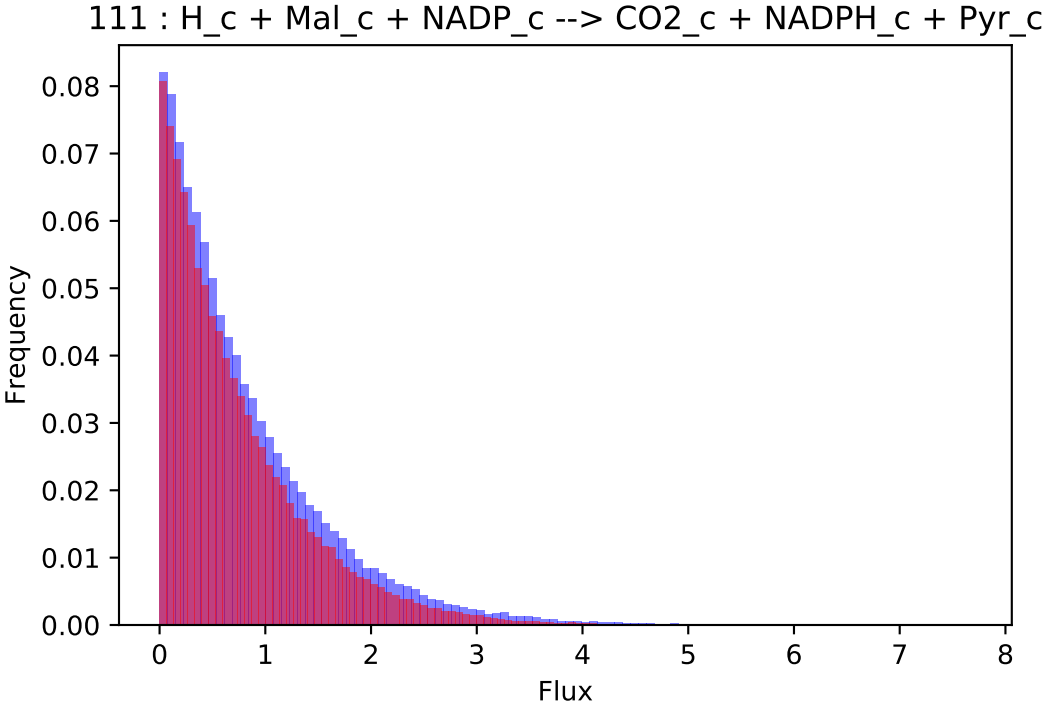

106 : ATP_h + SA_h --> ADP_h + H_h + S3P_h
Frequency
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

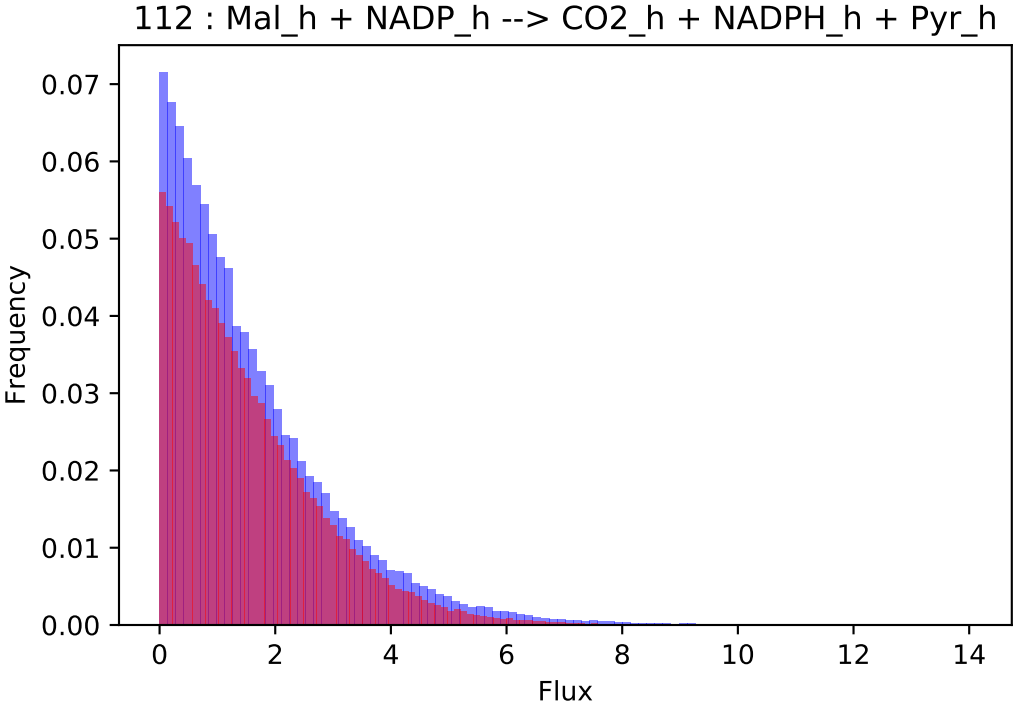

107 : PEP_h + S3P_h --> EPSP_h + Pi_h
Frequency
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

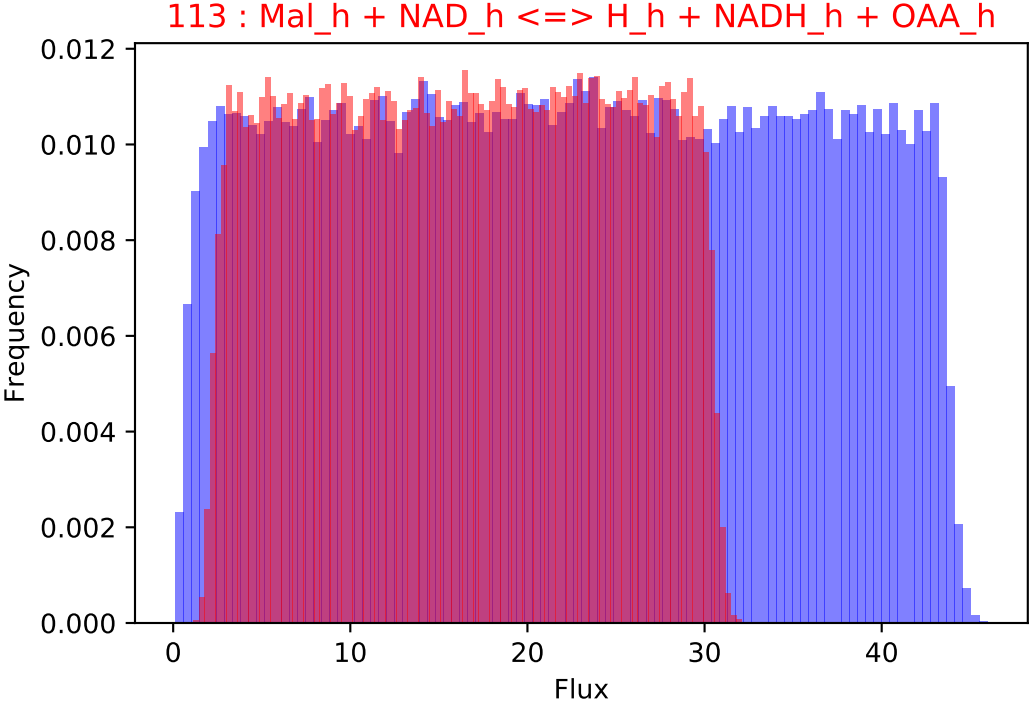

108 : EPSP_h --> CHR_h + Pi_h
Frequency
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

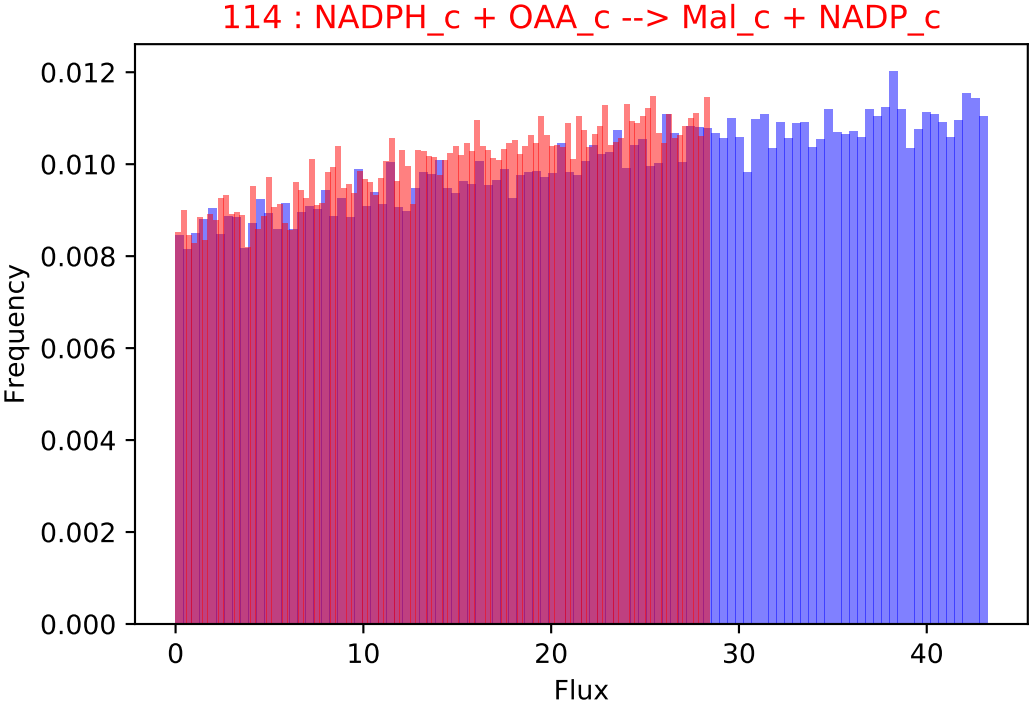

109 : ATP_h + R5P_h --> AMP_h + H_h + PRPP_h
Frequency
0.025
0.020
0.015
0.010
0.005
0.000
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
Flux

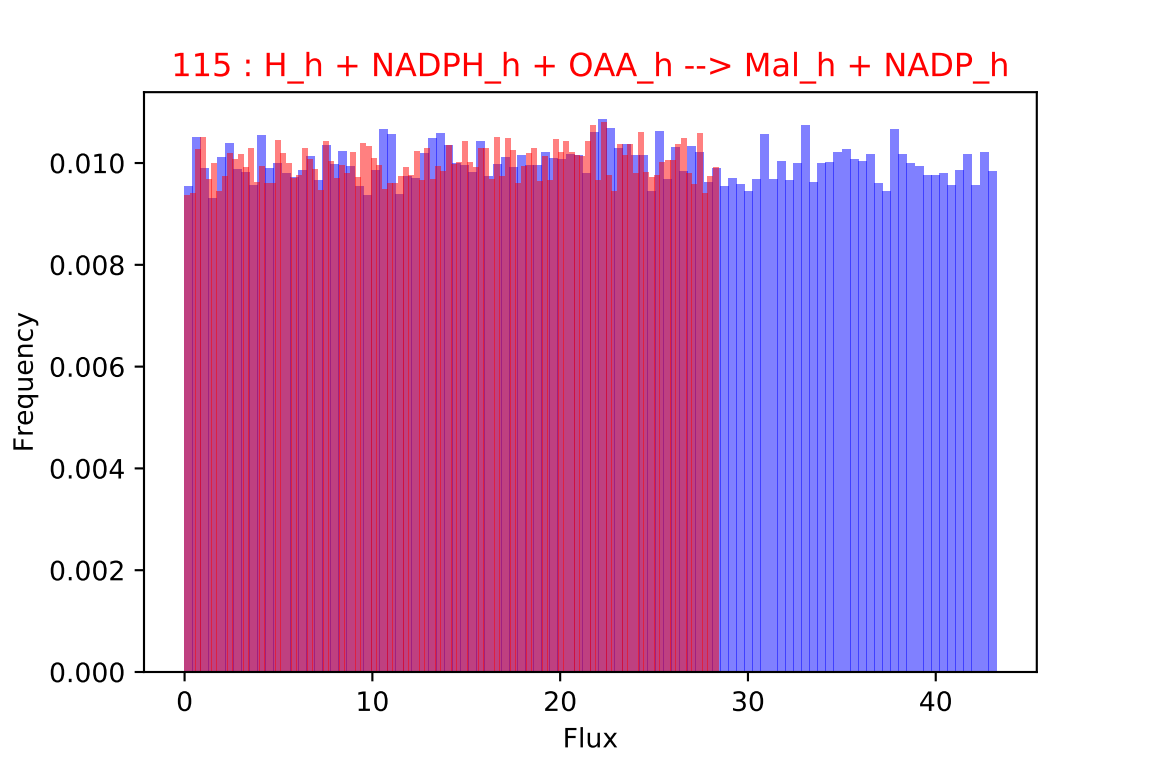

110 : ATP_h + Pi_h + Pyr_h <=> AMP_h + 2.0 H_h + PEP_h + PPi_h
Frequency
0.00
0.01
0.02
0.03
0.04
0.05
−5.0
−2.5
0.0
2.5
5.0
7.5
10.0
12.5
15.0
Flux

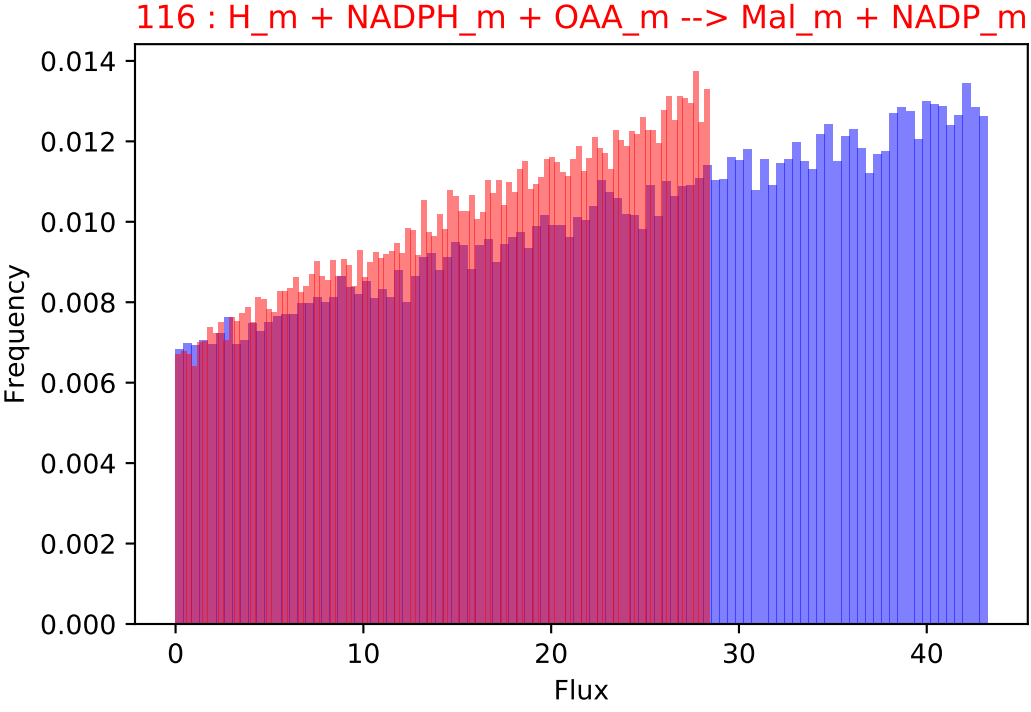

111 : H_c + Mal_c + NADP_c --> CO2_c + NADPH_c + Pyr_c
Frequency
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0
1
2
3
4
5
6
7
8
Flux

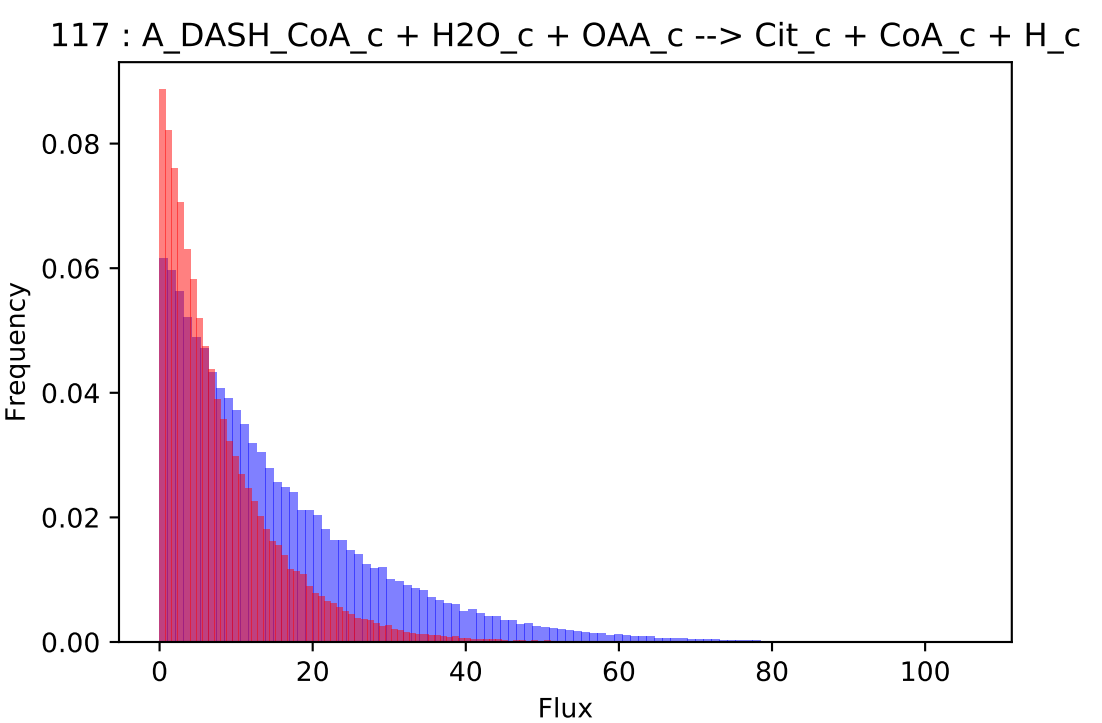

112 : Mal_h + NADP_h --> CO2_h + NADPH_h + Pyr_h
Frequency
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0
2
4
6
8
10
12
14
Flux

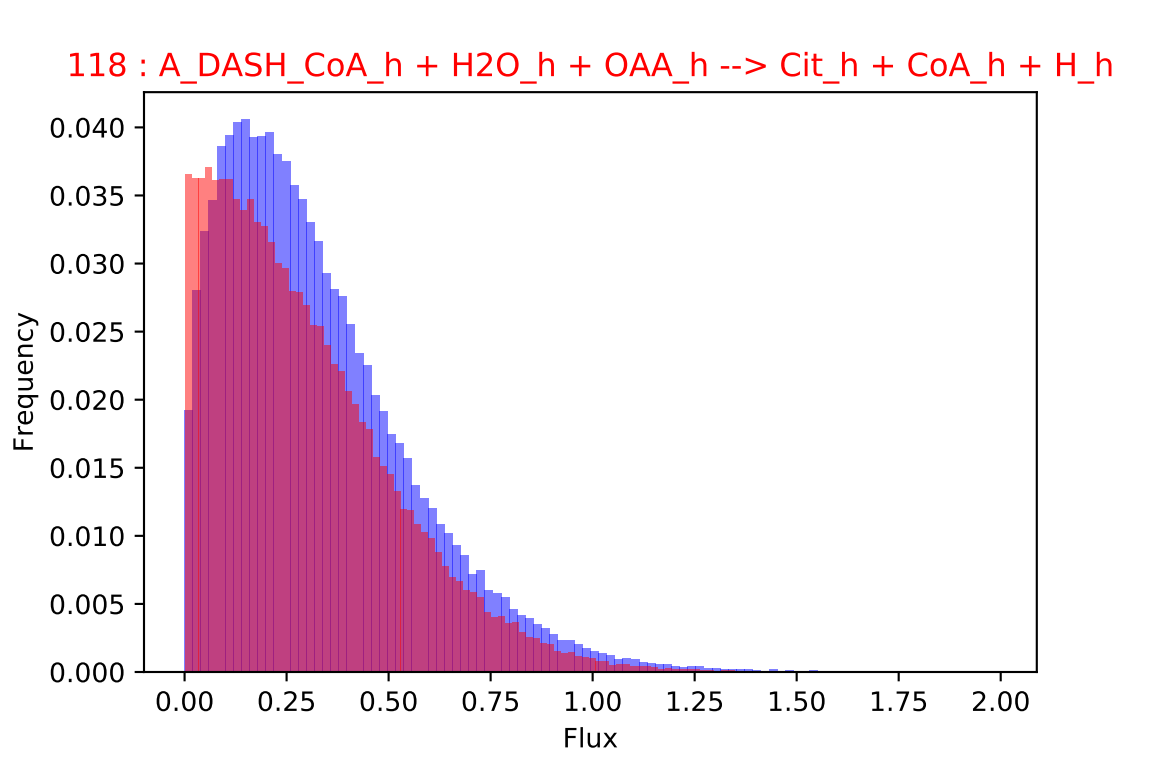

113 : Mal_h + NAD_h <=> H_h + NADH_h + OAA_h
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Frequency
0
10
20
30
40
Flux

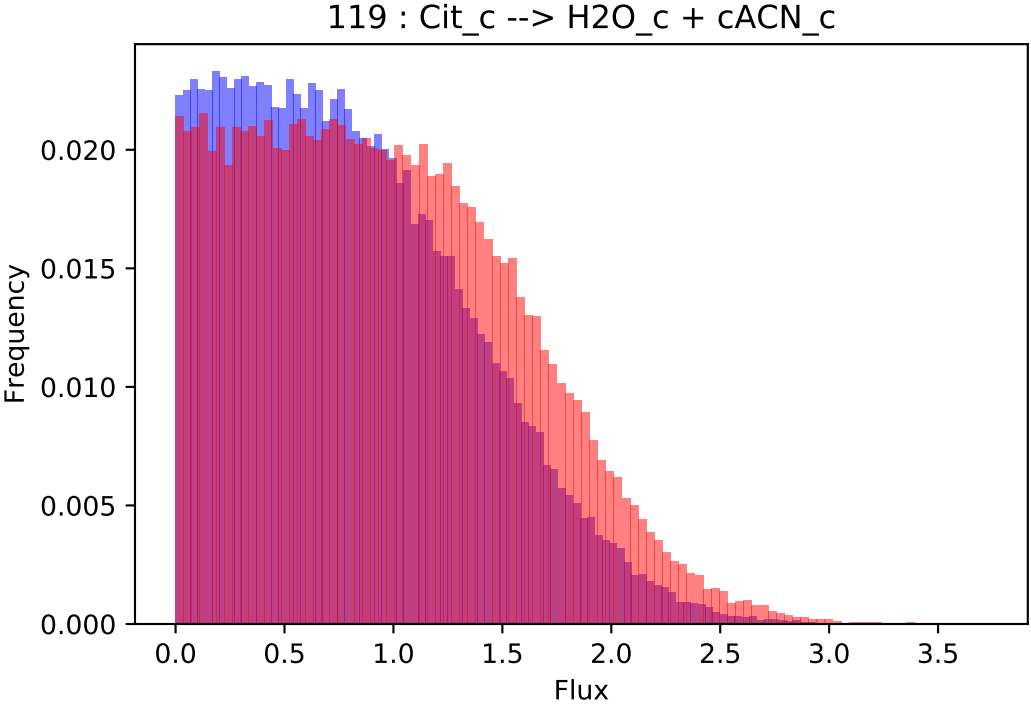

114 : NADPH_c + OAA_c --> Mal_c + NADP_c
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Frequency
0
10
20
30
40
Flux

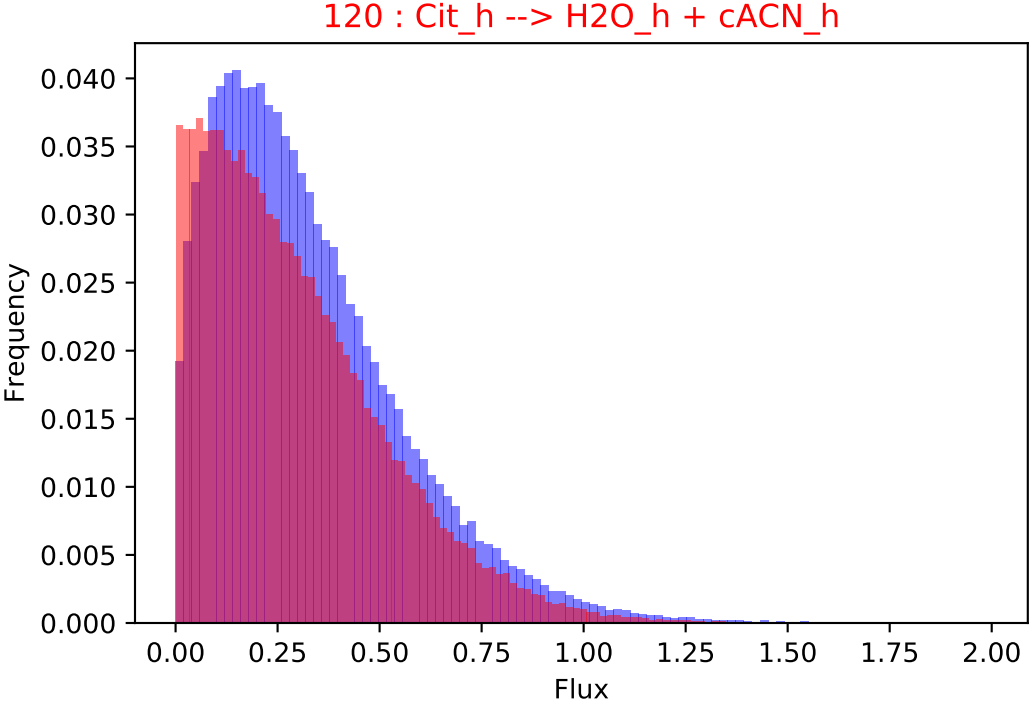

115 : H_h + NADPH_h + OAA_h --> Mal_h + NADP_h
Frequency
0.000
0.002
0.004
0.006
0.008
0.010
0
10
20
30
40
Flux

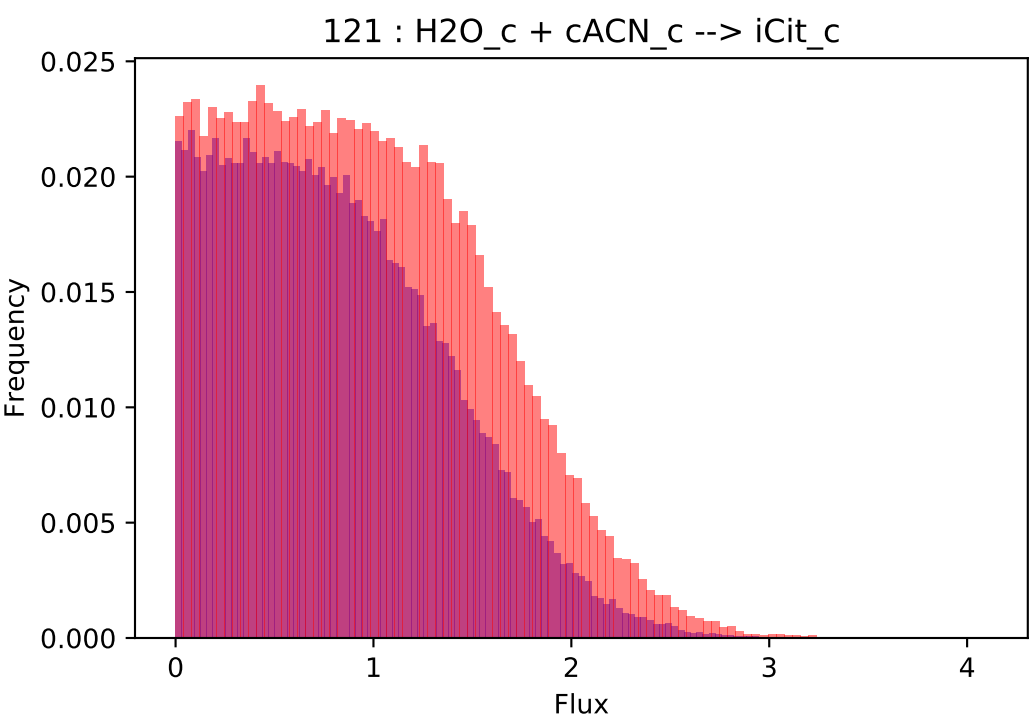

116 : H_m + NADPH_m + OAA_m --> Mal_m + NADP_m
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Frequency
0
10
20
30
40
Flux

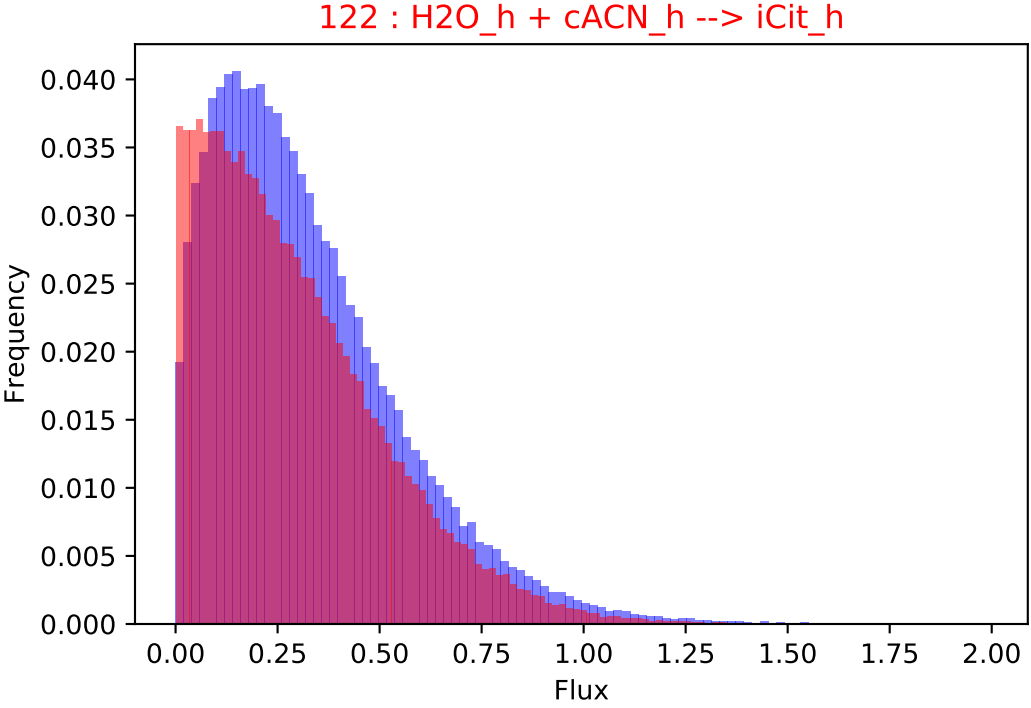

117 : A_DASH_CoA_c + H2O_c + OAA_c --> Cit_c + CoA_c + H_c
Frequency
0.00
0.02
0.04
0.06
0.08
0
20
40
60
80
100
Flux

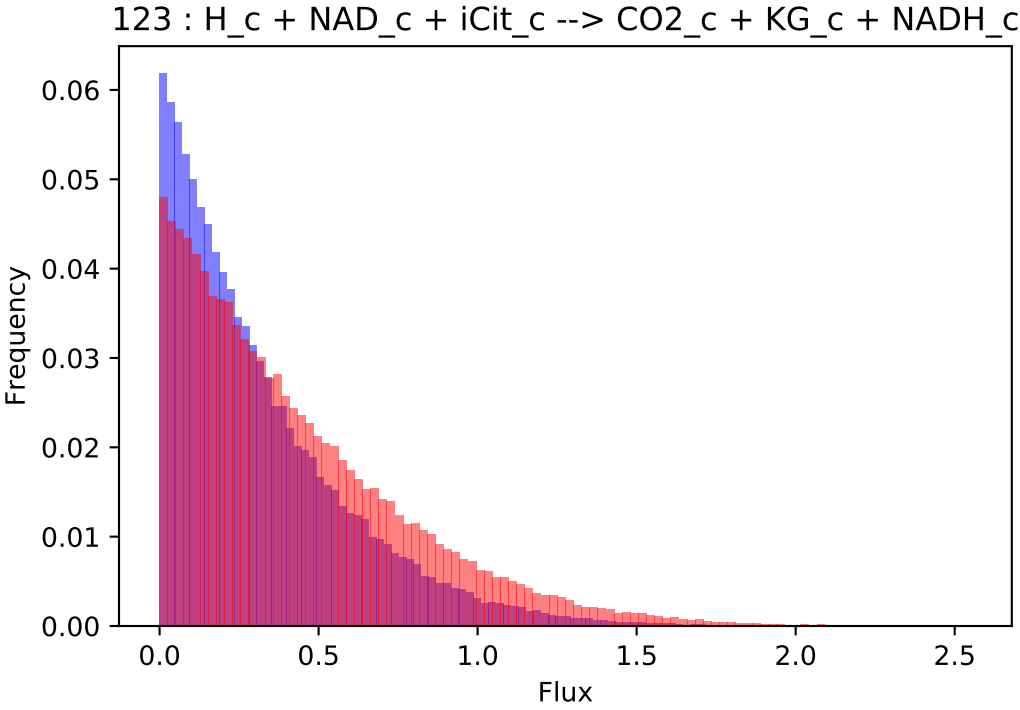

118 : A_DASH_CoA_h + H2O_h + OAA_h --> Cit_h + CoA_h + H_h
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
Flux

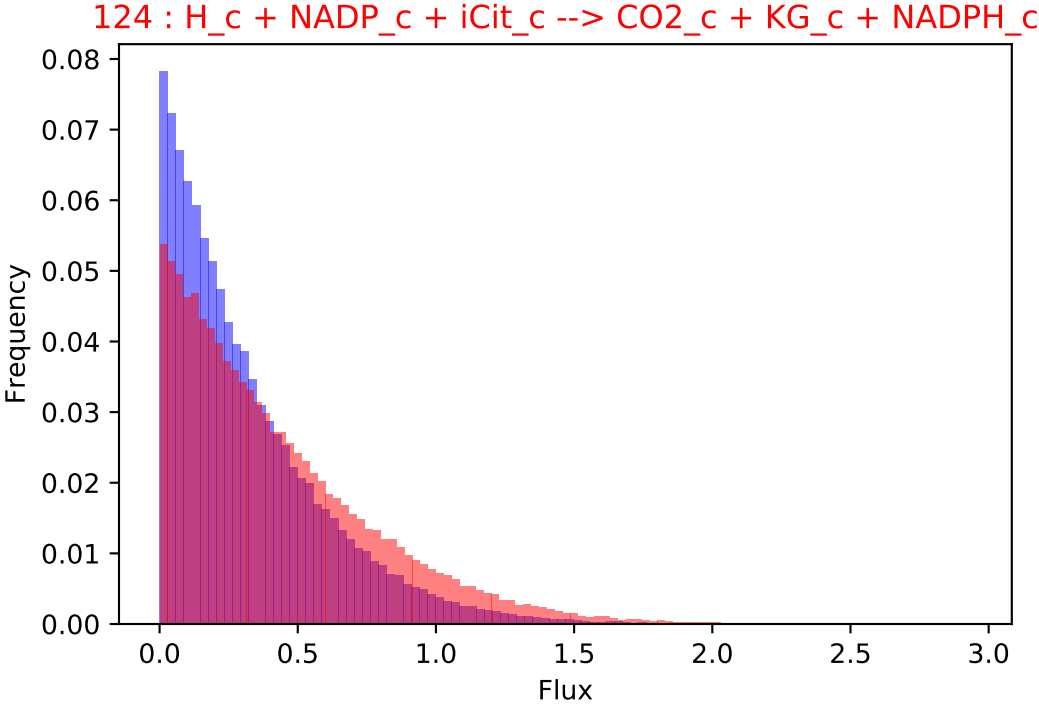

119 : Cit_c --> H2O_c + cACN_c
Frequency
0.020
0.015
0.010
0.005
0.000
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
Flux

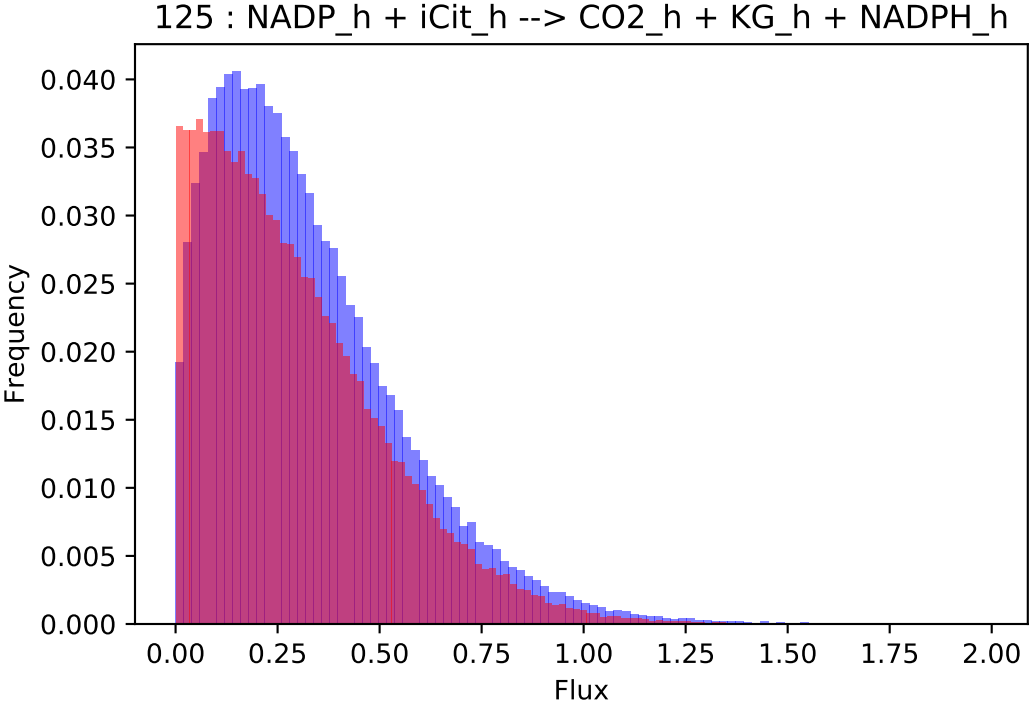

120 : Cit_h --> H2O_h + cACN_h
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
Flux

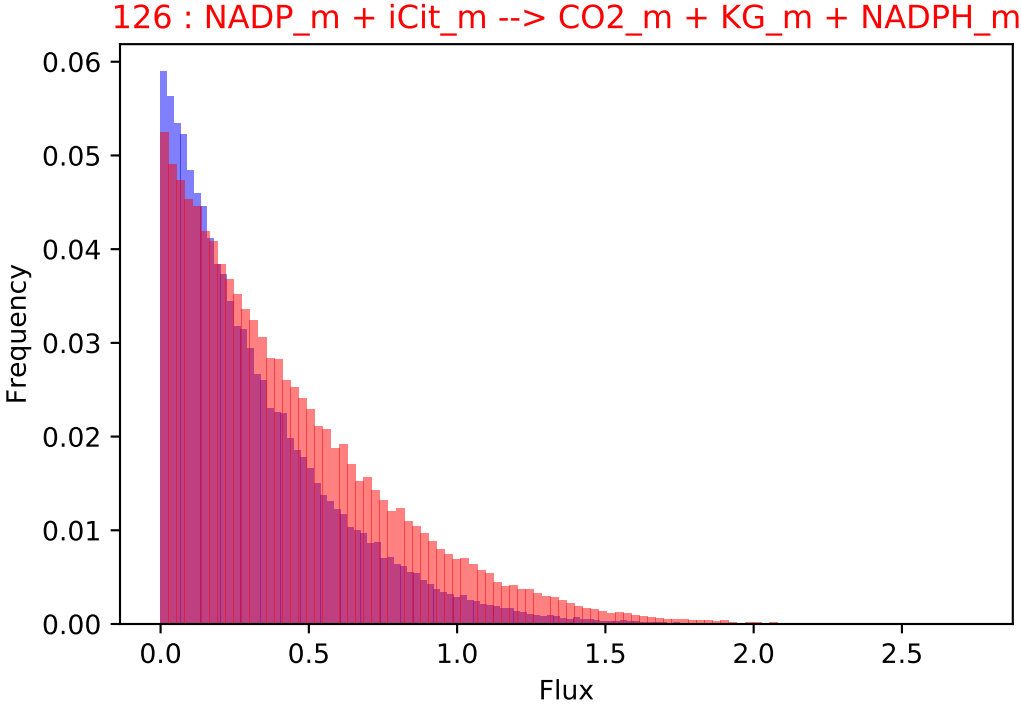

121 : H2O_c + cACN_c --> iCit_c
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
0
1
2
3
4
Flux

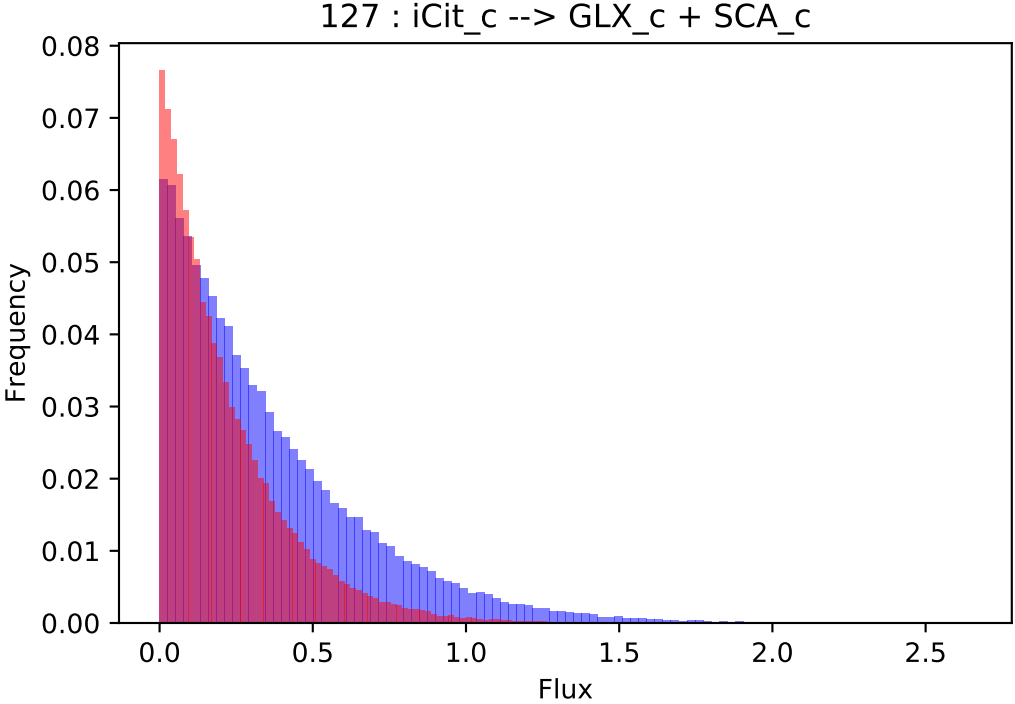

122 : H2O_h + cACN_h --> iCit_h
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
Flux

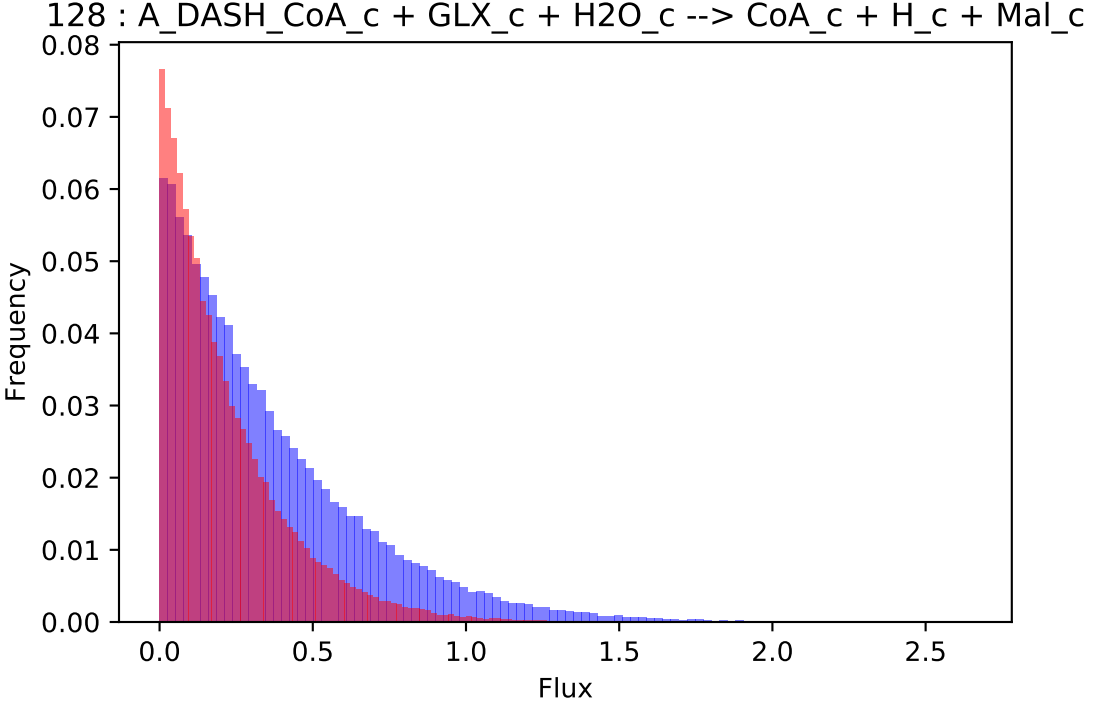

123 : H_c + NAD_c + iCit_c --> CO2_c + KG_c + NADH_c
Frequency
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.0
0.5
1.0
1.5
2.0
2.5
Flux

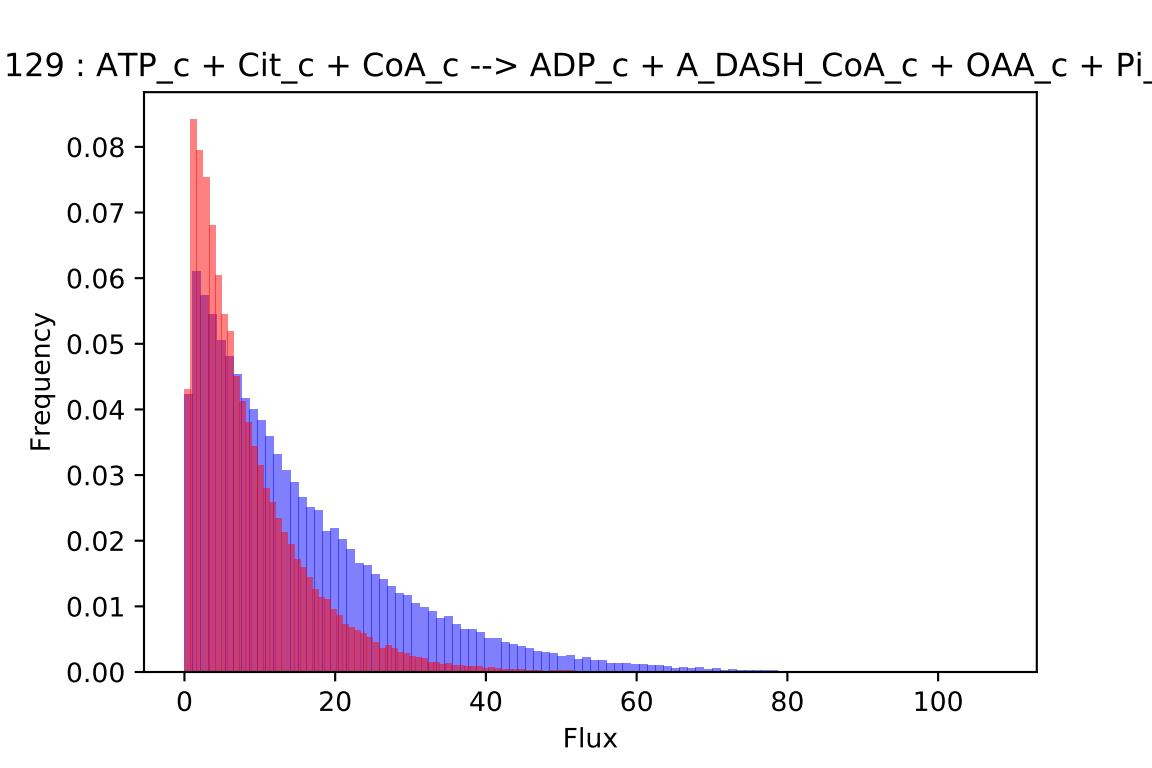

124 : H_c + NADP_c + iCit_c --> CO2_c + KG_c + NADPH_c
Frequency
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Flux

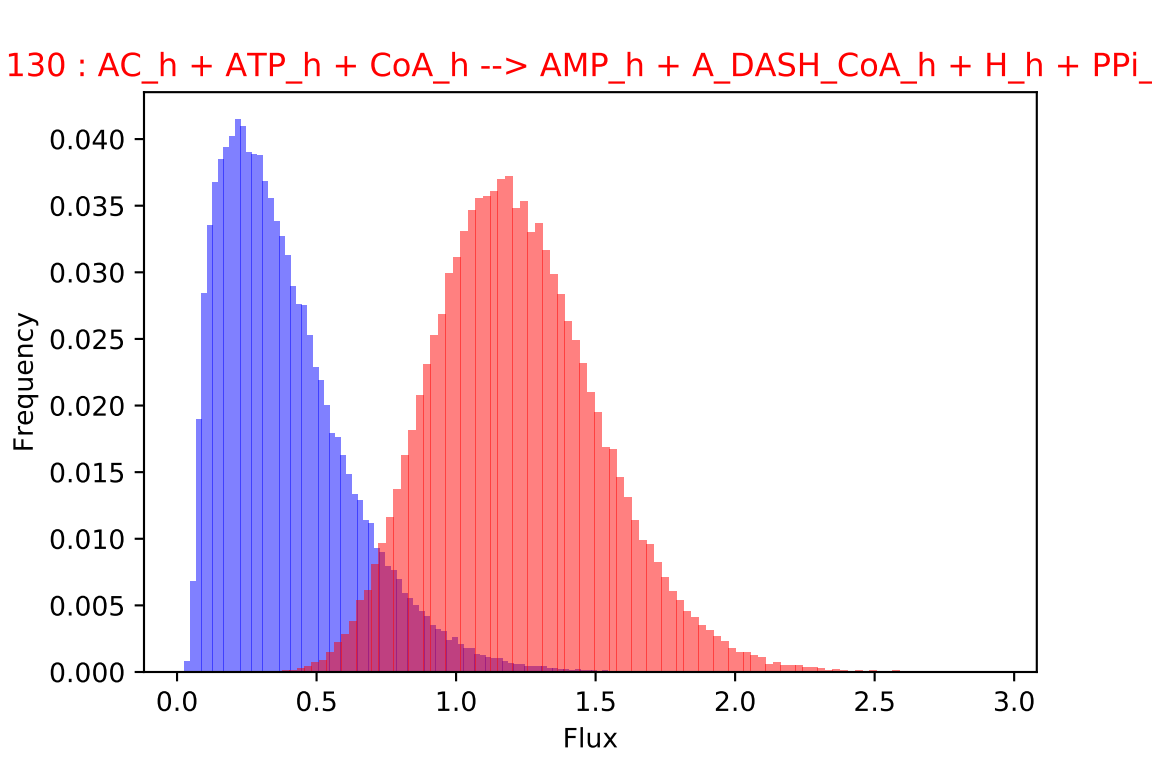

125 : NADP_h + iCit_h --> CO2_h + KG_h + NADPH_h
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
Flux

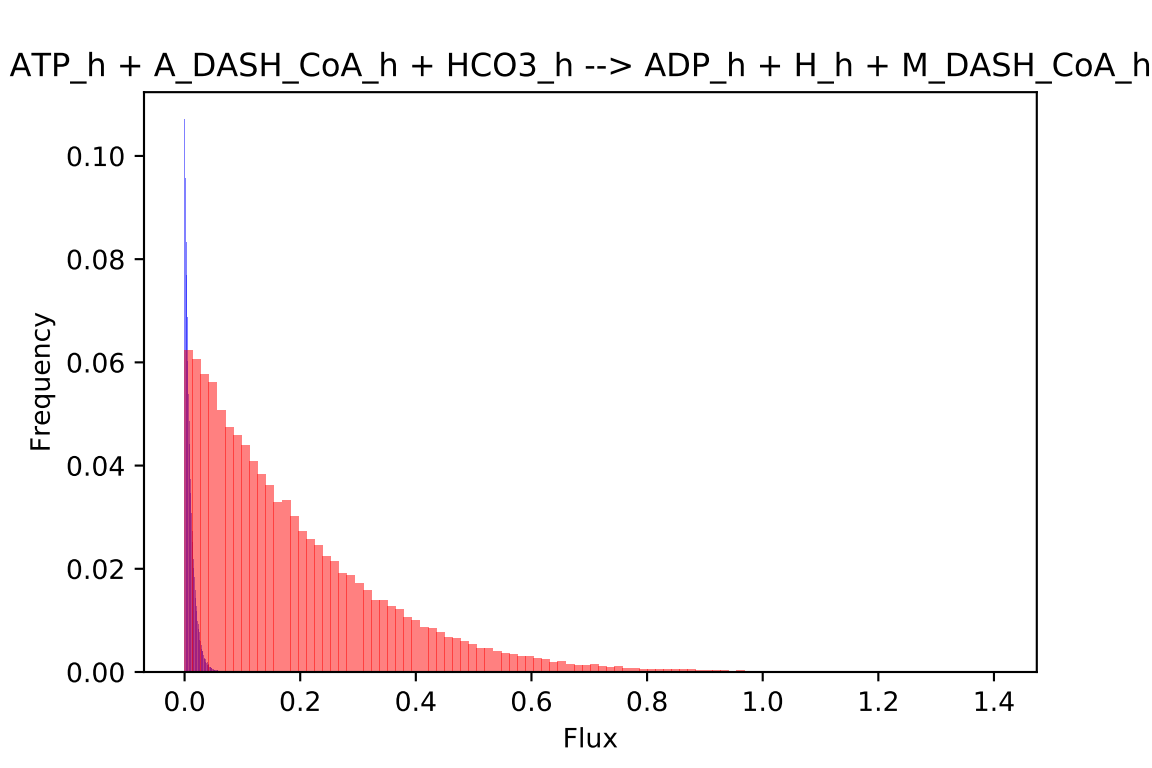

126 : NADP_m + iCit_m --> CO2_m + KG_m + NADPH_m
Frequency
0.06
0.05
0.04
0.03
0.02
0.01
0.00
0.0
0.5
1.0
1.5
2.0
2.5
Flux

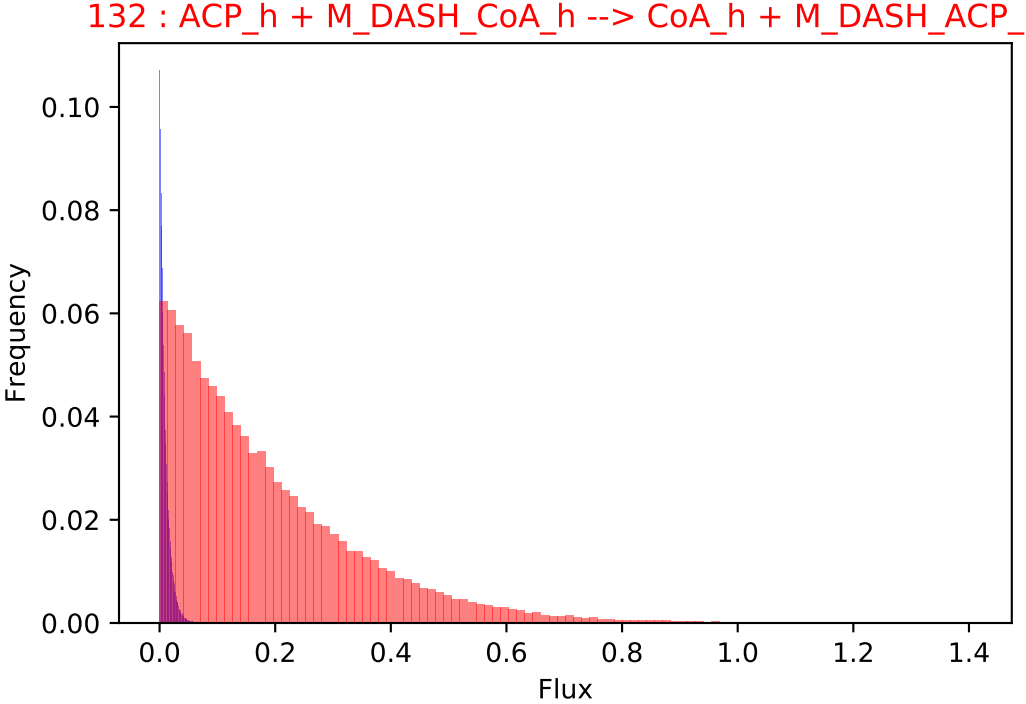

127 : iCit_c --> GLX_c + SCA_c
Frequency
Flux
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.0
0.5
1.0
1.5
2.0
2.5

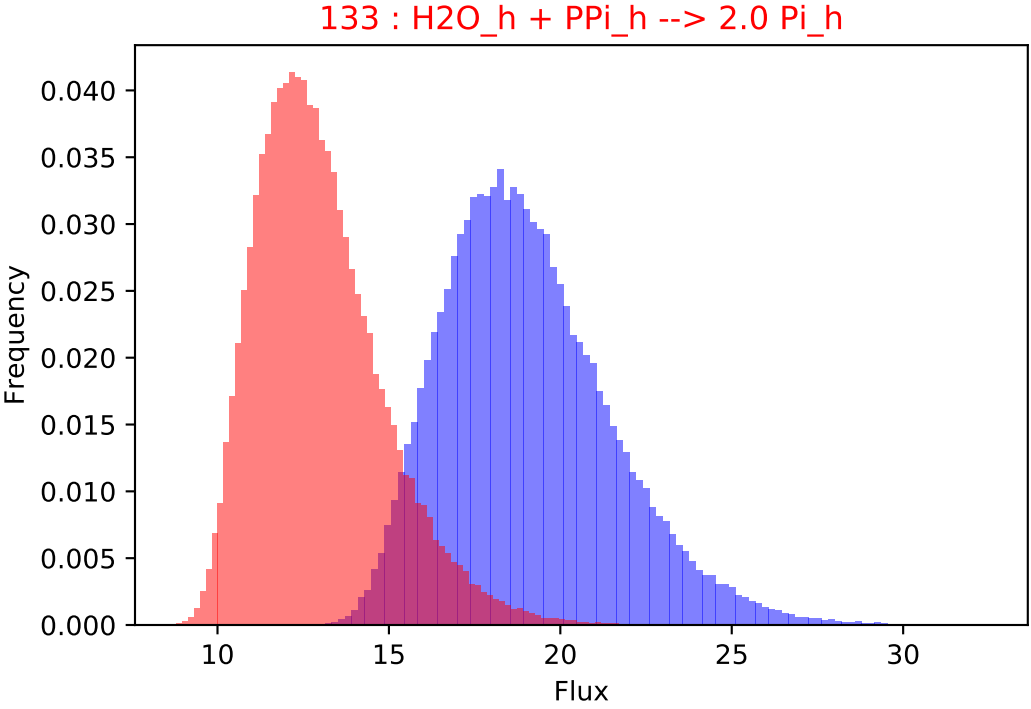

128 : A_DASH_CoA_c + GLX_c + H2O_c --> CoA_c + H_c + Mal_c
Frequency
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
0.0
0.5
1.0
1.5
2.0
2.5
Flux

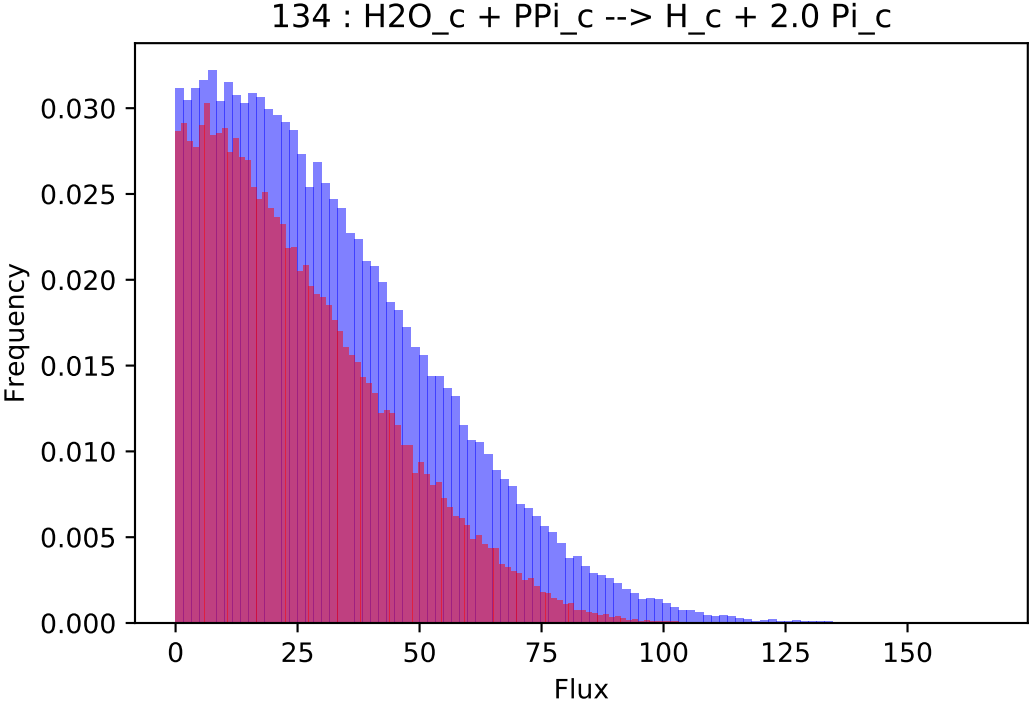

129 : ATP_c + Cit_c + CoA_c --> ADP_c + A_DASH_CoA_c + OAA_c + Pi_
Frequency
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0
20
40
60
80
100
Flux

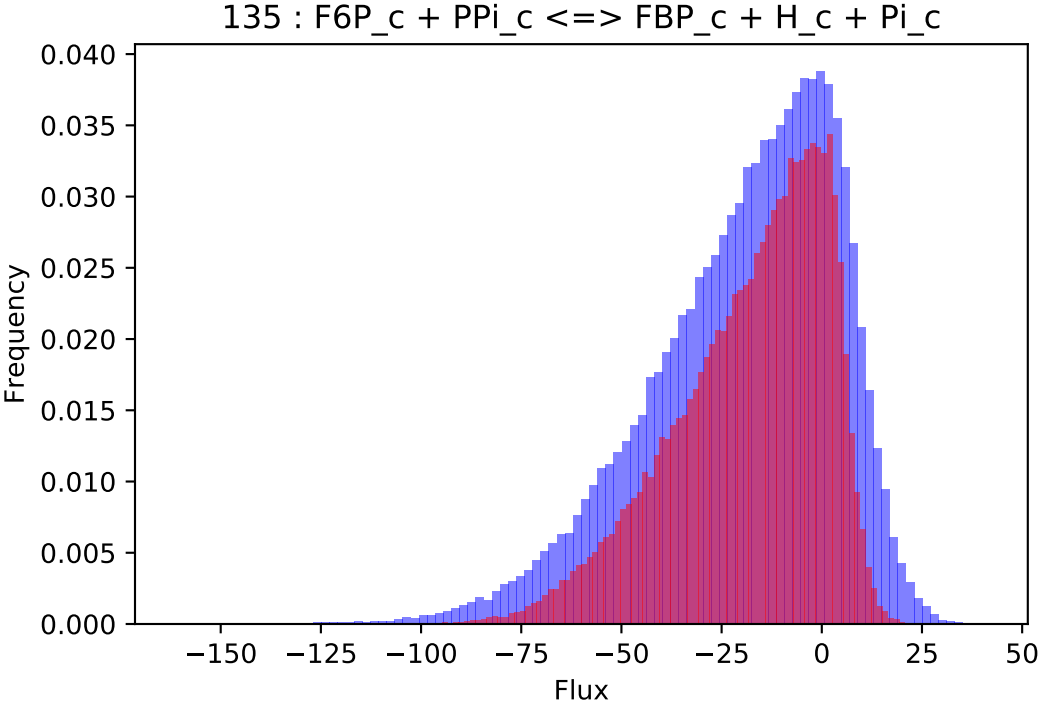

130 : AC_h + ATP_h + CoA_h --> AMP_h + A_DASH_CoA_h + H_h + PPi_
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Flux

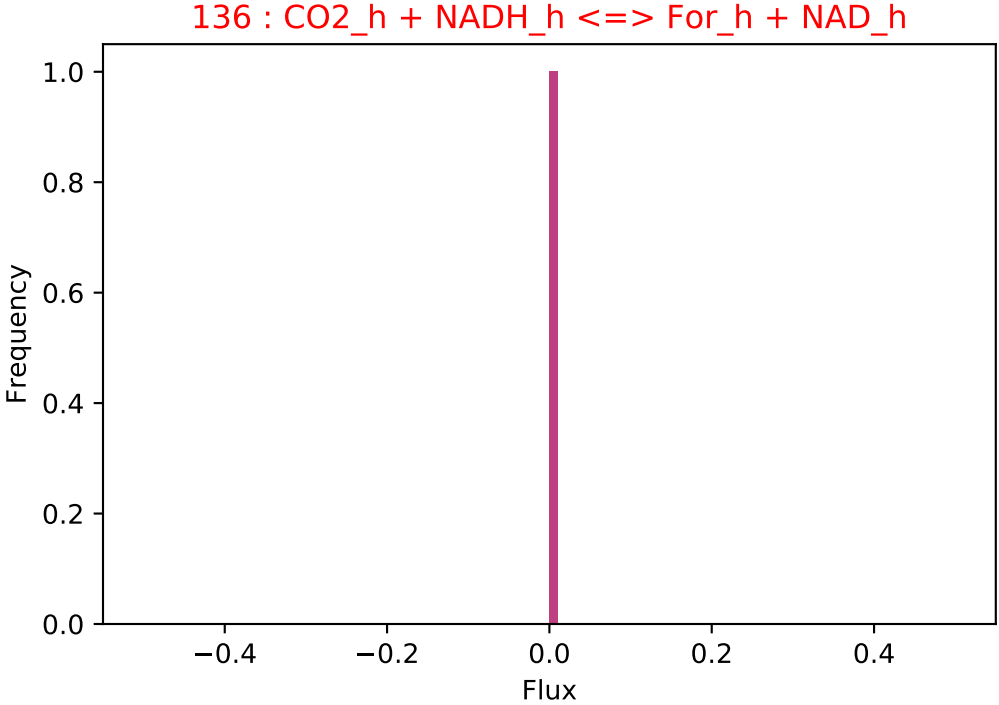

ATP_h + A_DASH_CoA_h + HCO3_h --> ADP_h + H_h + M_DASH_CoA_h
Frequency
0.00
0.02
0.04
0.06
0.08
0.10
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
Flux

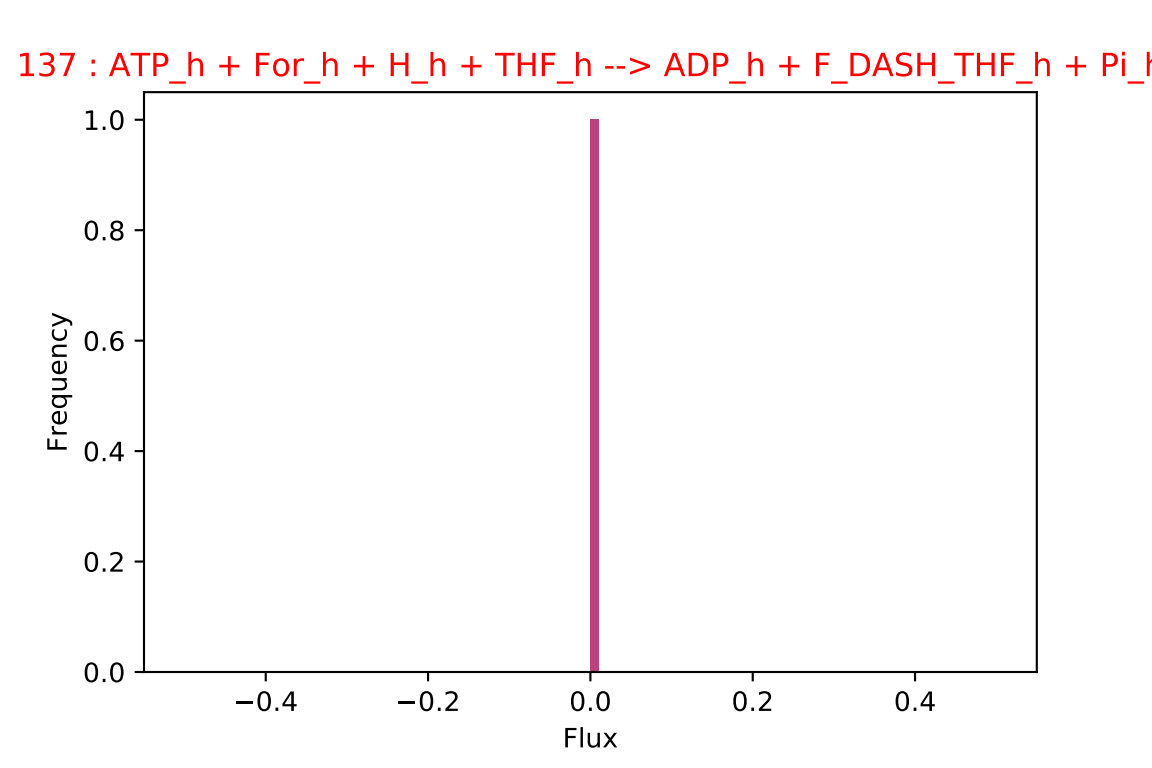

132 : ACP_h + M_DASH_CoA_h --> CoA_h + M_DASH_ACP_h
Frequency
0.00
0.02
0.04
0.06
0.08
0.10
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
Flux

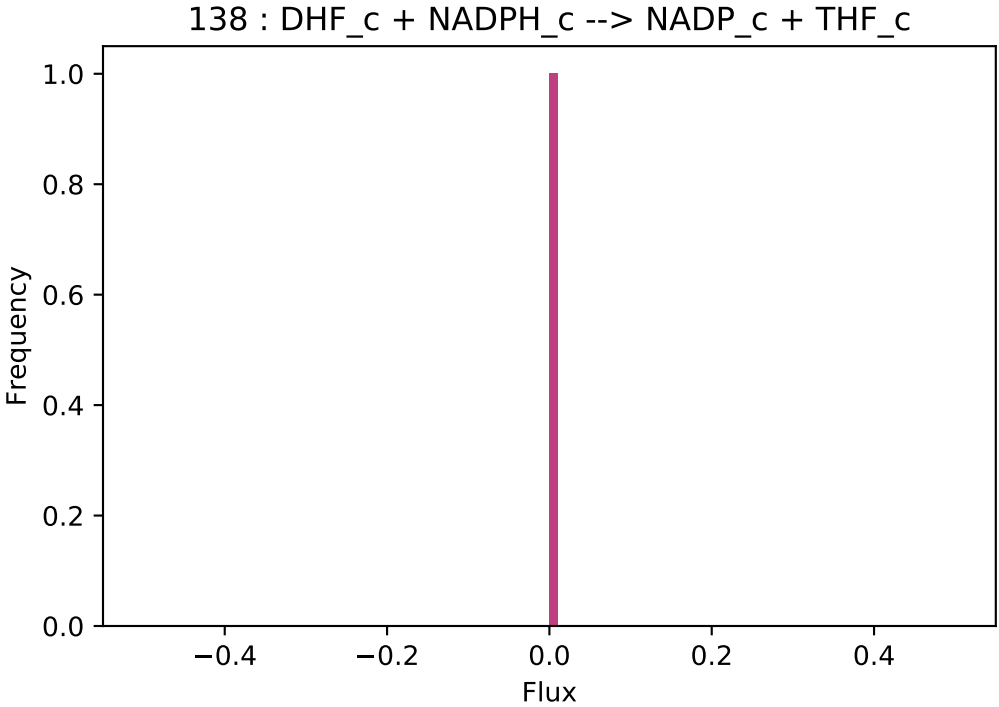

133 : H2O_h + PPi_h --> 2.0 Pi_h
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
10
15
20
25
30
Flux

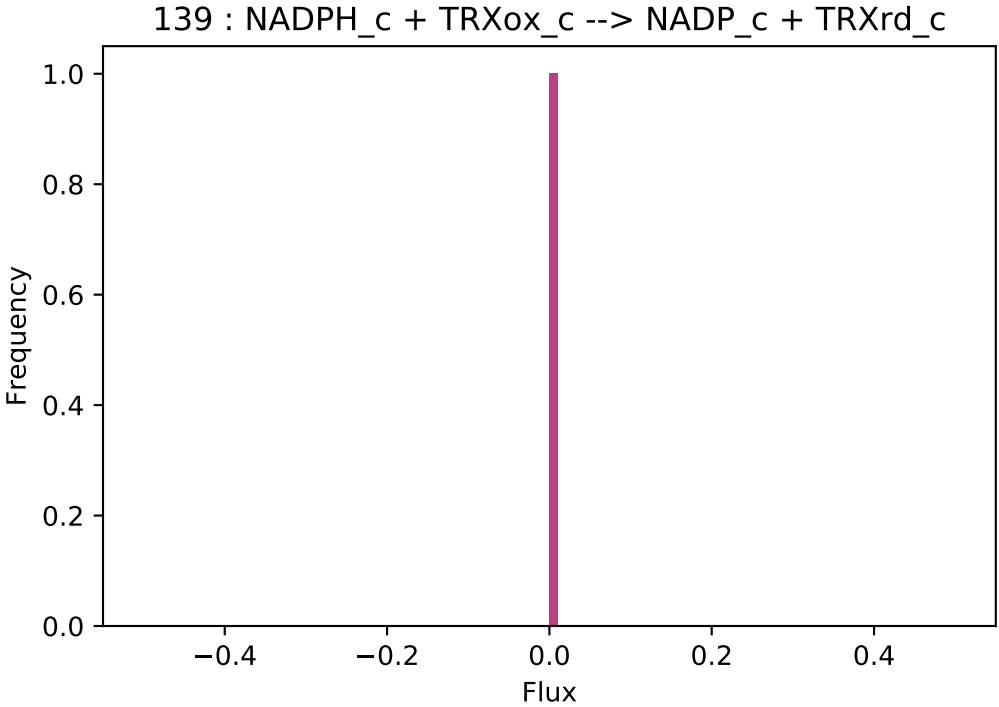

134 : H2O_c + PPi_c --> H_c + 2.0 Pi_c
Frequency
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0
25
50
75
100
125
150
Flux

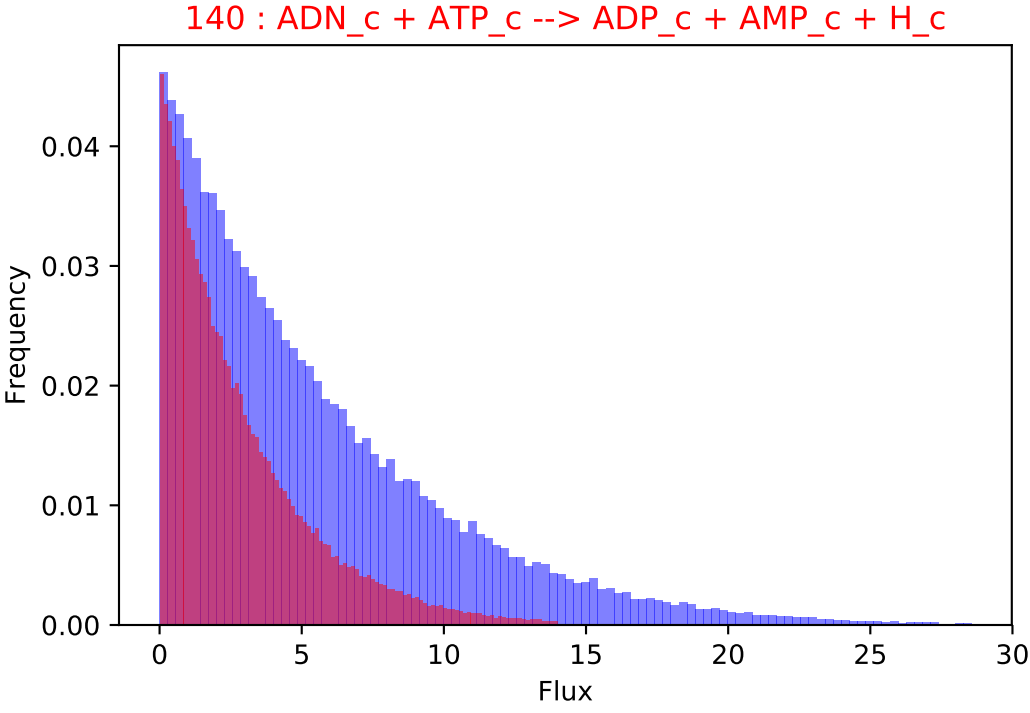

135 : F6P_c + PPi_c <=> FBP_c + H_c + Pi_c
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
−150
−125
−100
−75
−50
−25
0
25
50
Flux

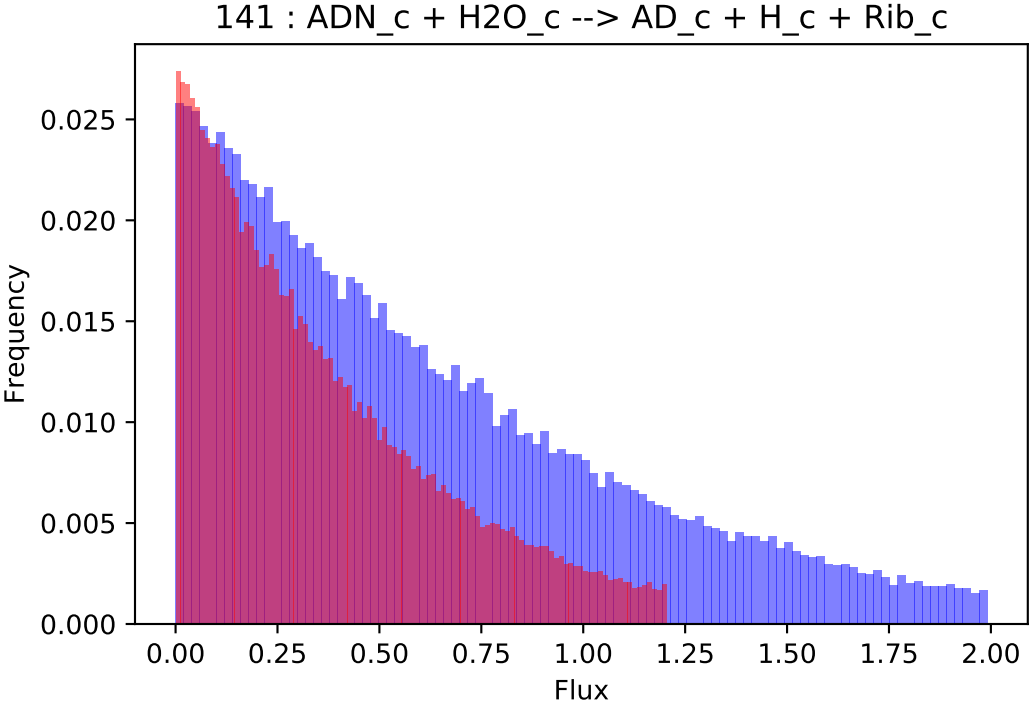

136 : CO2_h + NADH_h <=> For_h + NAD_h
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

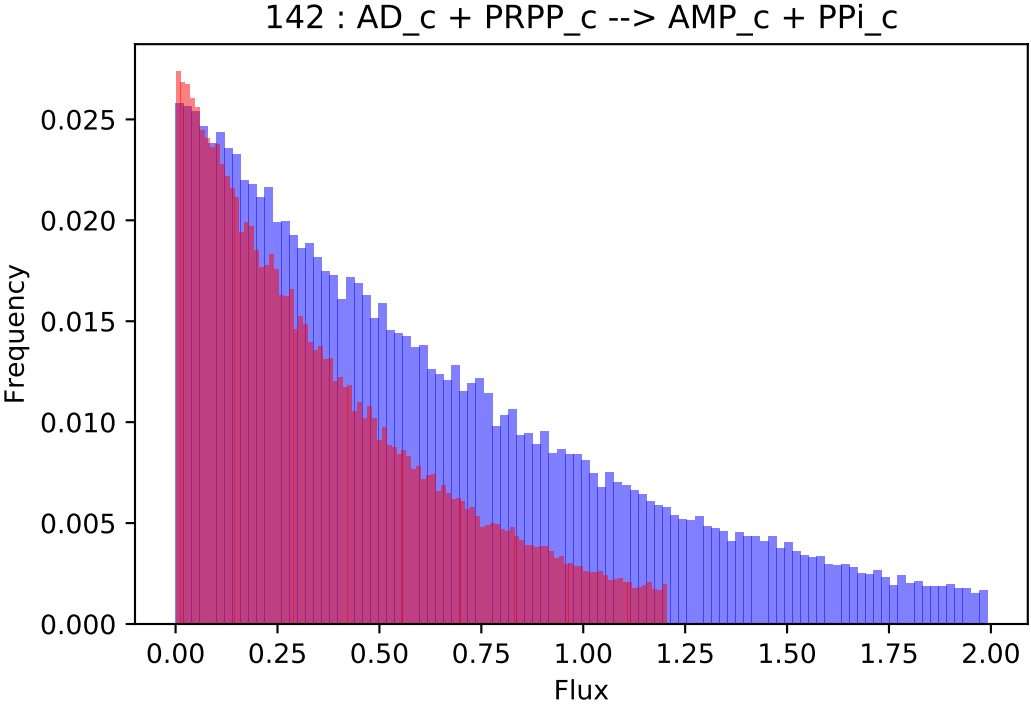

137 : ATP_h + For_h + H_h + THF_h --> ADP_h + F_DASH_THF_h + Pi_h
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

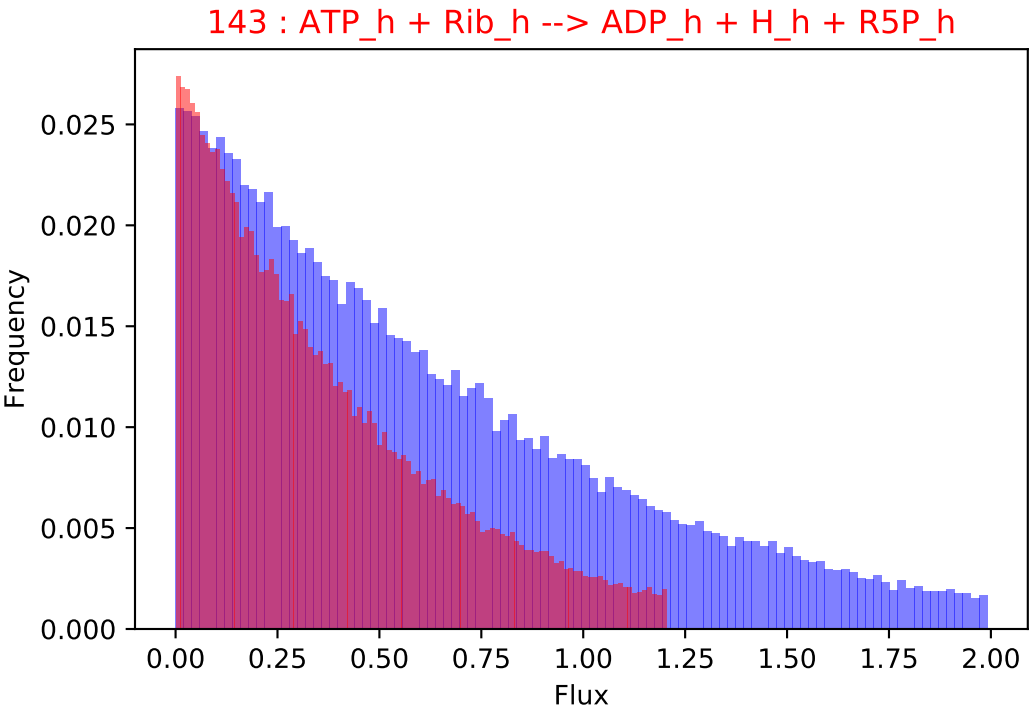

138 : DHF_c + NADPH_c --> NADP_c + THF_c
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

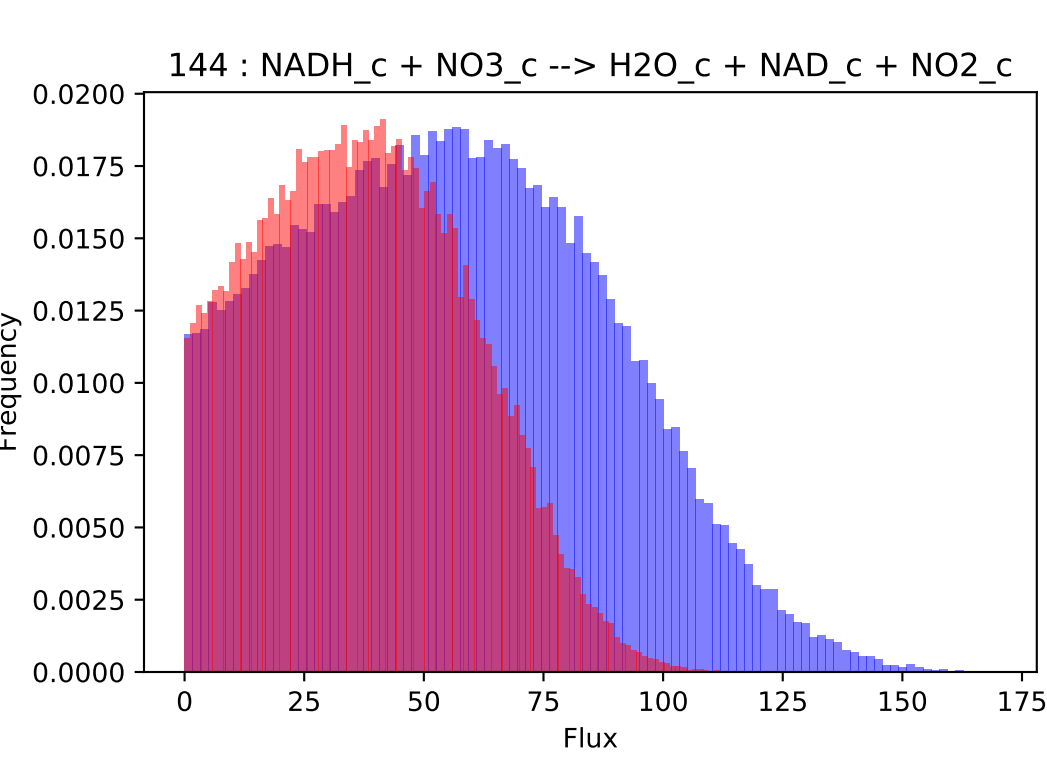

139 : NADPH_c + TRXox_c --> NADP_c + TRXrd_c
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

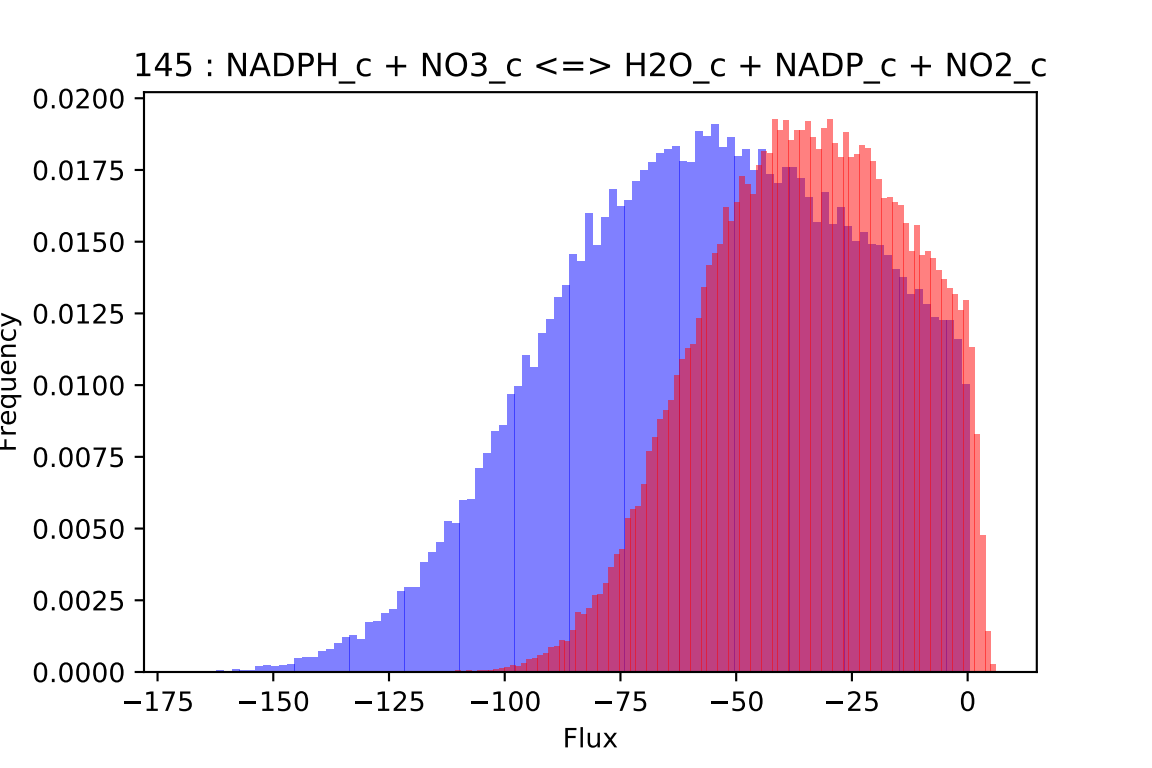

140 : ADN_c + ATP_c --> ADP_c + AMP_c + H_c
Frequency
0.00
0.01
0.02
0.03
0.04
0
5
10
15
20
25
30
Flux

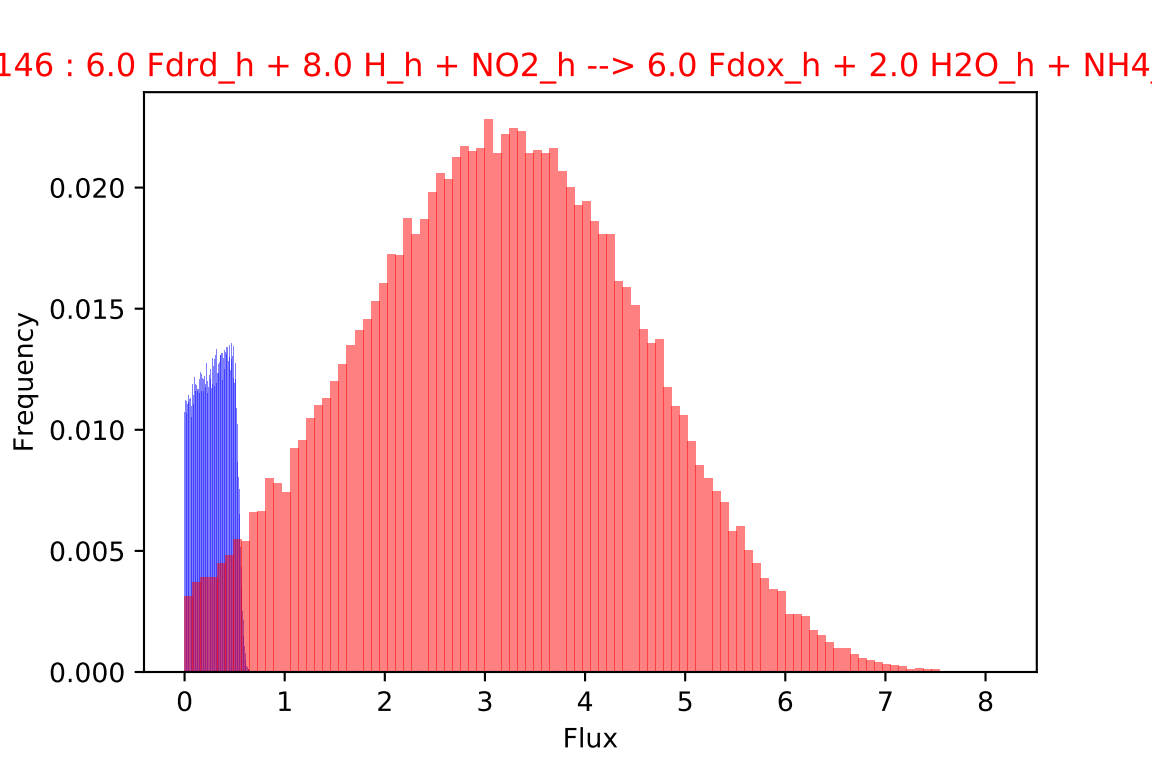

141 : ADN_c + H2O_c --> AD_c + H_c + Rib_c
Frequency
0.025
0.020
0.015
0.010
0.005
0.000
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
Flux

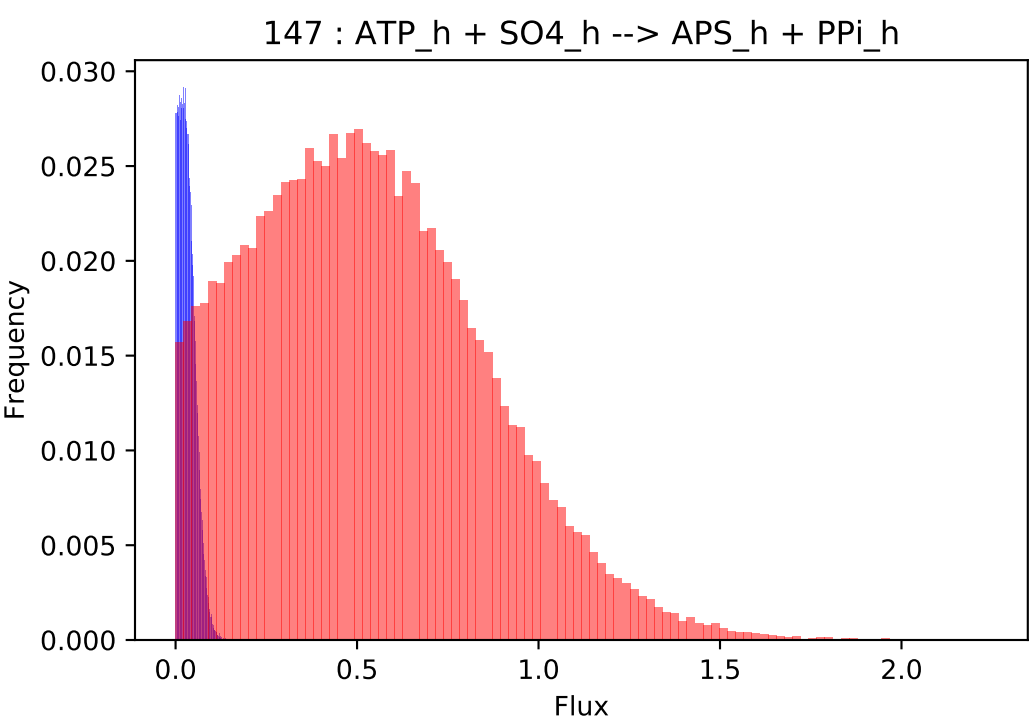

142 : AD_c + PRPP_c --> AMP_c + PPi_c
Frequency
0.025
0.020
0.015
0.010
0.005
0.000
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
Flux

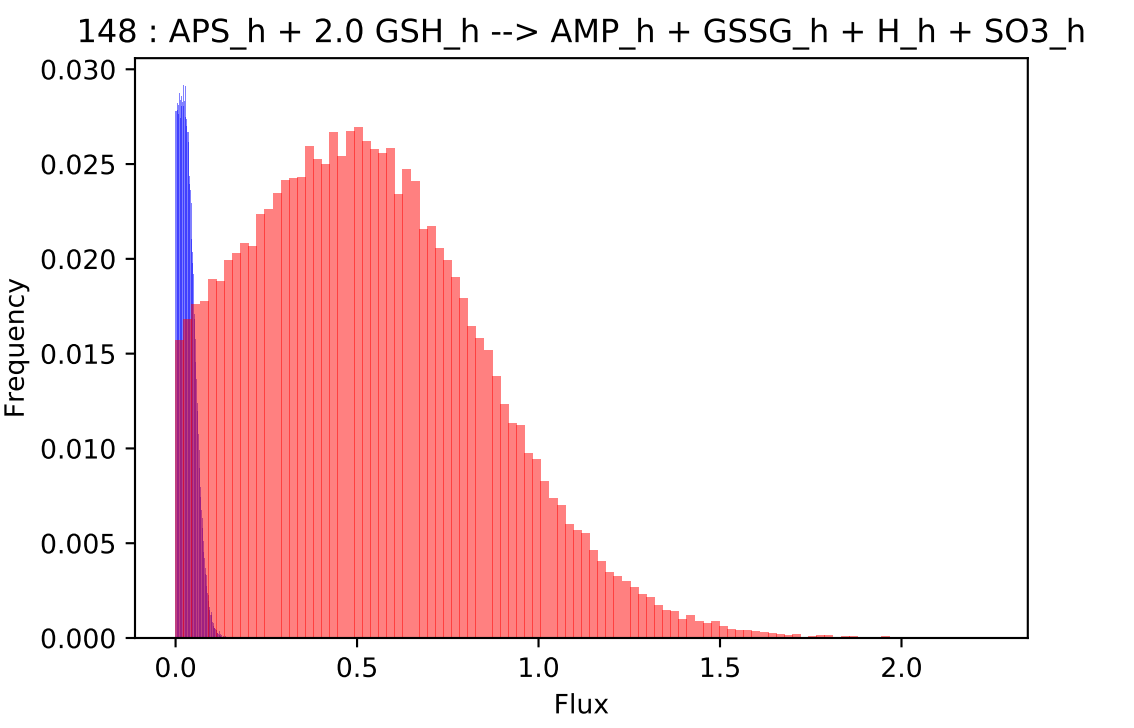

143 : ATP_h + Rib_h --> ADP_h + H_h + R5P_h
Frequency
0.025
0.020
0.015
0.010
0.005
0.000
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
Flux

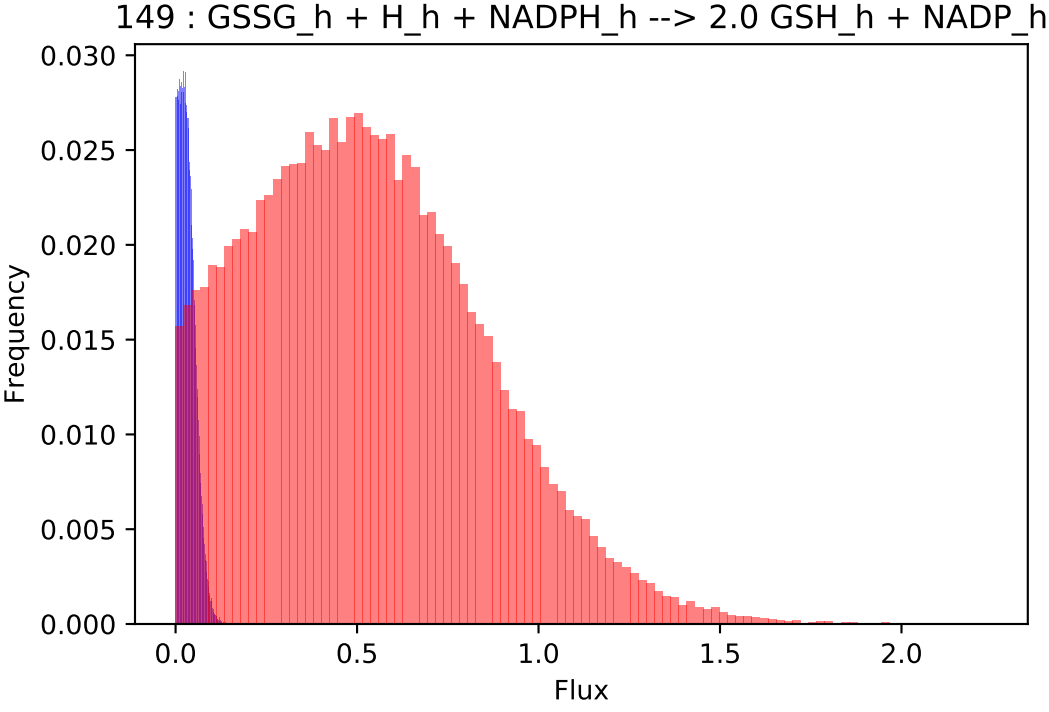

144 : NADH_c + NO3_c --> H2O_c + NAD_c + NO2_c
Frequency
0.0200
0.0175
0.0150
0.0125
0.0100
0.0075
0.0050
0.0025
0.0000
0
25
50
75
100
125
150
175
Flux

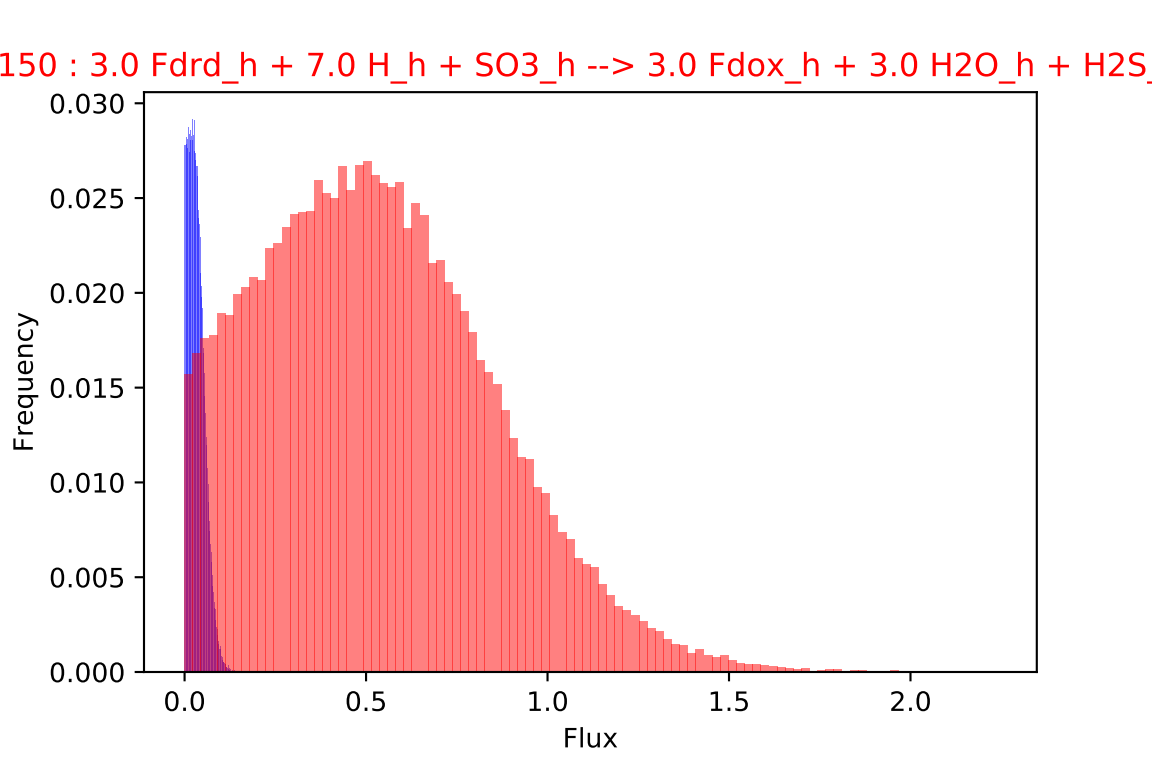

145 : NADPH_c + NO3_c <=> H2O_c + NADP_c + NO2_c
Frequency
0.0200
0.0175
0.0150
0.0125
0.0100
0.0075
0.0050
0.0025
0.0000
−175
−150
−125
−100
−75
−50
−25
0
Flux

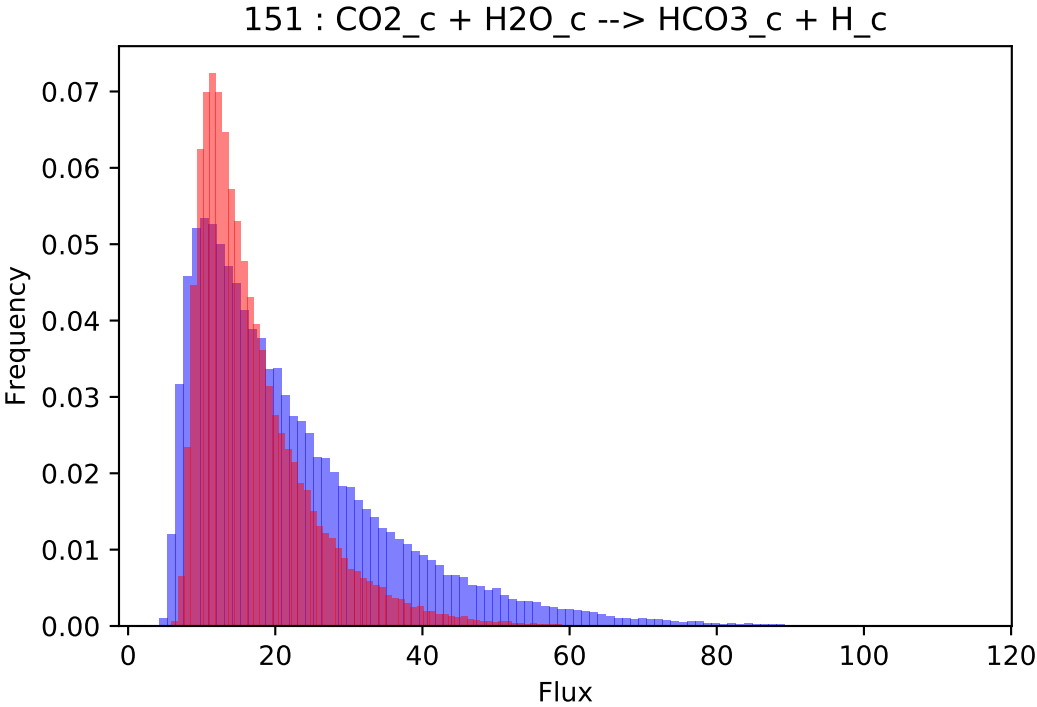

146 : 6.0 Fdrd_h + 8.0 H_h + NO2_h --> 6.0 Fdox_h + 2.0 H2O_h + NH4_
0.020
0.015
0.010
0.005
0.000
Frequency
0
1
2
3
4
5
6
7
8
Flux

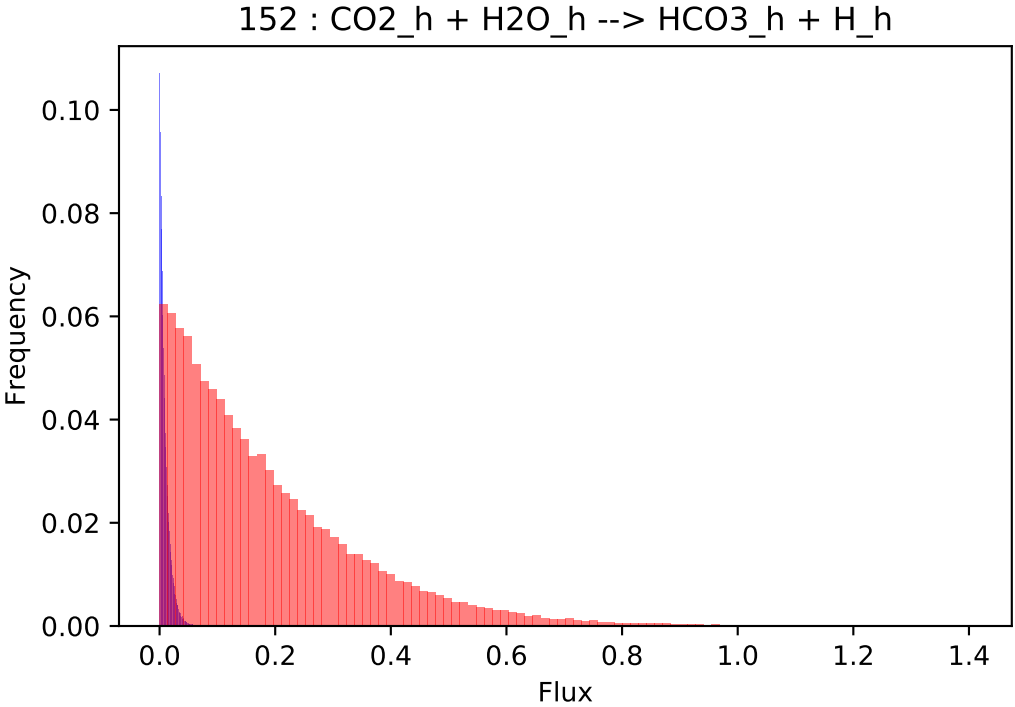

147 : ATP_h + SO4_h --> APS_h + PPi_h
0.030
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
0.0
0.5
1.0
1.5
2.0
Flux

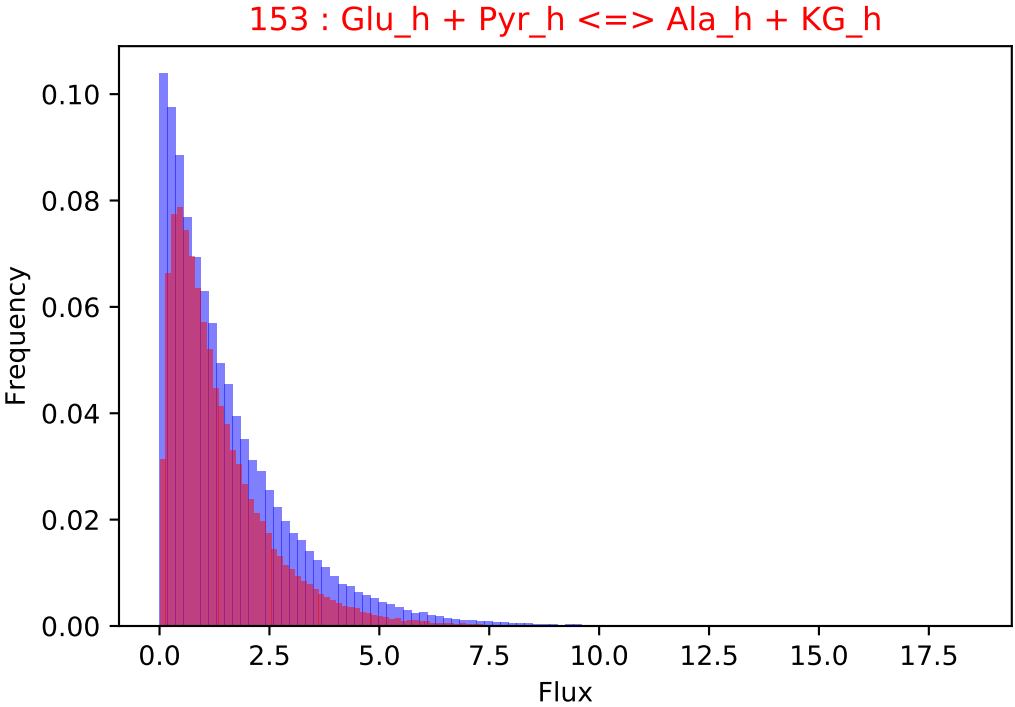

148 : APS_h + 2.0 GSH_h --> AMP_h + GSSG_h + H_h + SO3_h
0.030
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
0.0
0.5
1.0
1.5
2.0
Flux

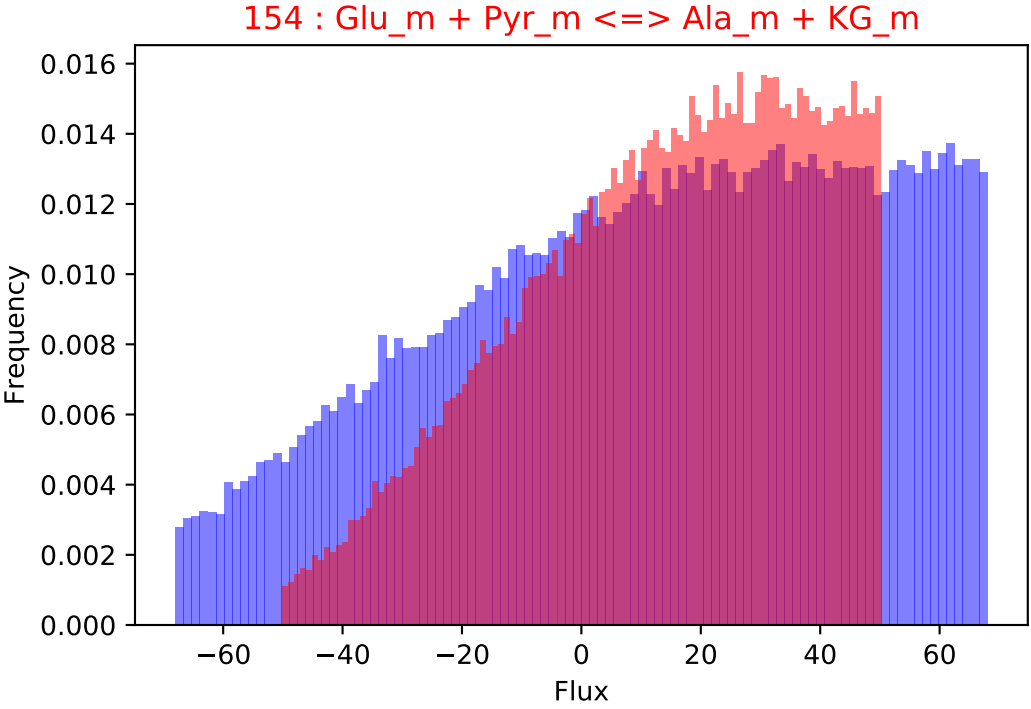

149 : GSSG_h + H_h + NADPH_h --> 2.0 GSH_h + NADP_h
0.030
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
0.0
0.5
1.0
1.5
2.0
Flux

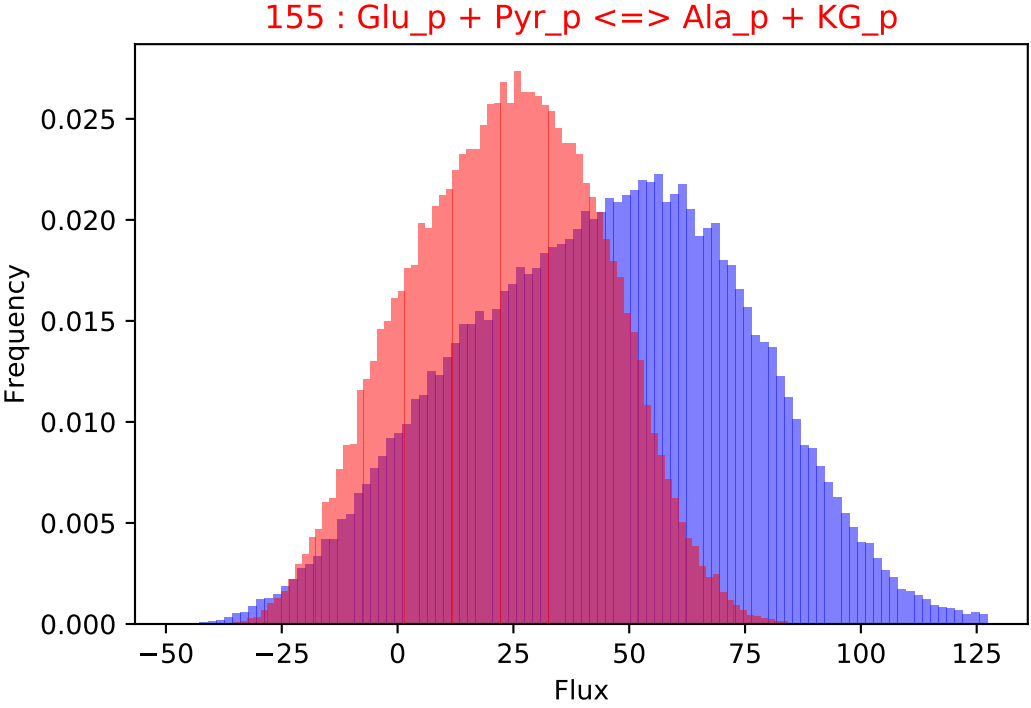

150 : 3.0 Fdrd_h + 7.0 H_h + SO3_h --> 3.0 Fdox_h + 3.0 H2O_h + H2S_
0.030
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
0.0
0.5
1.0
1.5
2.0
Flux

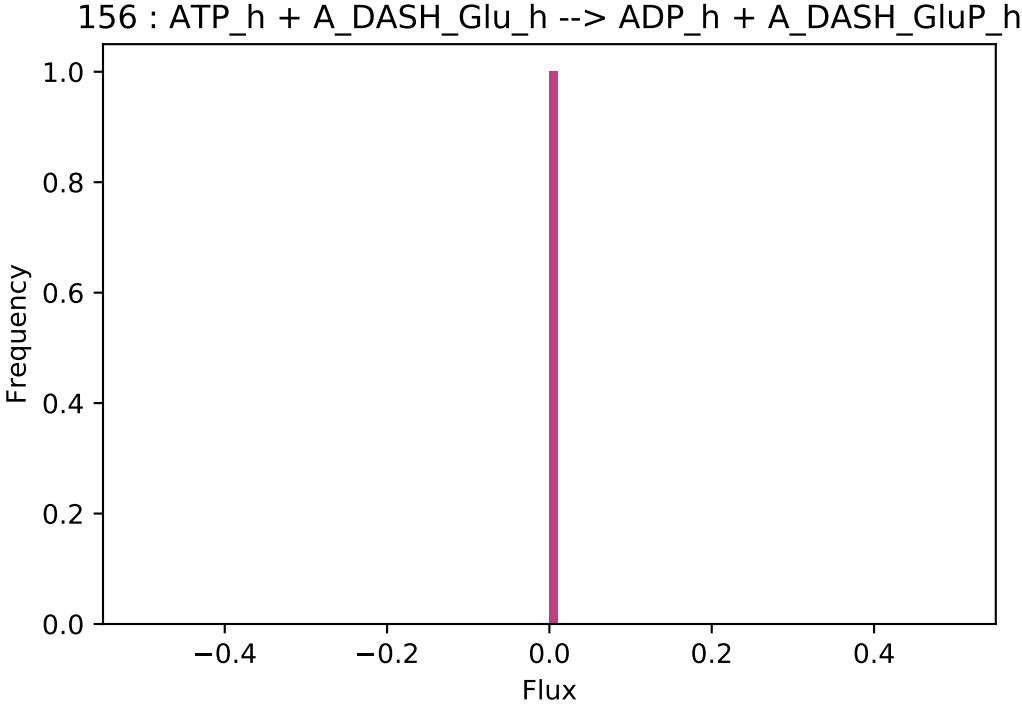

151 : CO2_c + H2O_c --> HCO3_c + H_c
Frequency
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0
20
40
60
80
100
120
Flux

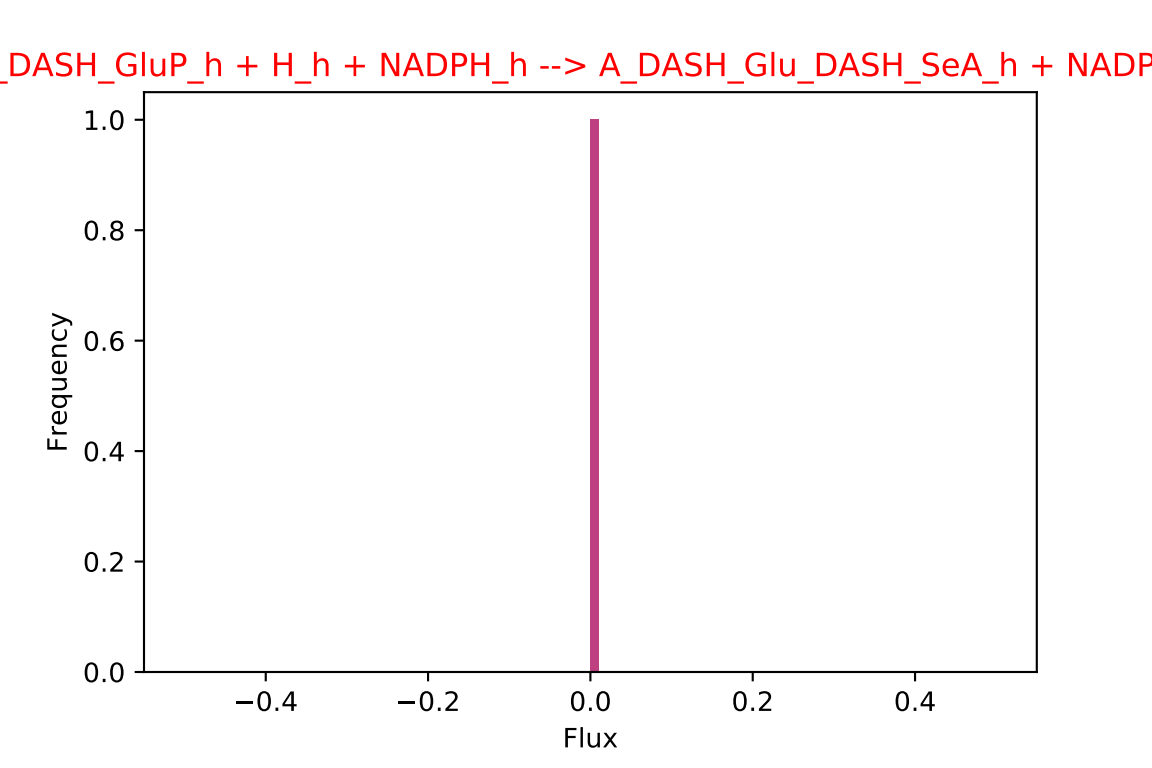

152 : CO2_h + H2O_h --> HCO3_h + H_h
Frequency
0.00
0.02
0.04
0.06
0.08
0.10
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
Flux

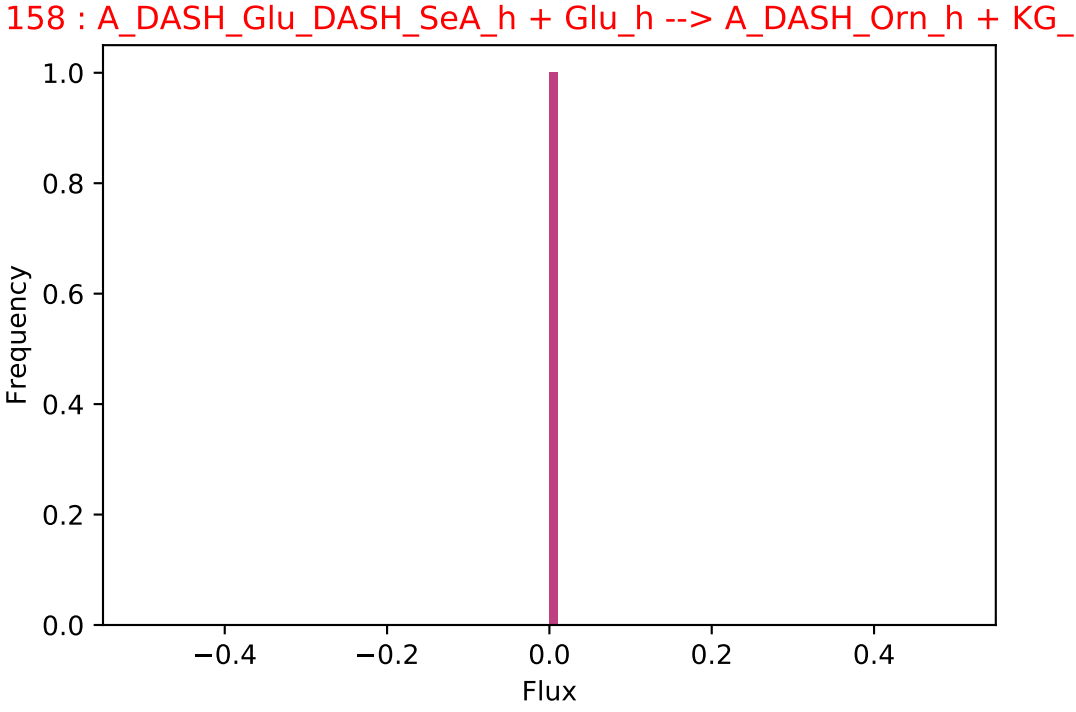

153 : Glu_h + Pyr_h <=> Ala_h + KG_h
Frequency
0.00
0.02
0.04
0.06
0.08
0.10
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
Flux

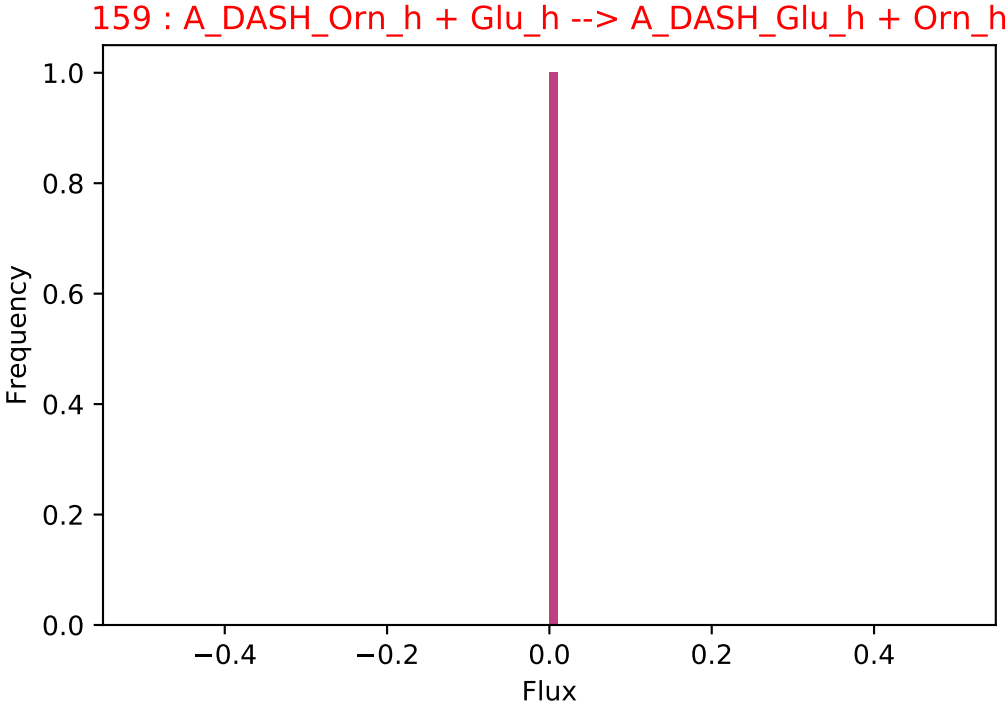

154 : Glu_m + Pyr_m <=> Ala_m + KG_m
0.016
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Frequency
−60
−40
−20
0
20
40
60
Flux

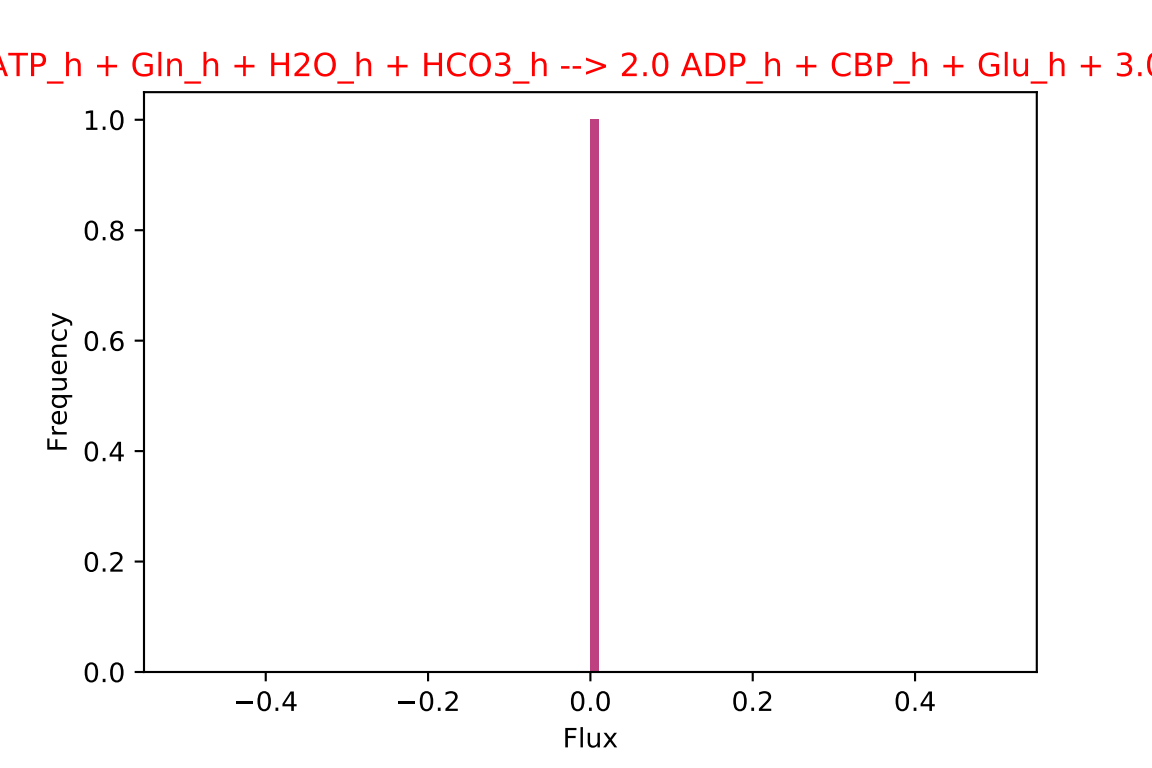

155 : Glu_p + Pyr_p <=> Ala_p + KG_p
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
−50
−25
0
25
50
75
100
125
Flux

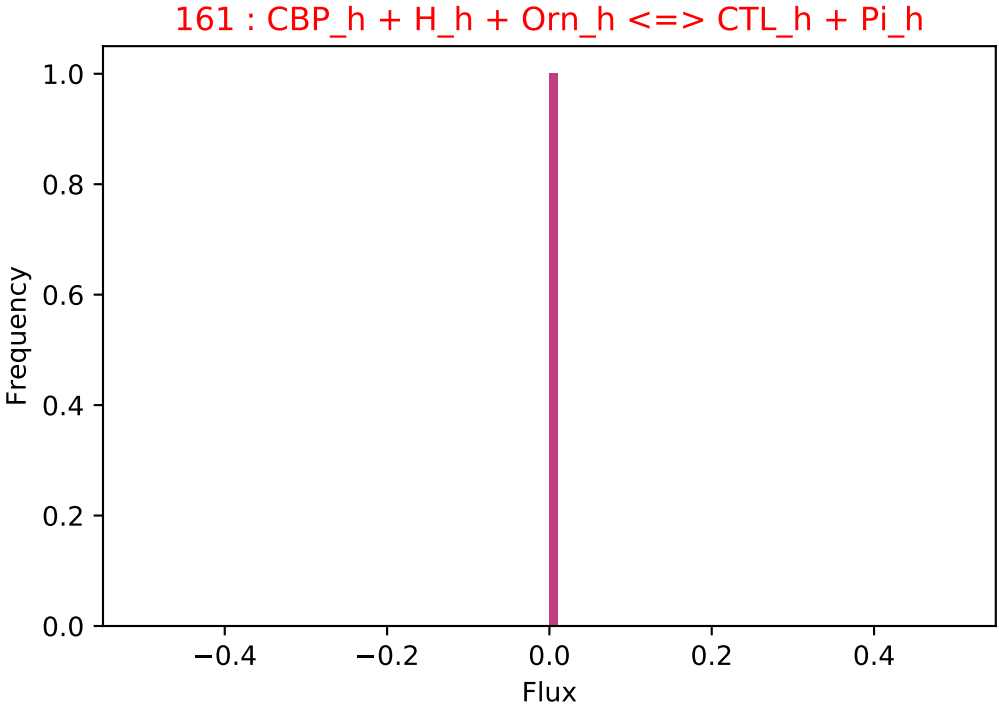

156 : ATP_h + A_DASH_Glu_h --> ADP_h + A_DASH_GluP_h
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

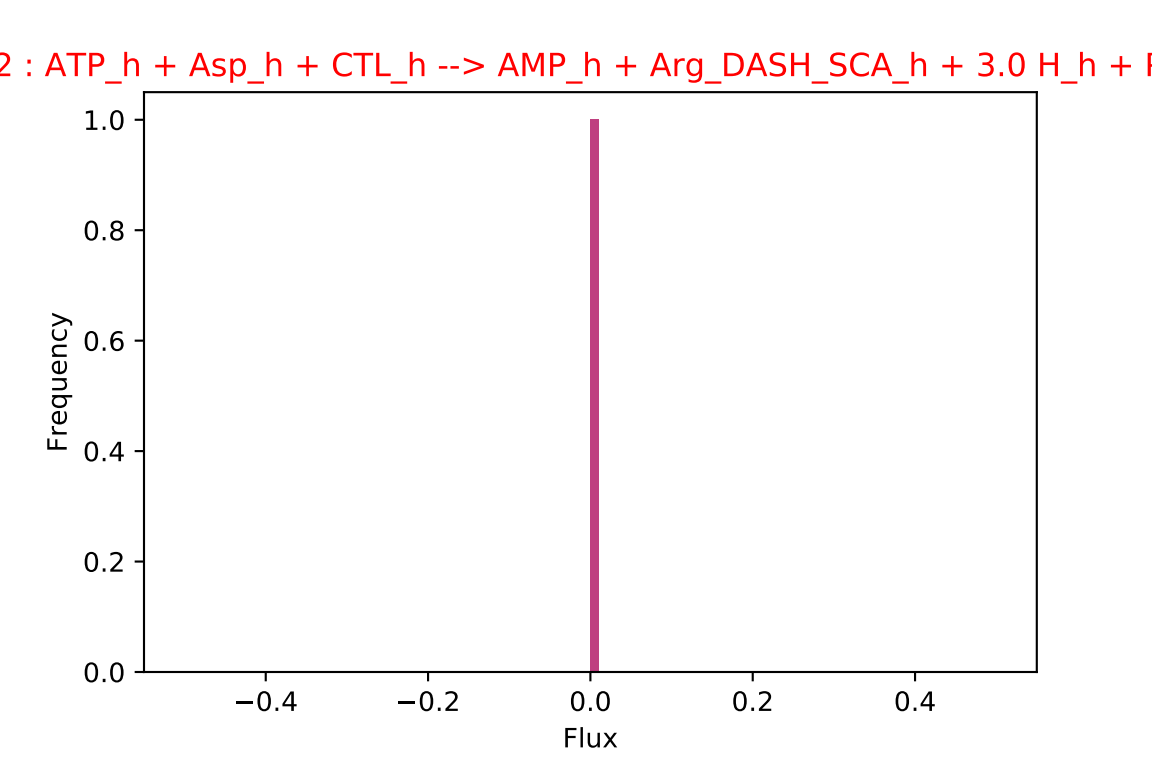

_DASH_GluP_h + H_h + NADPH_h --> A_DASH_Glu_DASH_SeA_h + NADP
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

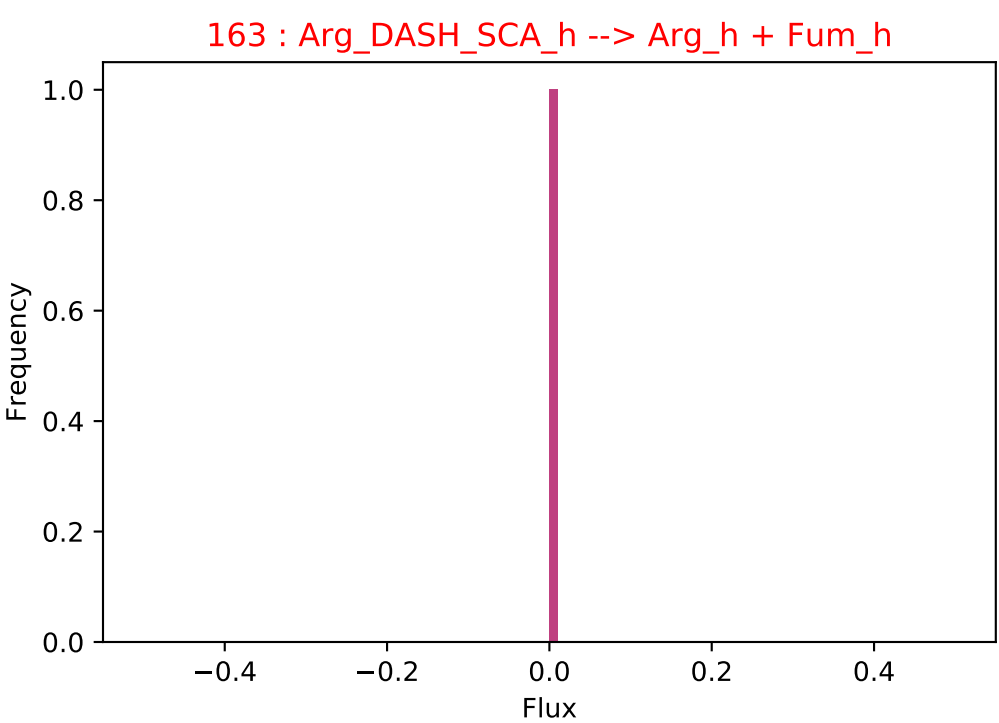

158 : A_DASH_Glu_DASH_SeA_h + Glu_h --> A_DASH_Orn_h + KG_h
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

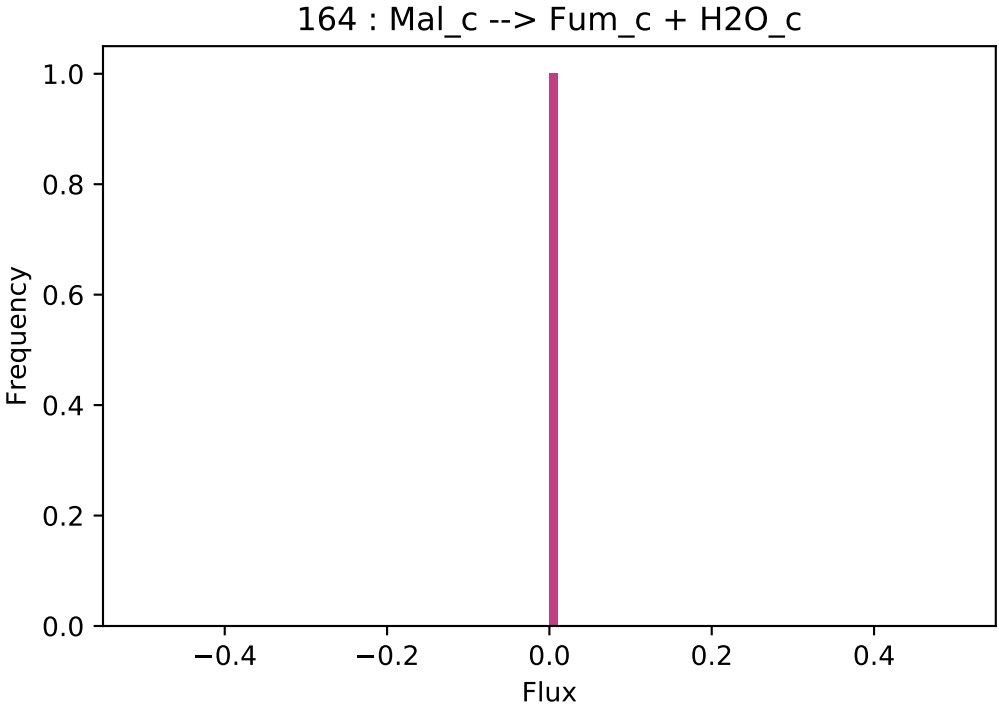

159 : A_DASH_Orn_h + Glu_h --> A_DASH_Glu_h + Orn_h
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

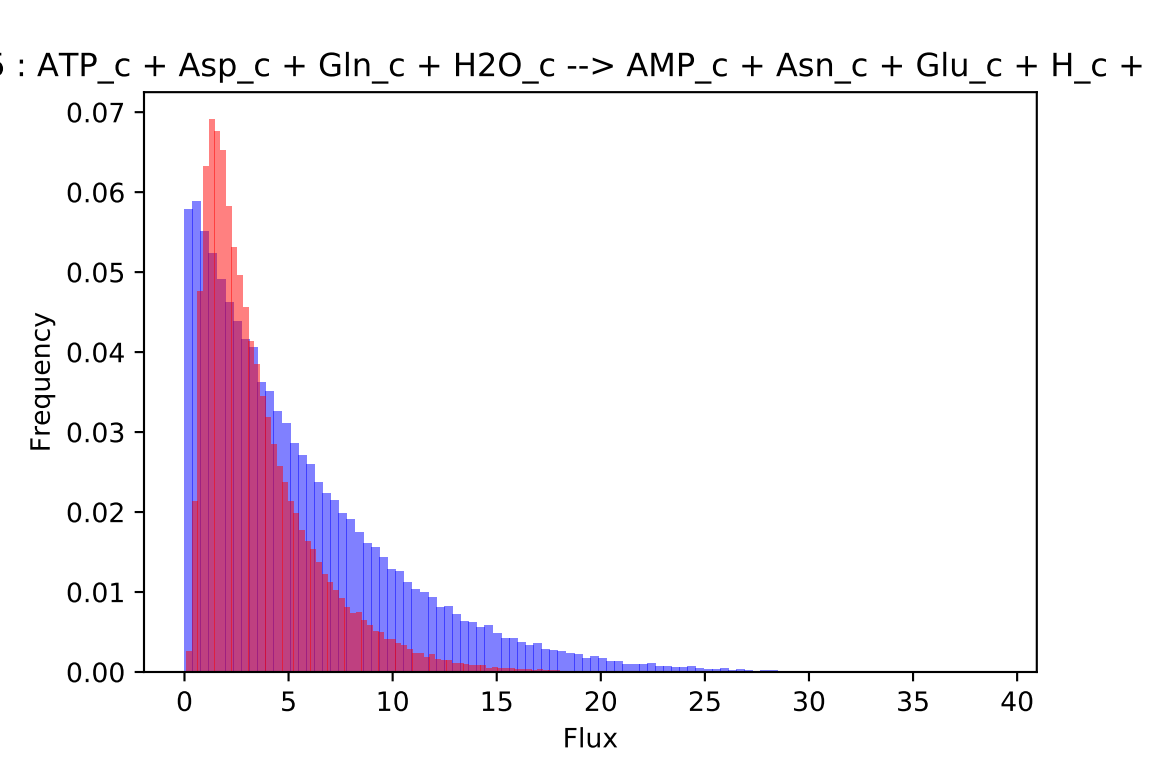

ATP_h + Gln_h + H2O_h + HCO3_h --> 2.0 ADP_h + CBP_h + Glu_h + 3.0
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

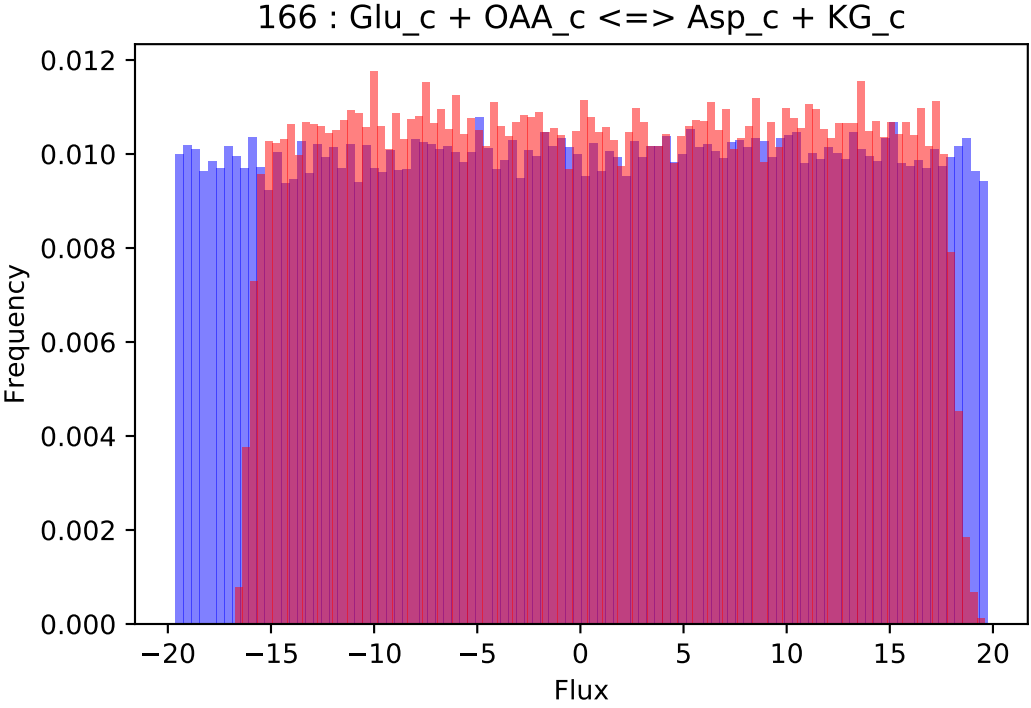

161 : CBP_h + H_h + Orn_h <=> CTL_h + Pi_h
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

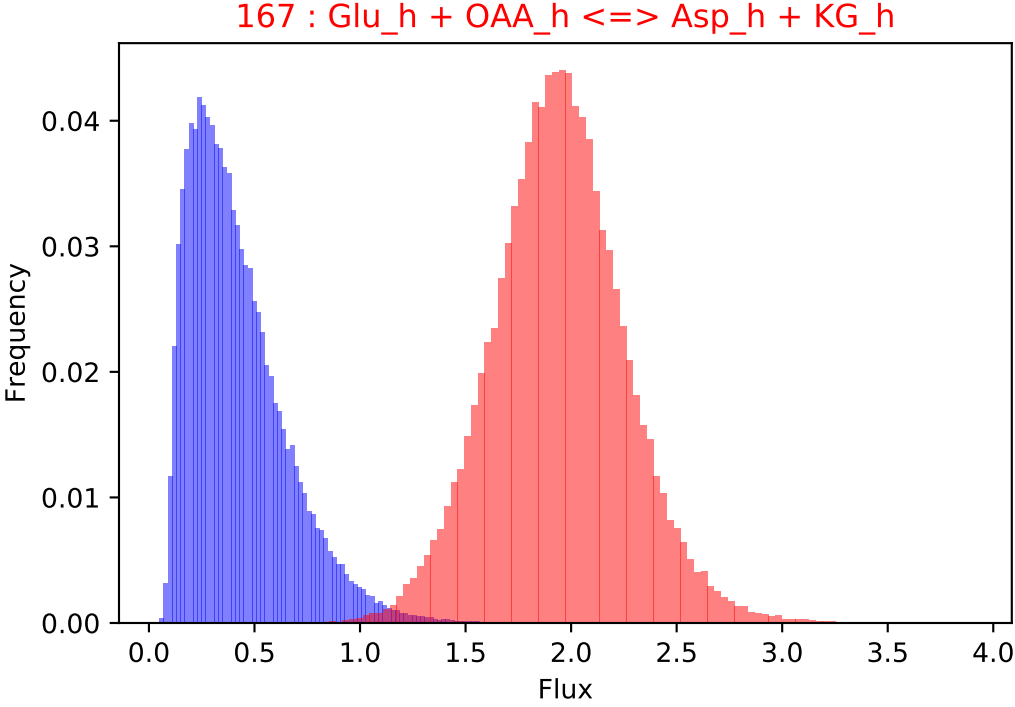

2 : ATP_h + Asp_h + CTL_h --> AMP_h + Arg_DASH_SCA_h + 3.0 H_h + P
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

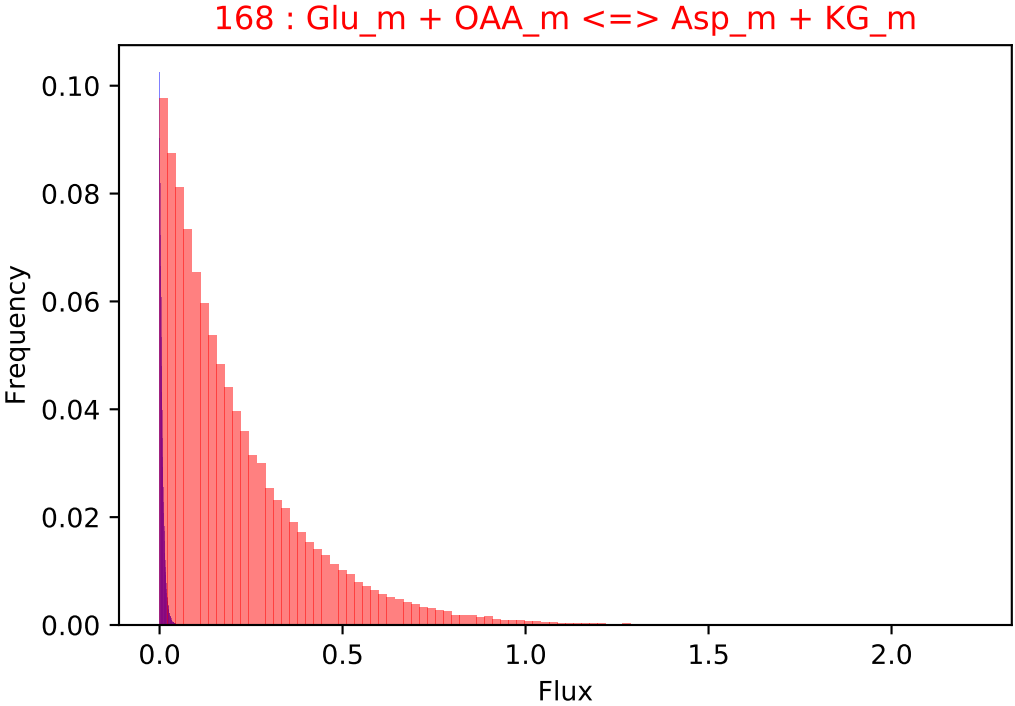

163 : Arg_DASH_SCA_h --> Arg_h + Fum_h
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

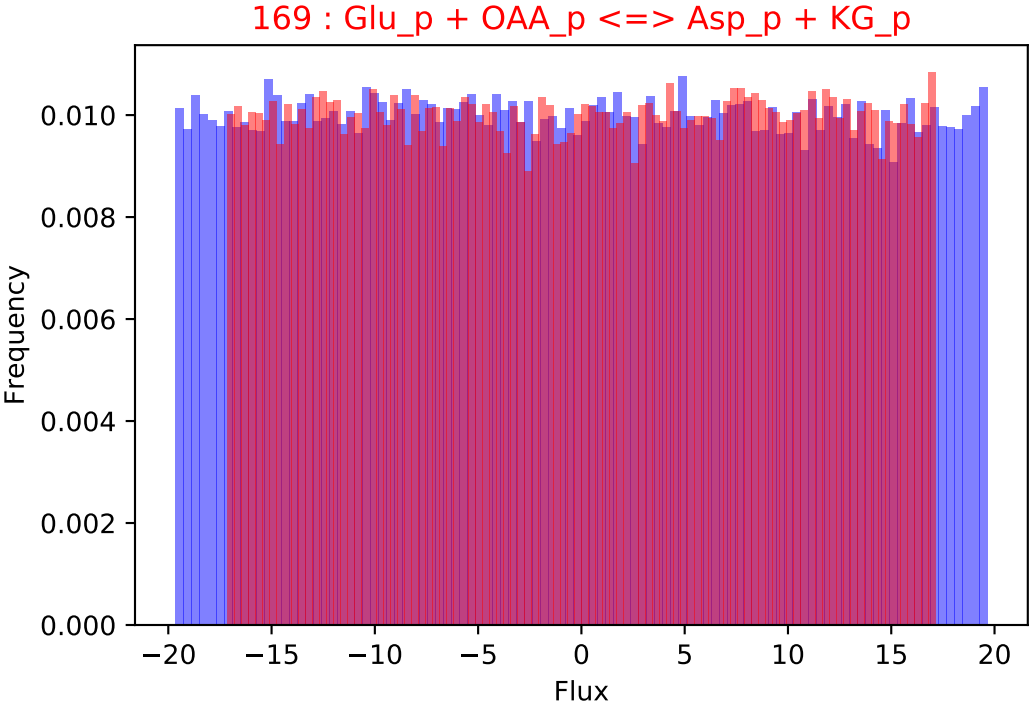

164 : Mal_c --> Fum_c + H2O_c
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

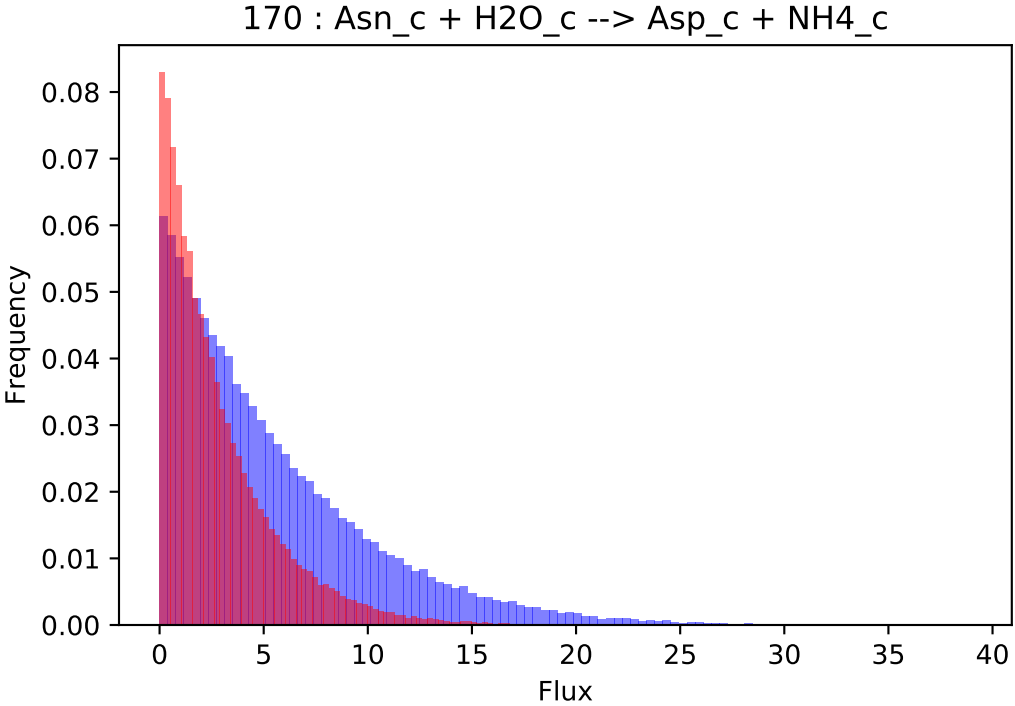

5 : ATP_c + Asp_c + Gln_c + H2O_c --> AMP_c + Asn_c + Glu_c + H_c +
Frequency
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0
5
10
15
20
25
30
35
40
Flux

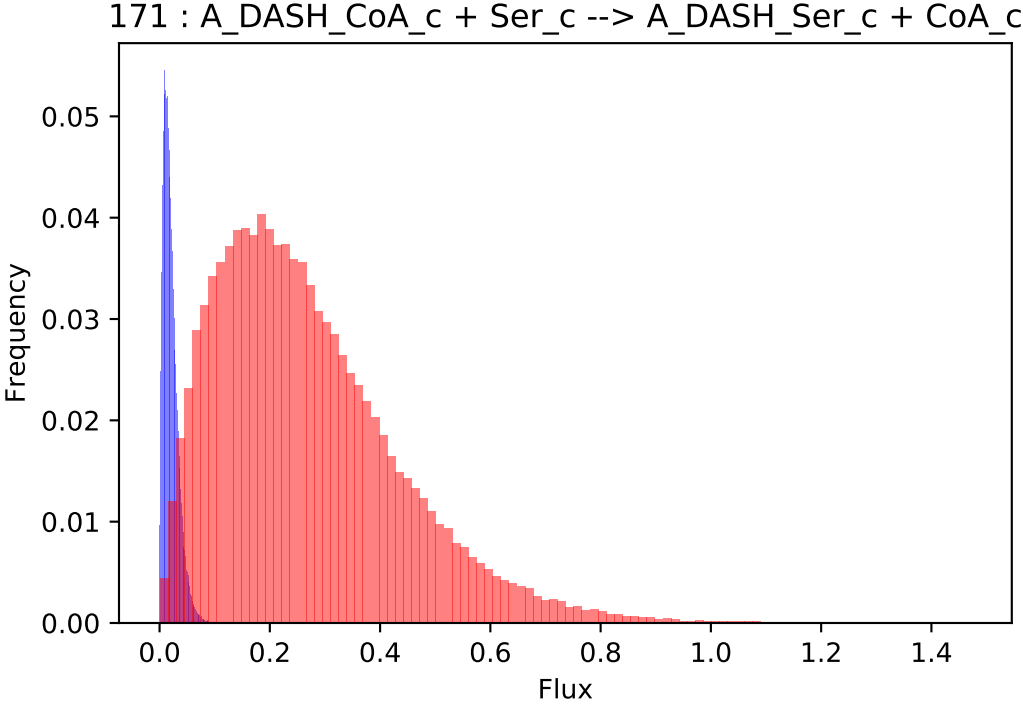

166 : Glu_c + OAA_c <=> Asp_c + KG_c
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Frequency
−20
−15
−10
−5
0
5
10
15
20
Flux

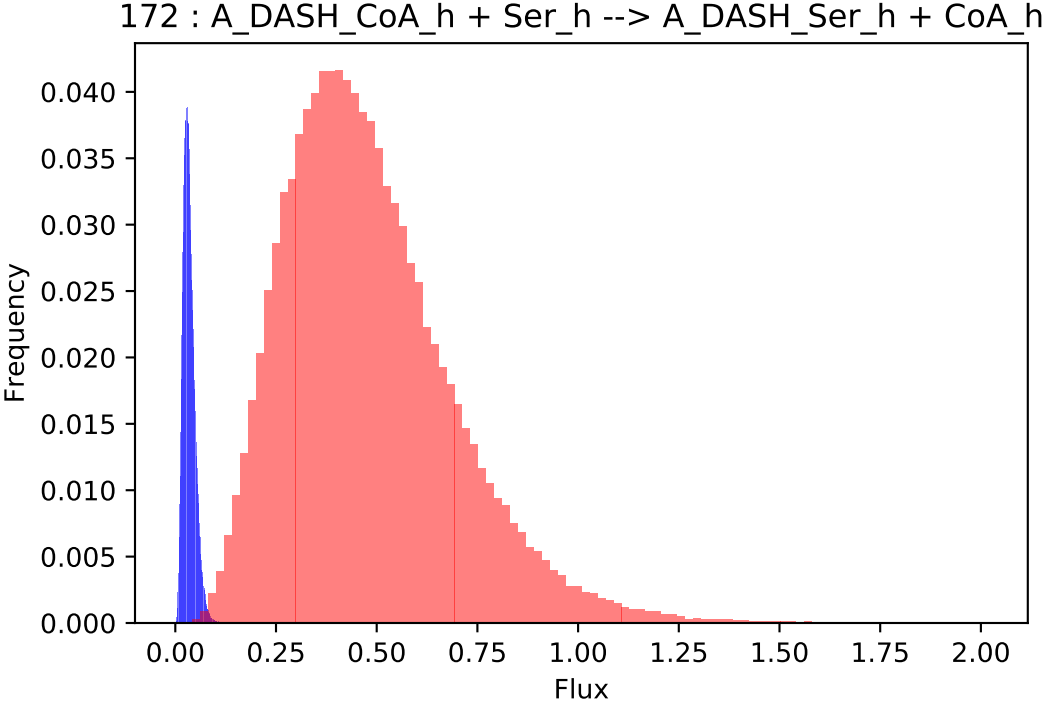

167 : Glu_h + OAA_h <=> Asp_h + KG_h
Frequency
0.00
0.01
0.02
0.03
0.04
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Flux

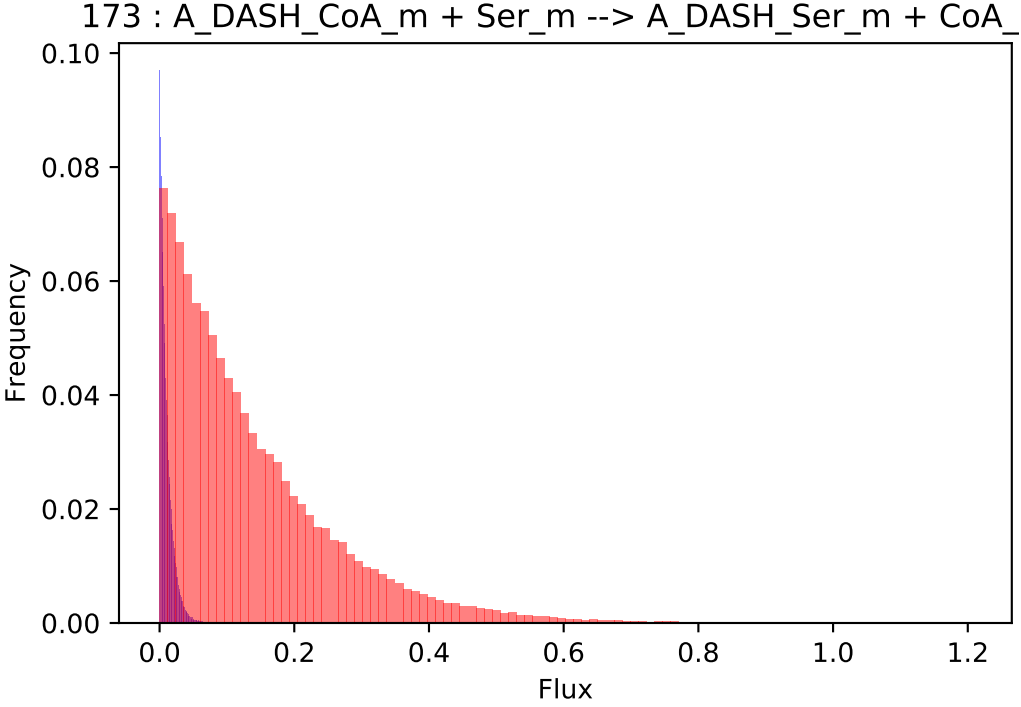

168 : Glu_m + OAA_m <=> Asp_m + KG_m
Frequency
0.00
0.02
0.04
0.06
0.08
0.10
0.0
0.5
1.0
1.5
2.0
Flux

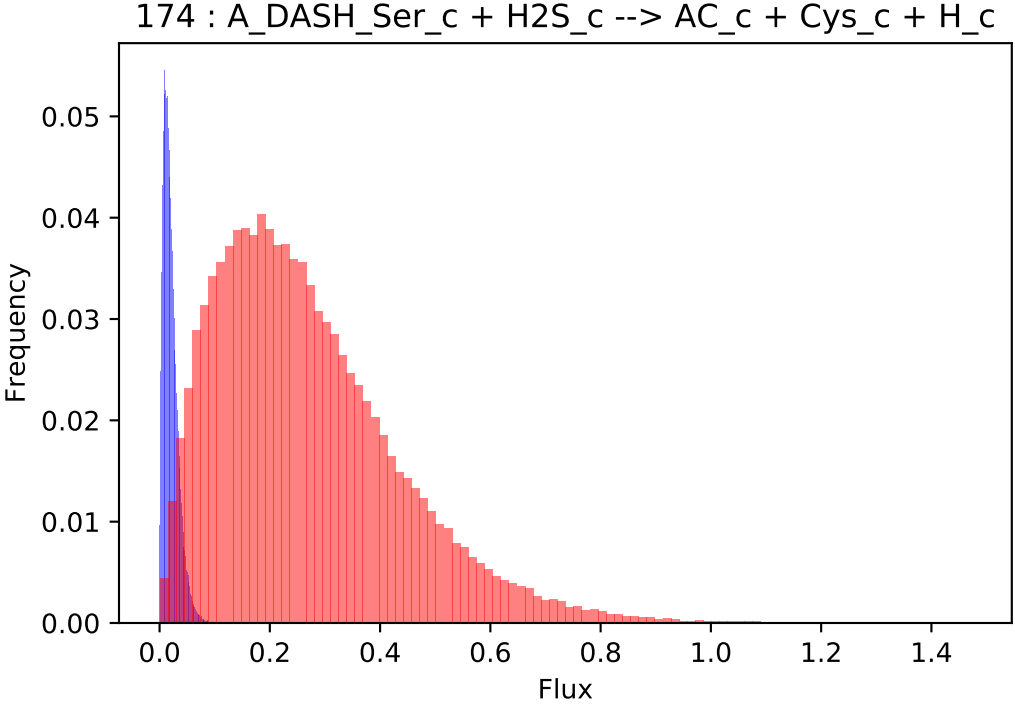

169 : Glu_p + OAA_p <=> Asp_p + KG_p
0.010
0.008
0.006
0.004
0.002
0.000
Frequency
−20
−15
−10
−5
0
5
10
15
20
Flux

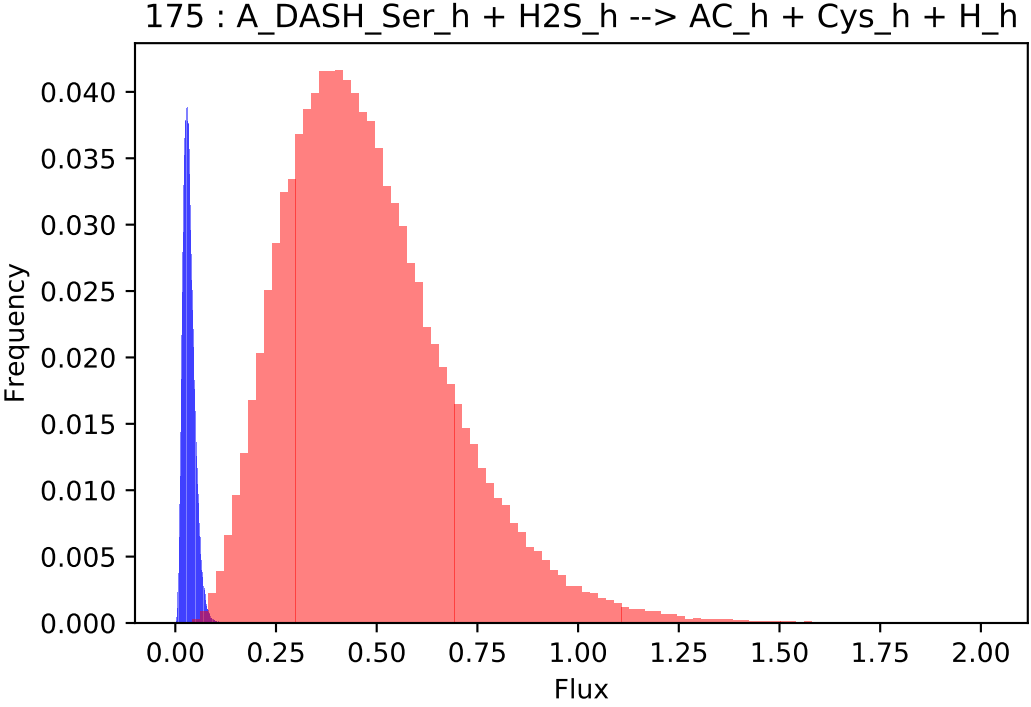

170 : Asn_c + H2O_c --> Asp_c + NH4_c
Frequency
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0
5
10
15
20
25
30
35
40
Flux

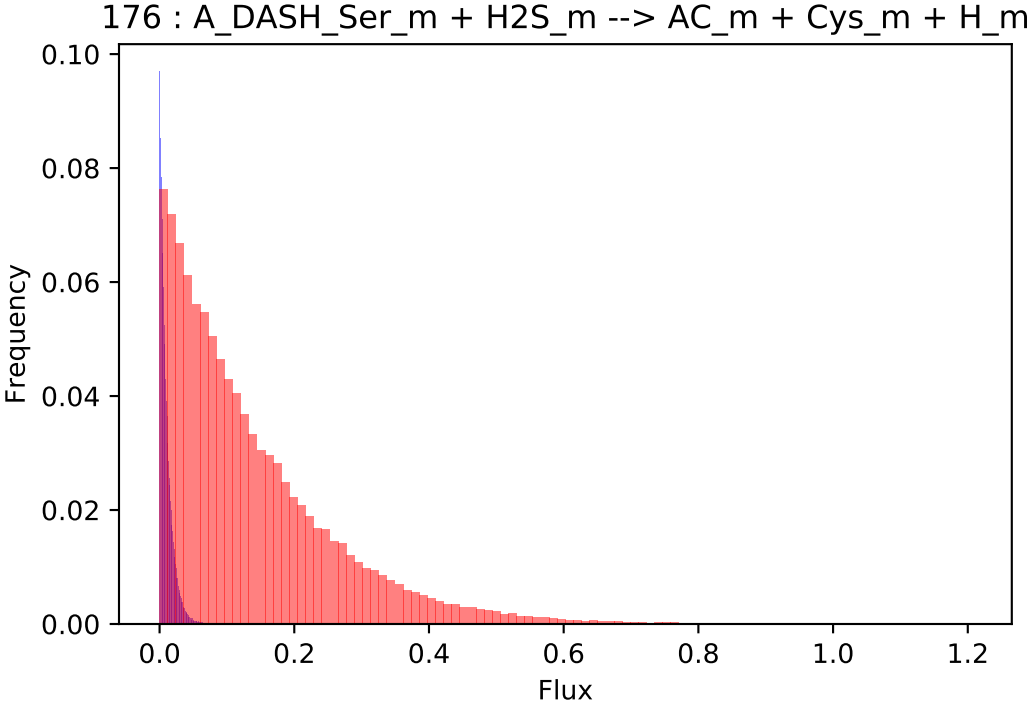

171 : A_DASH_CoA_c + Ser_c --> A_DASH_Ser_c + CoA_c
Frequency
0.00
0.01
0.02
0.03
0.04
0.05
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
Flux

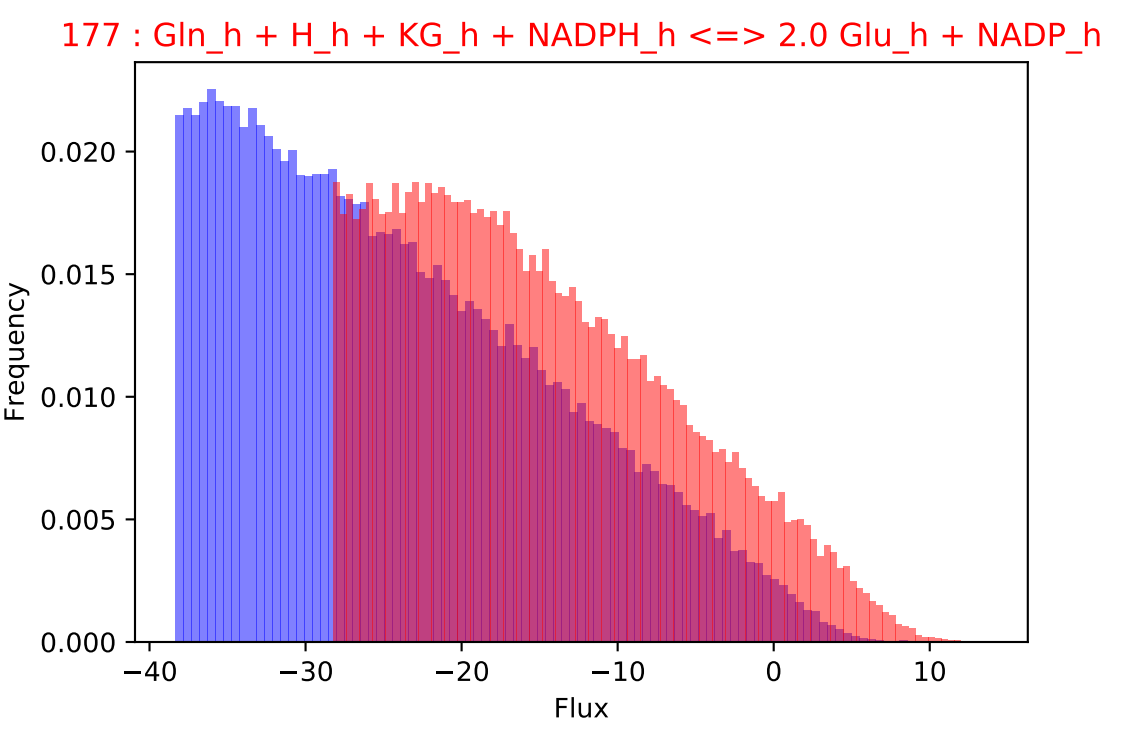

172 : A_DASH_CoA_h + Ser_h --> A_DASH_Ser_h + CoA_h
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
Flux

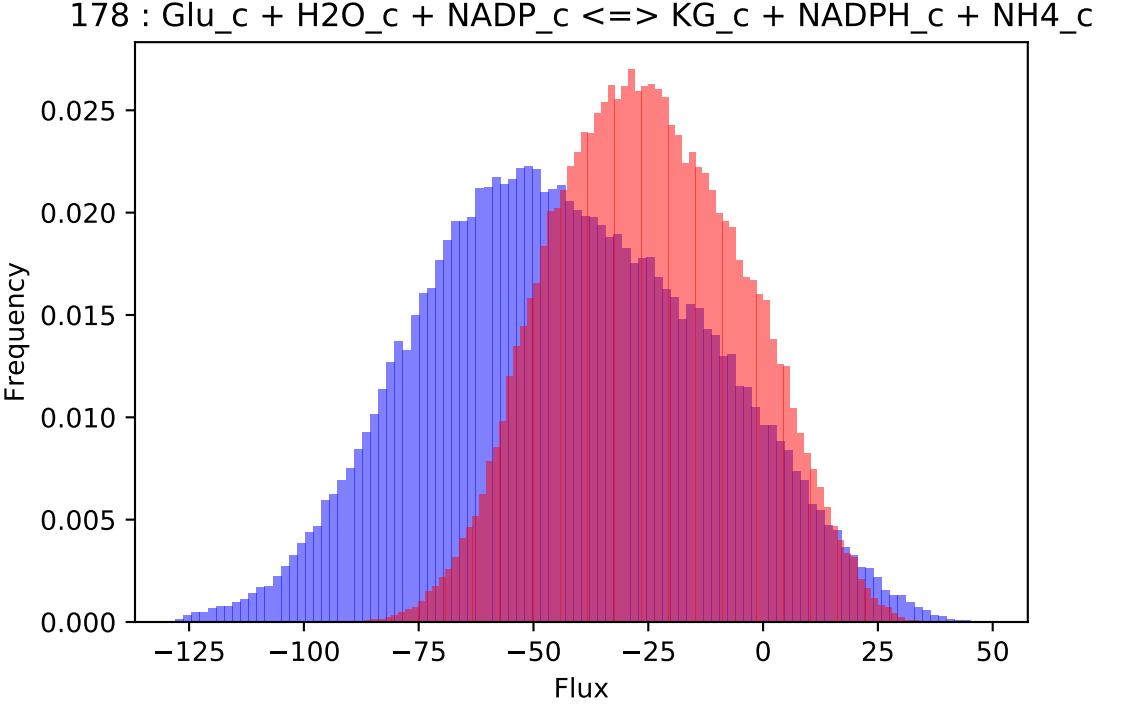

173 : A_DASH_CoA_m + Ser_m --> A_DASH_Ser_m + CoA_m
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

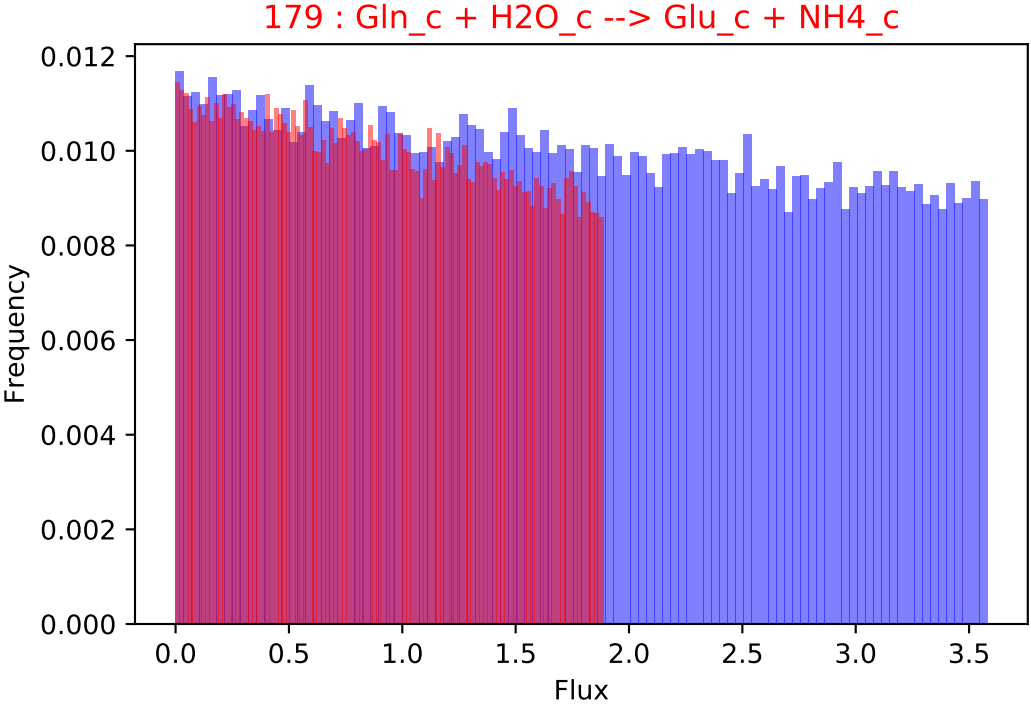

174 : A_DASH_Ser_c + H2S_c --> AC_c + Cys_c + H_c
Frequency
0.00
0.01
0.02
0.03
0.04
0.05
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
Flux

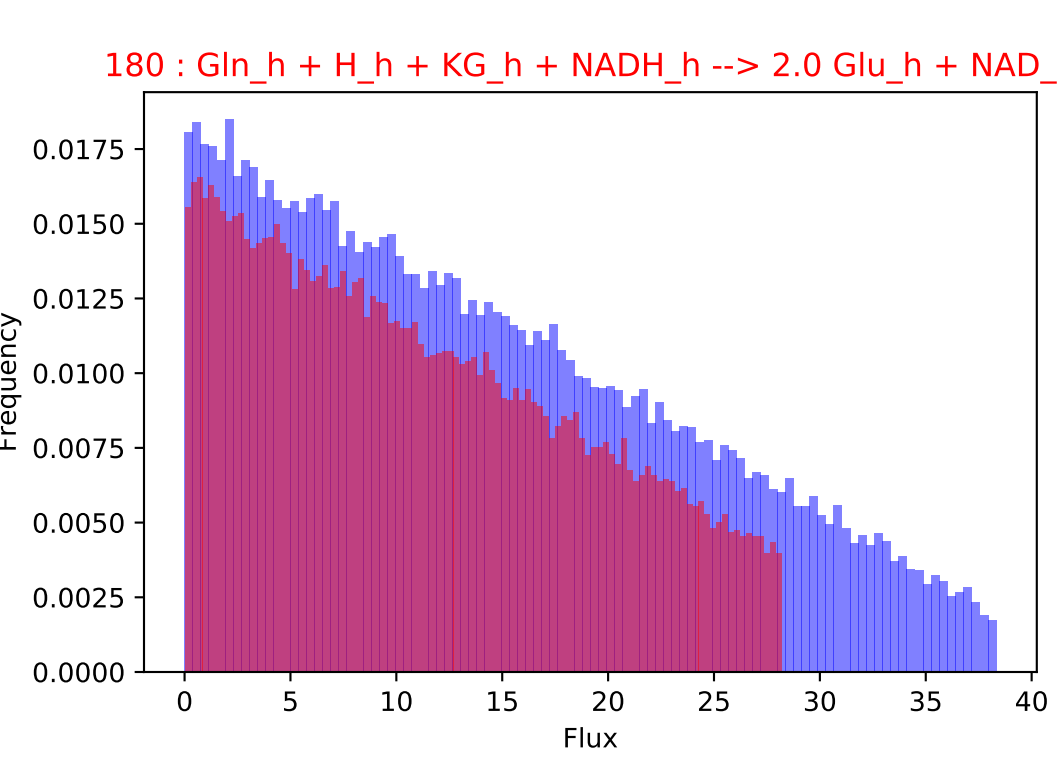

175 : A_DASH_Ser_h + H2S_h --> AC_h + Cys_h + H_h
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
Flux

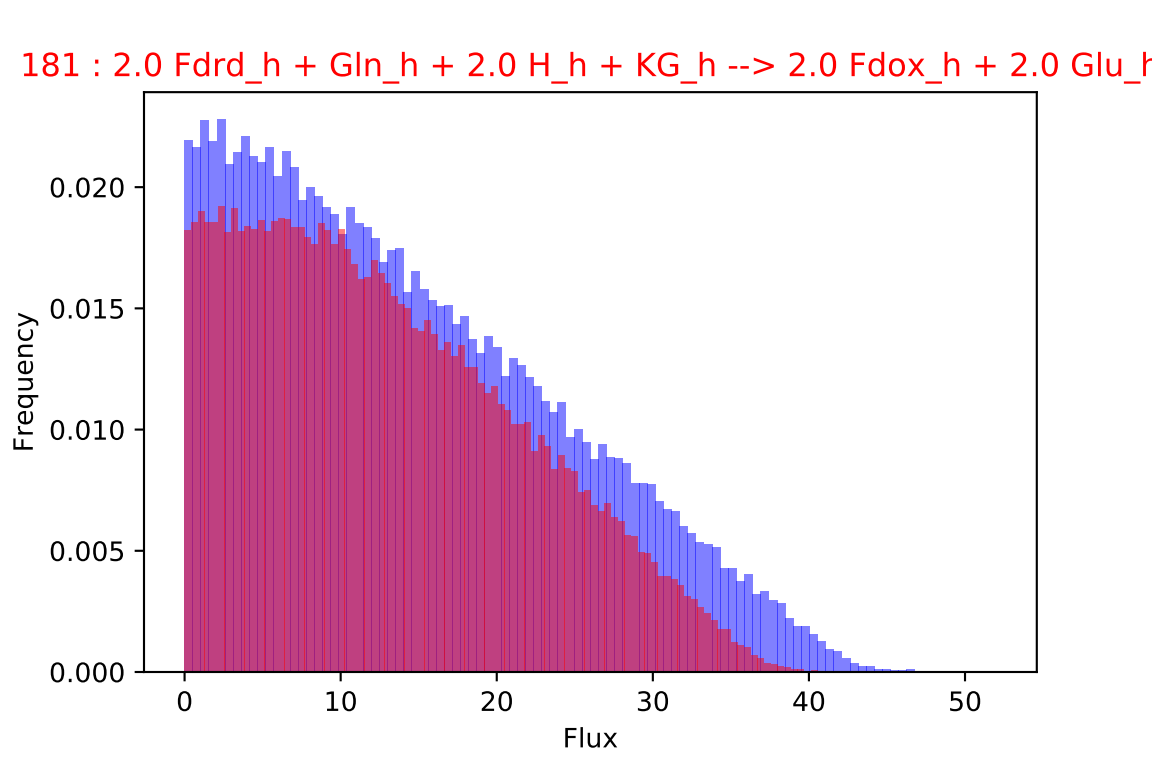

176 : A_DASH_Ser_m + H2S_m --> AC_m + Cys_m + H_m
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

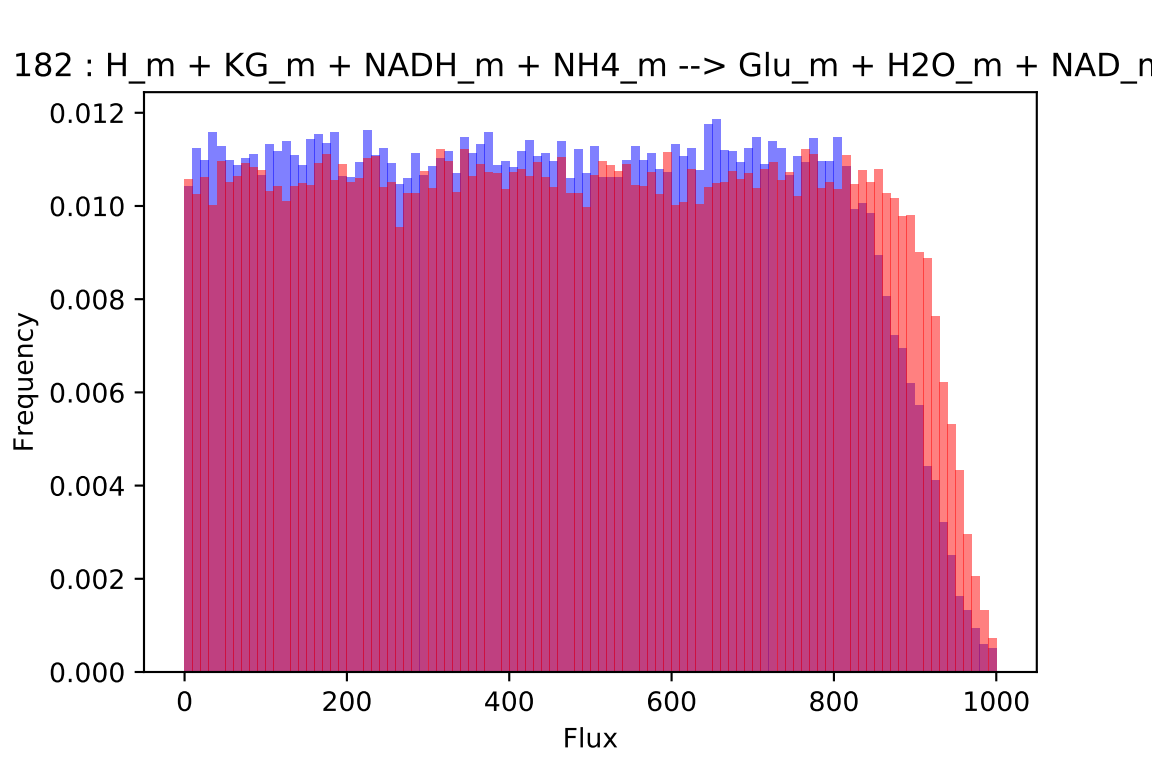

177 : Gln_h + H_h + KG_h + NADPH_h <=> 2.0 Glu_h + NADP_h
0.020
0.015
0.010
0.005
0.000
Frequency
−40
−30
−20
−10
0
10
Flux

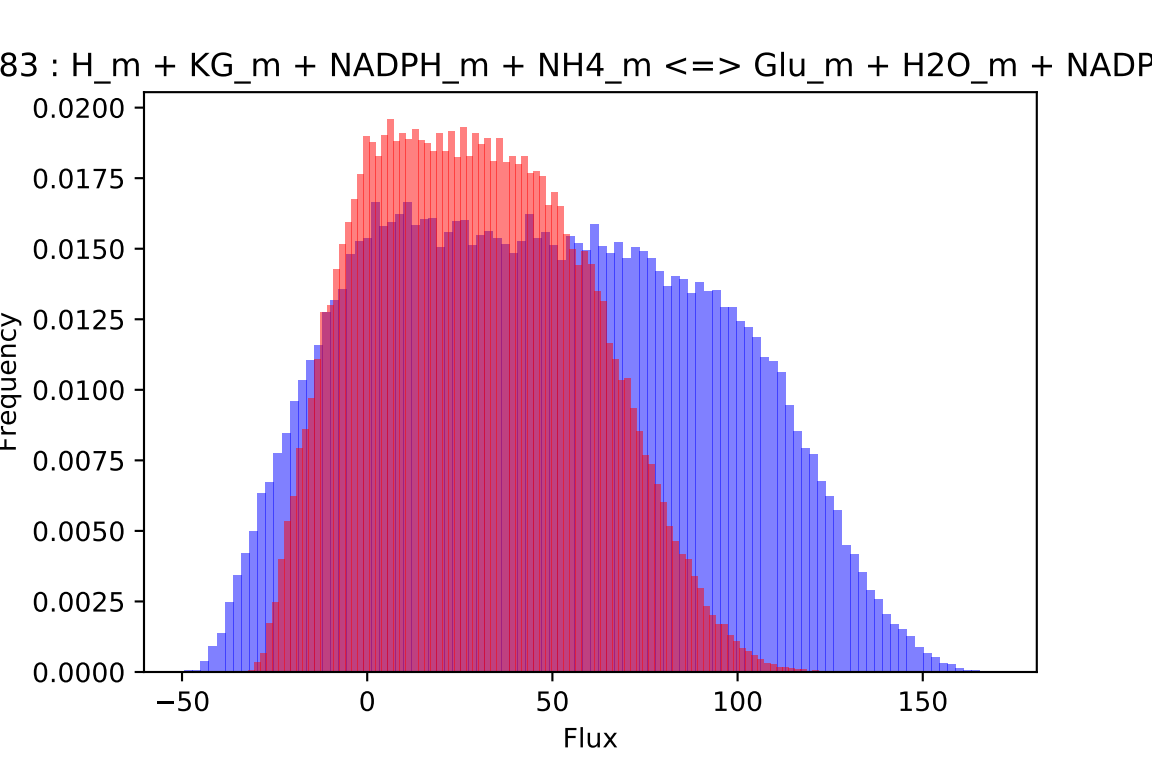

178 : Glu_c + H2O_c + NADP_c <=> KG_c + NADPH_c + NH4_c
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
−125
−100
−75
−50
−25
0
25
50
Flux

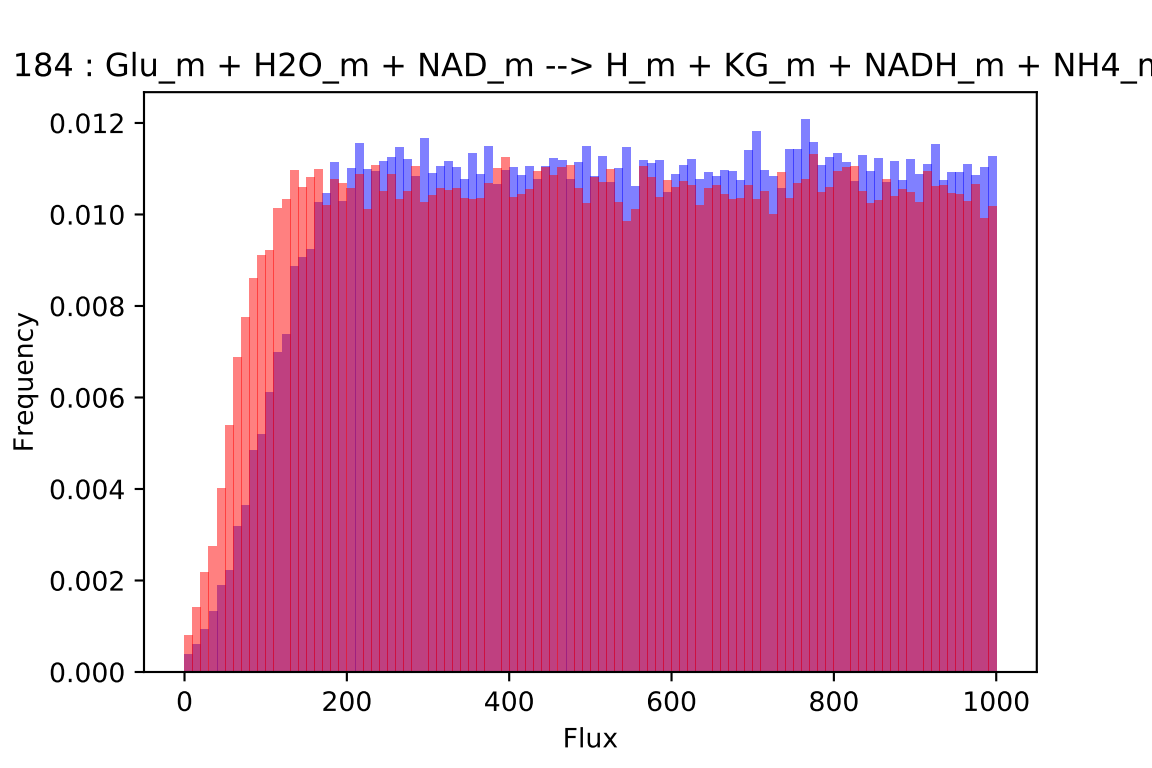

179 : Gln_c + H2O_c --> Glu_c + NH4_c
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Frequency
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
Flux

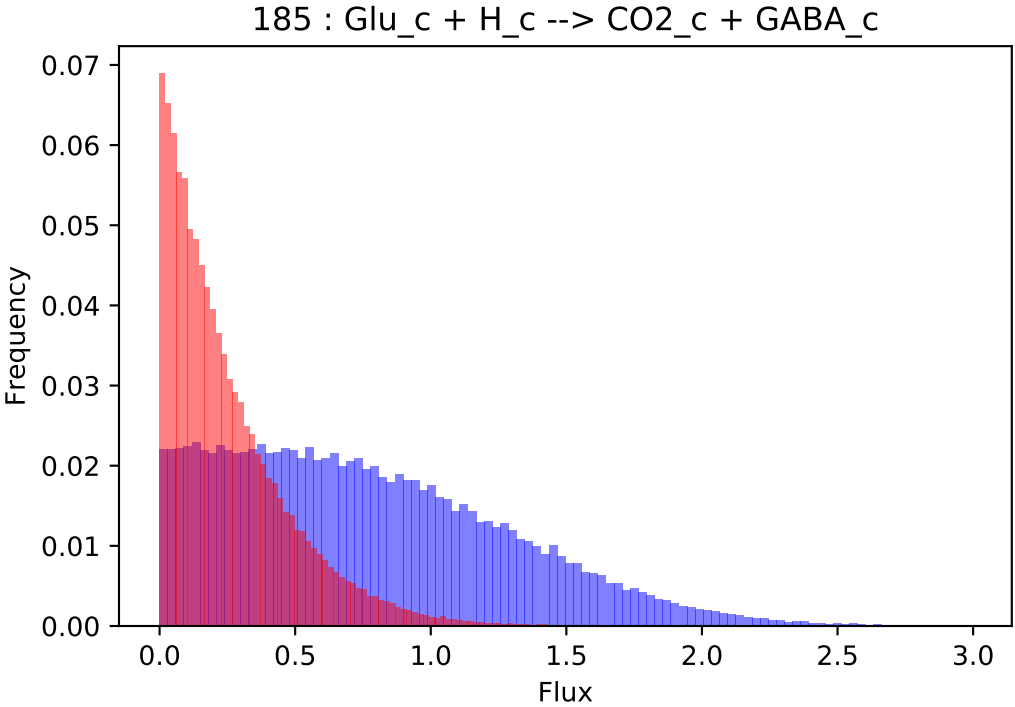

180 : Gln_h + H_h + KG_h + NADH_h --> 2.0 Glu_h + NAD_h
Frequency
0.0175
0.0150
0.0125
0.0100
0.0075
0.0050
0.0025
0.0000
0
5
10
15
20
25
30
35
40
Flux

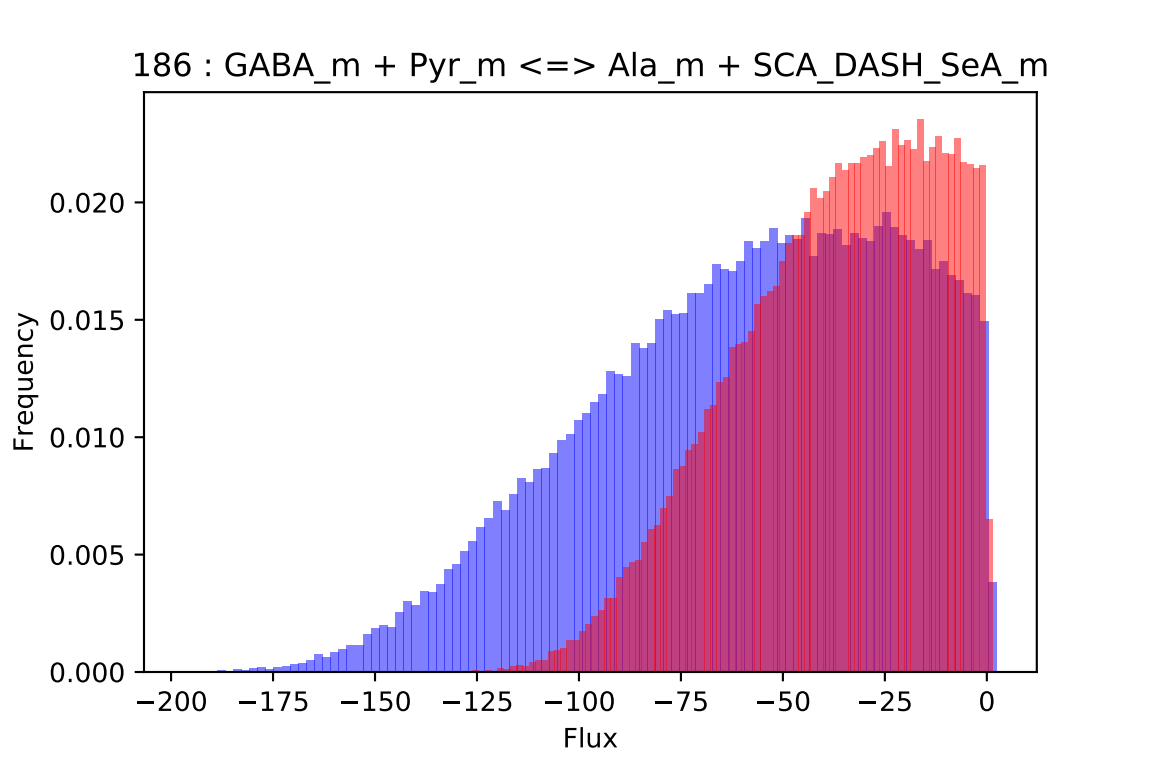

181 : 2.0 Fdrd_h + Gln_h + 2.0 H_h + KG_h --> 2.0 Fdox_h + 2.0 Glu_h
0.020
0.015
0.010
0.005
0.000
Frequency
0
10
20
30
40
50
Flux

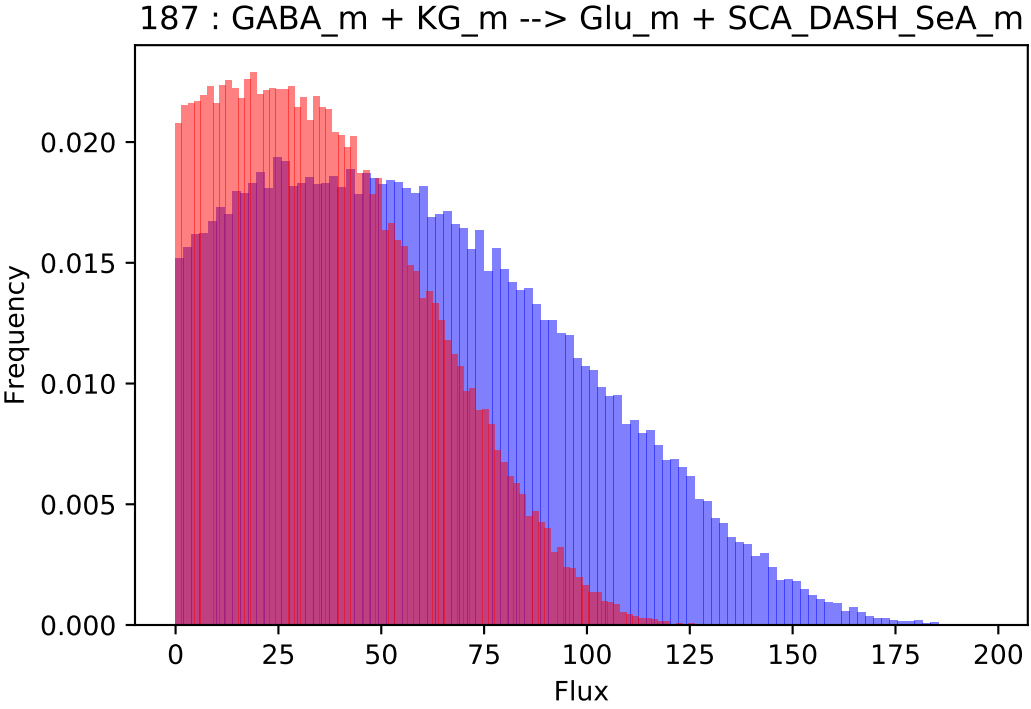

182 : H_m + KG_m + NADH_m + NH4_m --> Glu_m + H2O_m + NAD_m
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Frequency
0
200
400
600
800
1000
Flux

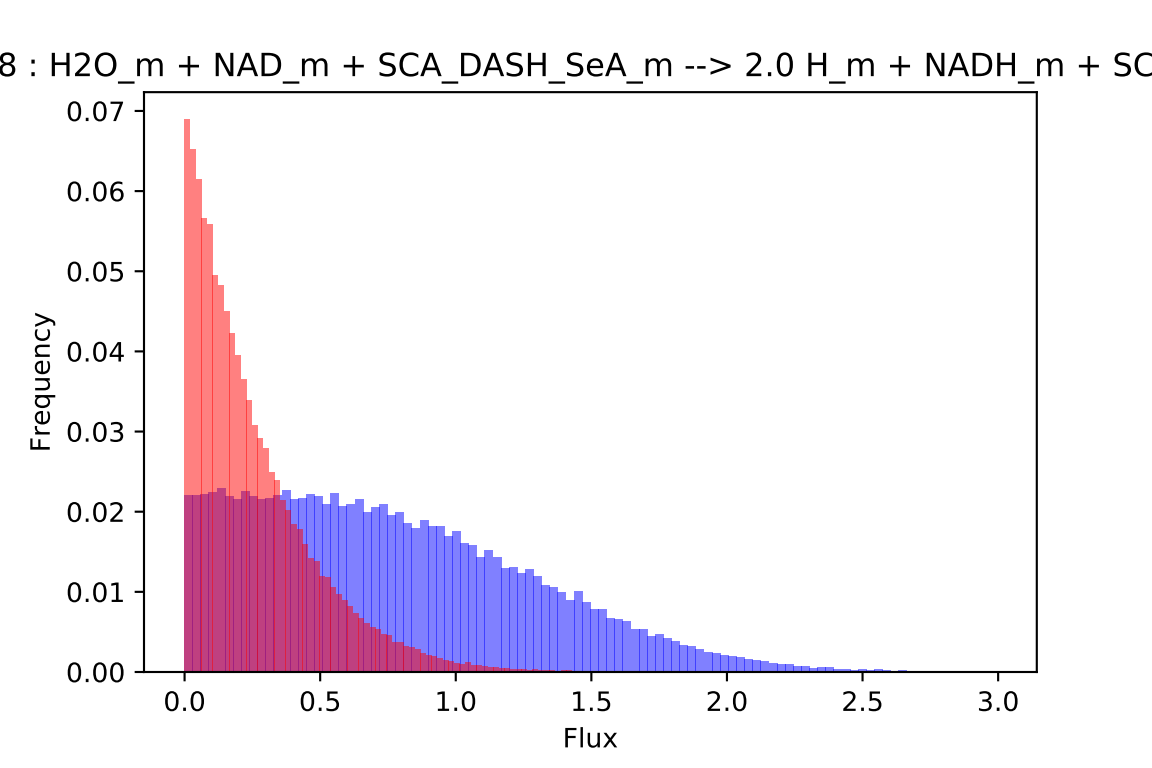

83 : H_m + KG_m + NADPH_m + NH4_m <=> Glu_m + H2O_m + NADP
0.0200
0.0175
0.0150
0.0125
0.0100
0.0075
0.0050
0.0025
0.0000
Frequency
−50
0
50
100
150
Flux

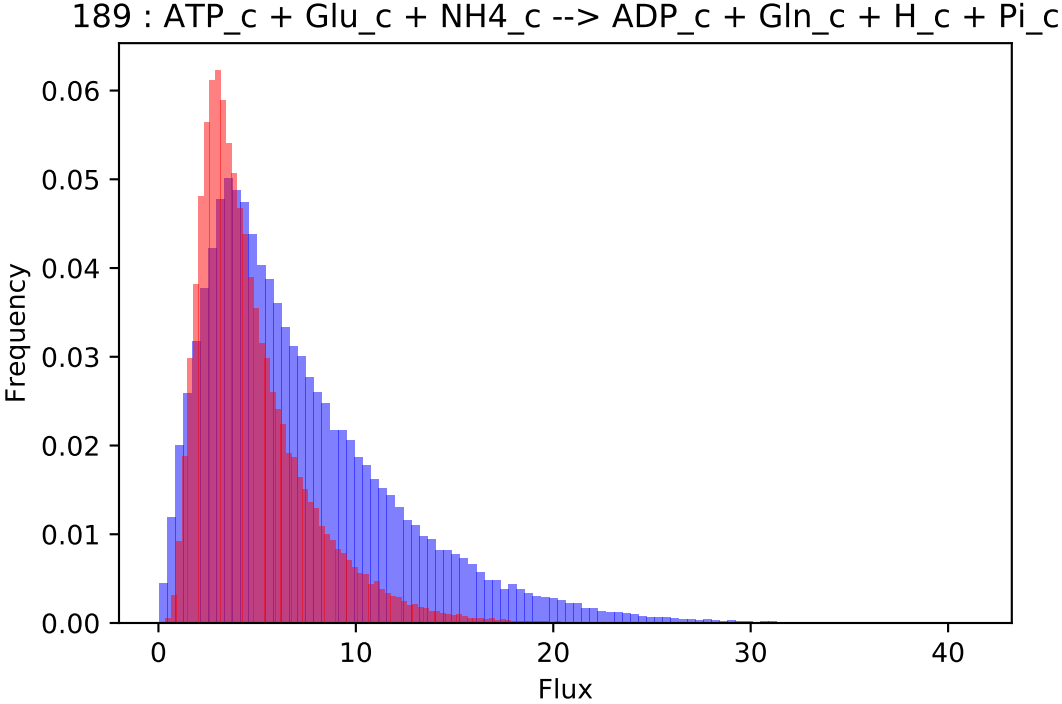

184 : Glu_m + H2O_m + NAD_m --> H_m + KG_m + NADH_m + NH4_m
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Frequency
0
200
400
600
800
1000
Flux

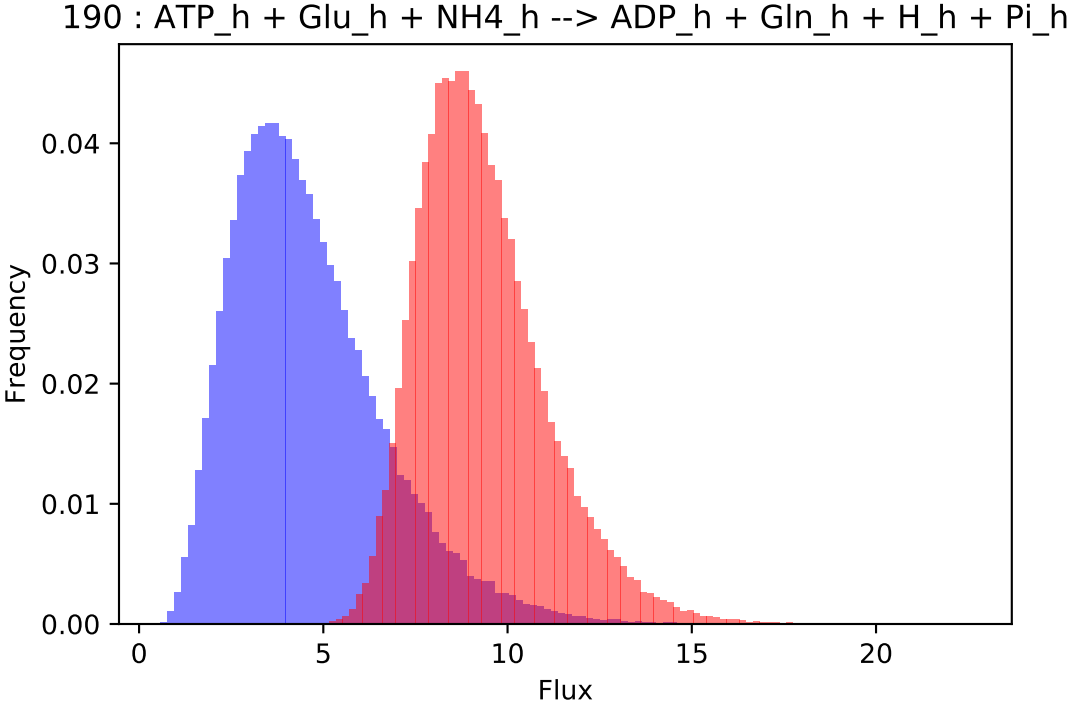

185 : Glu_c + H_c --> CO2_c + GABA_c
Frequency
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Flux

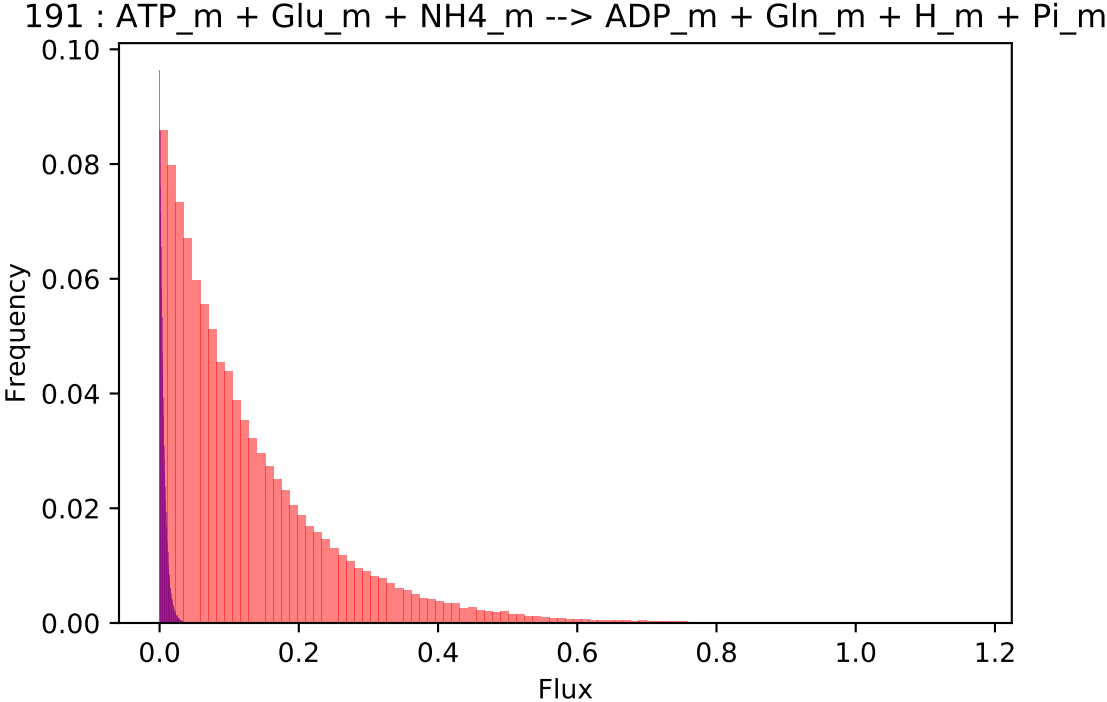

186 : GABA_m + Pyr_m <=> Ala_m + SCA_DASH_SeA_m
Frequency
0.020
0.015
0.010
0.005
0.000
−200
−175
−150
−125
−100
−75
−50
−25
0
Flux

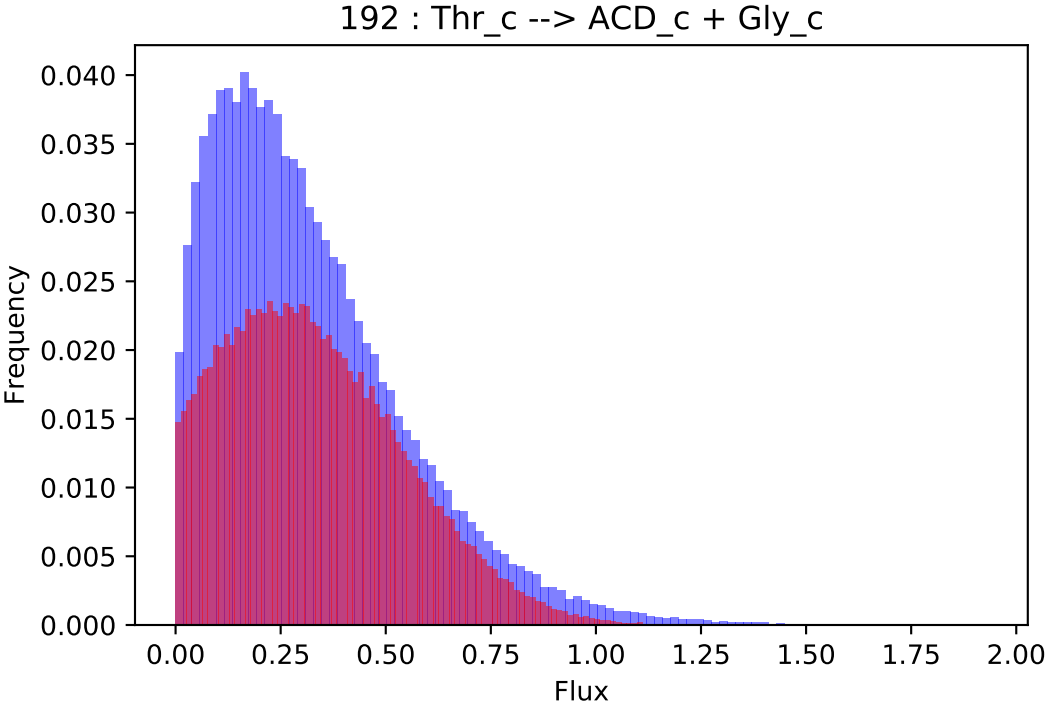

187 : GABA_m + KG_m --> Glu_m + SCA_DASH_SeA_m
Frequency
0.020
0.015
0.010
0.005
0.000
0
25
50
75
100
125
150
175
200
Flux

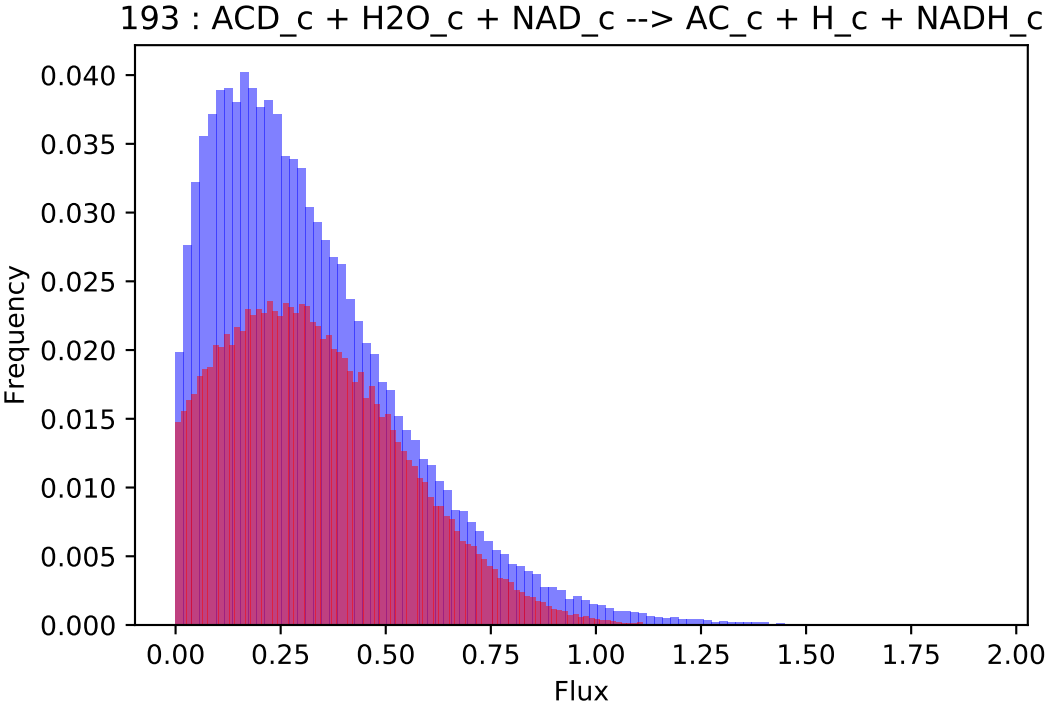

8 : H2O_m + NAD_m + SCA_DASH_SeA_m --> 2.0 H_m + NADH_m + SC
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Flux

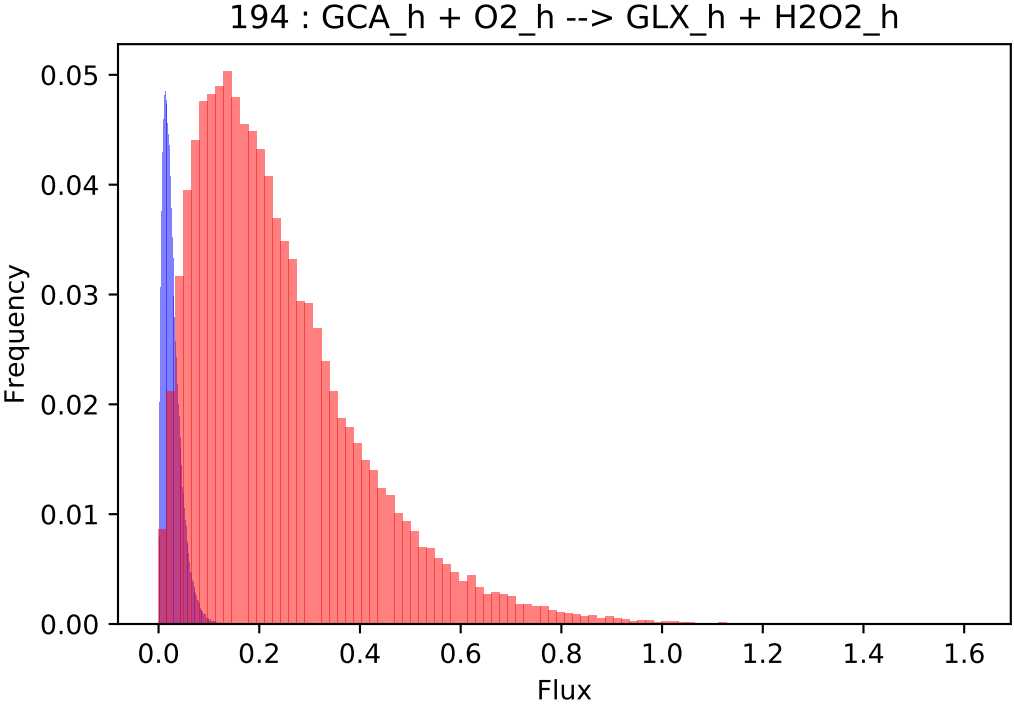

189 : ATP_c + Glu_c + NH4_c --> ADP_c + Gln_c + H_c + Pi_c
Frequency
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0
10
20
30
40
Flux

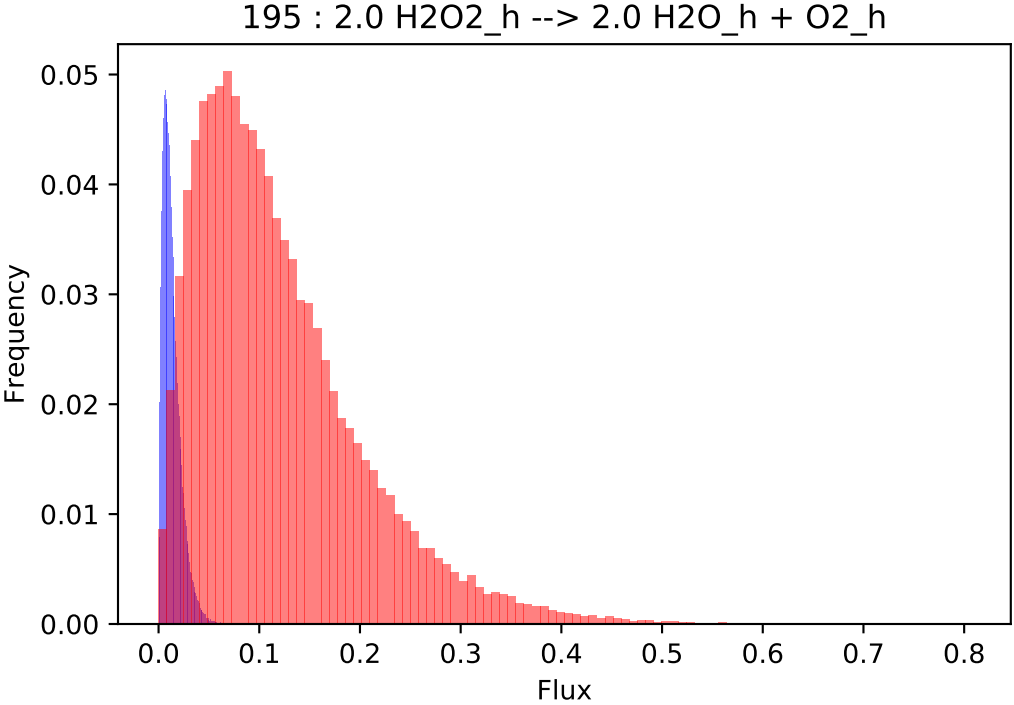

190 : ATP_h + Glu_h + NH4_h --> ADP_h + Gln_h + H_h + Pi_h
Frequency
0.00
0.01
0.02
0.03
0.04
0
5
10
15
20
Flux

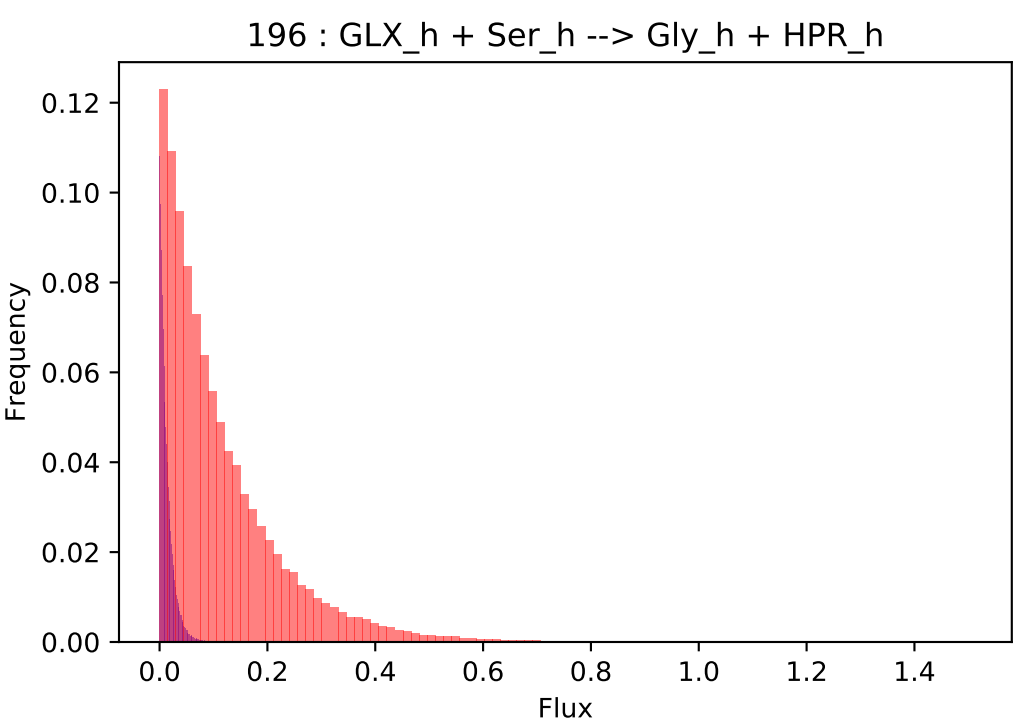

191 : ATP_m + Glu_m + NH4_m --> ADP_m + Gln_m + H_m + Pi_m
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

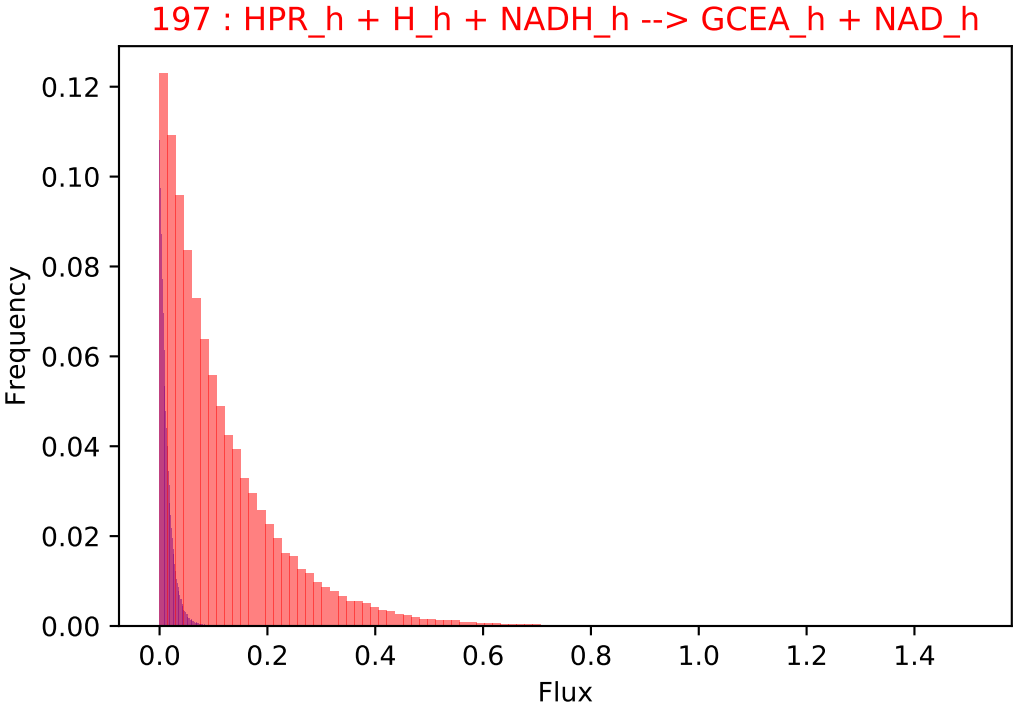

192 : Thr_c --> ACD_c + Gly_c
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
Flux

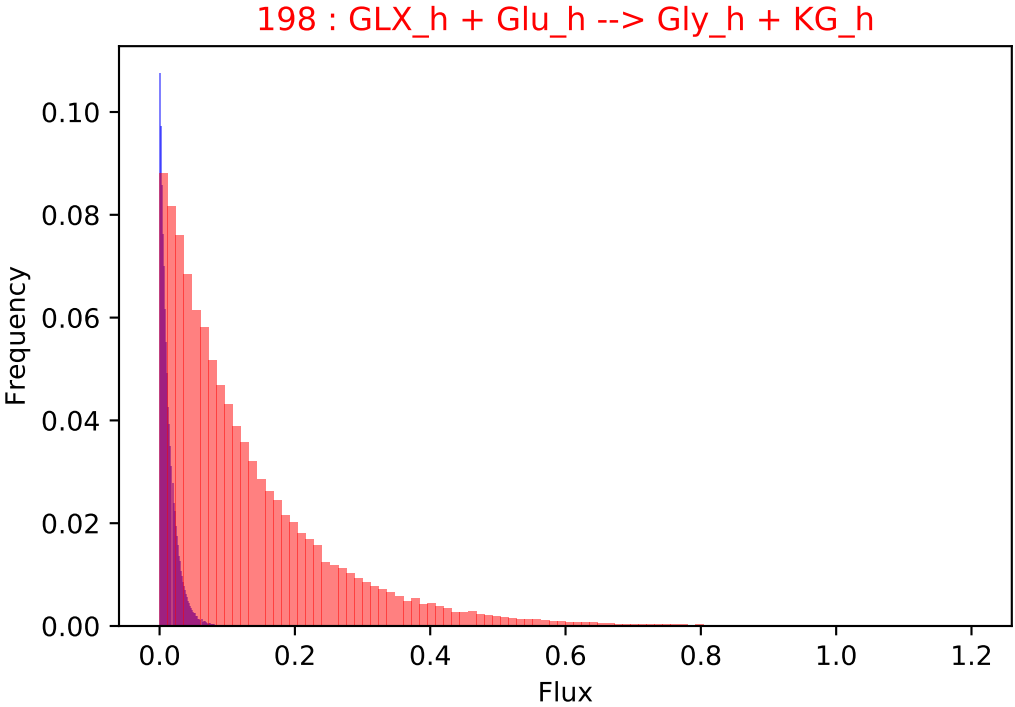

193 : ACD_c + H2O_c + NAD_c --> AC_c + H_c + NADH_c
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
Flux

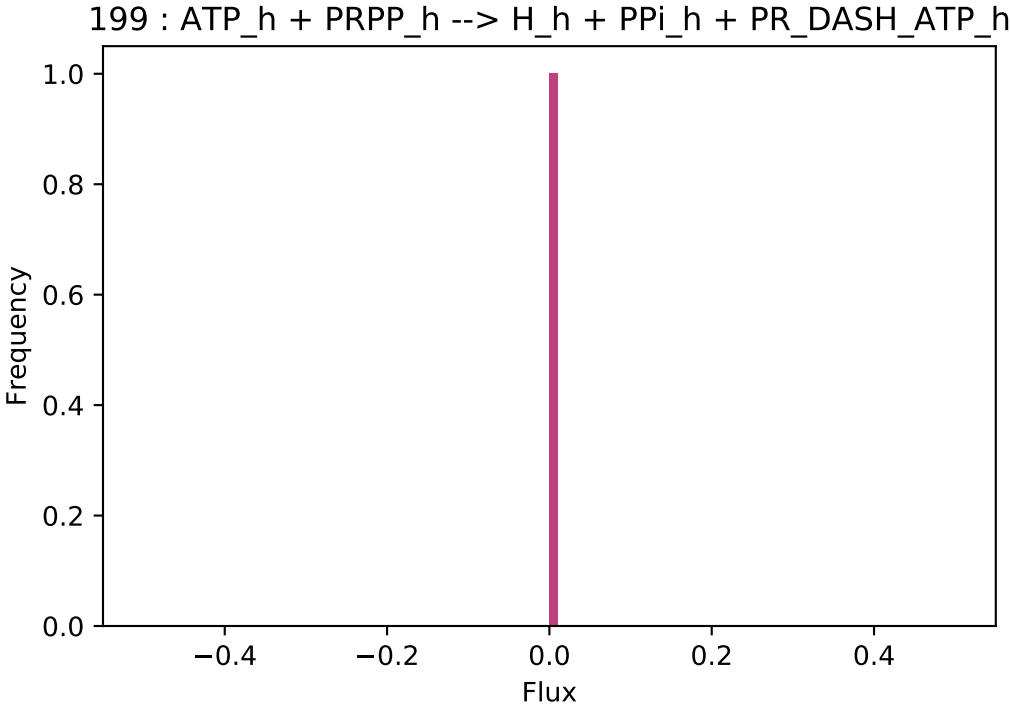

194 : GCA_h + O2_h --> GLX_h + H2O2_h
Frequency
0.00
0.01
0.02
0.03
0.04
0.05
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
Flux

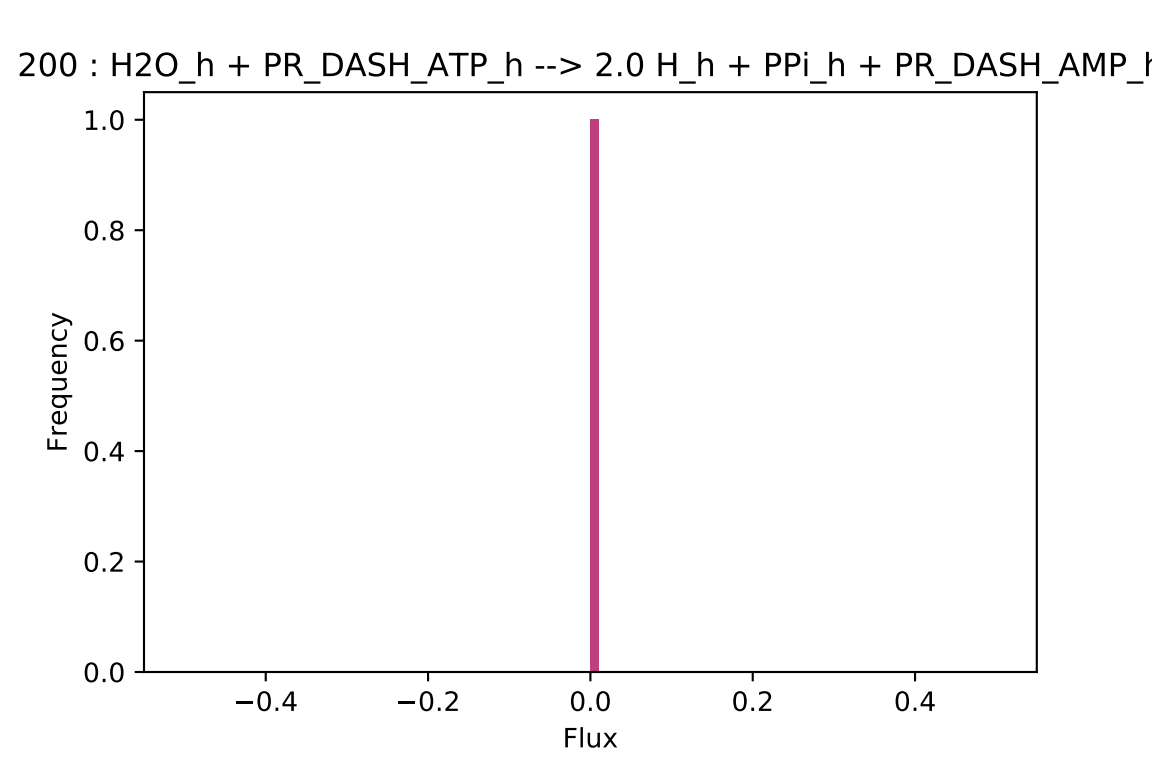

195 : 2.0 H2O2_h --> 2.0 H2O_h + O2_h
Frequency
0.05
0.04
0.03
0.02
0.01
0.00
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
Flux

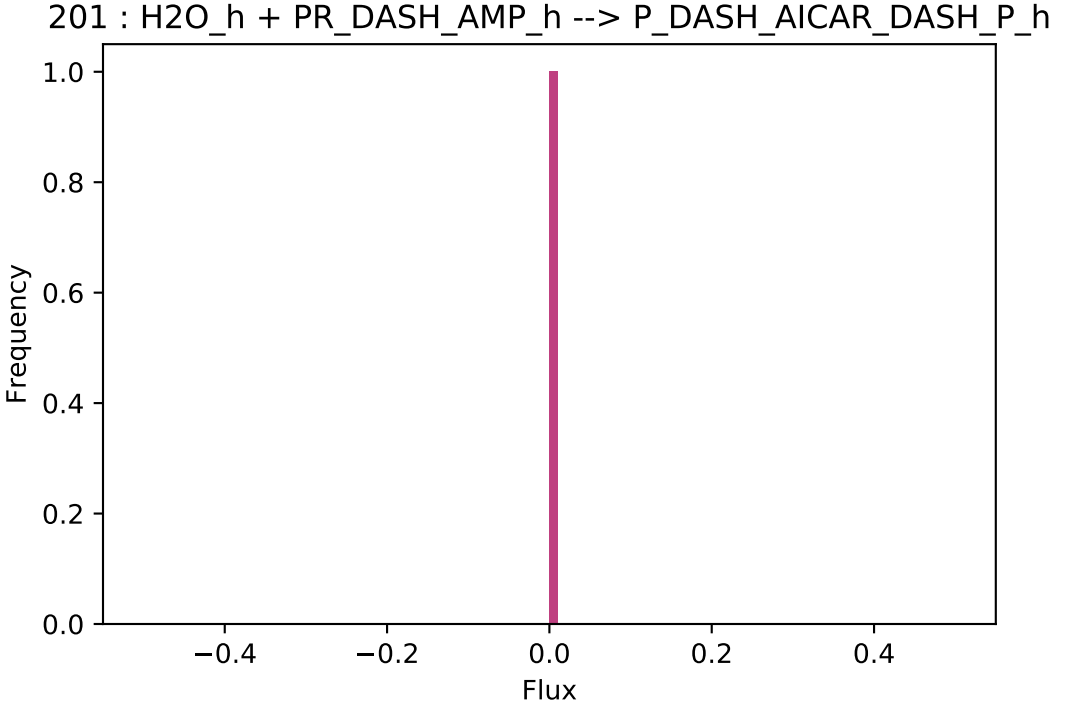

196 : GLX_h + Ser_h --> Gly_h + HPR_h
Frequency
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
Flux

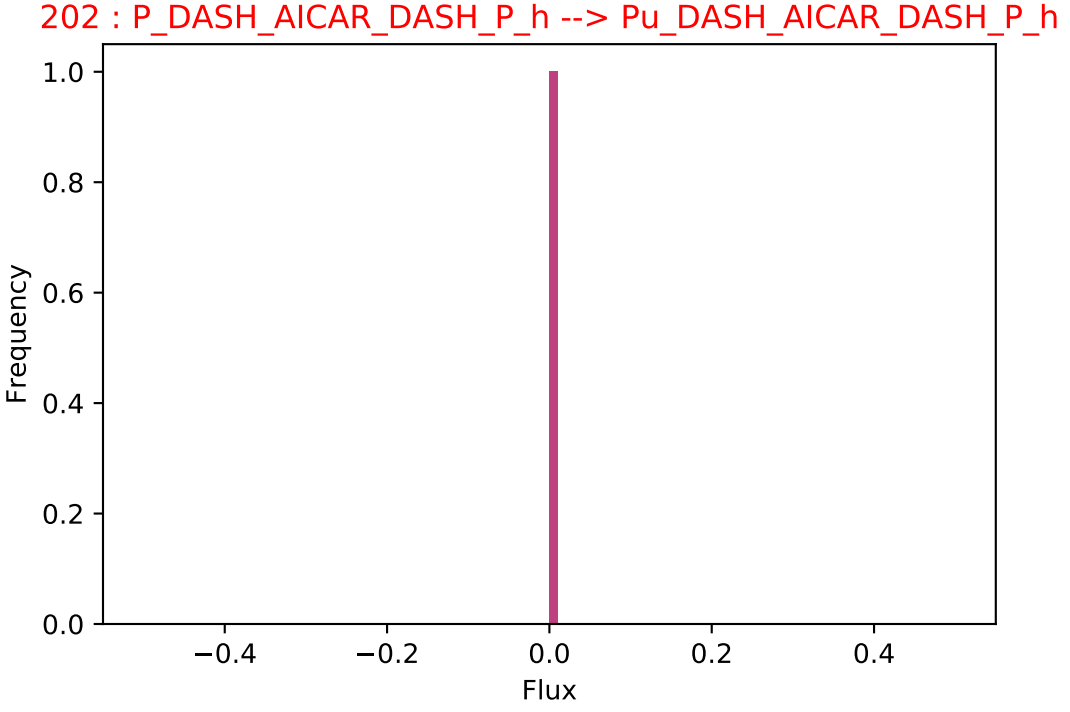

197 : HPR_h + H_h + NADH_h --> GCEA_h + NAD_h
Frequency
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
Flux

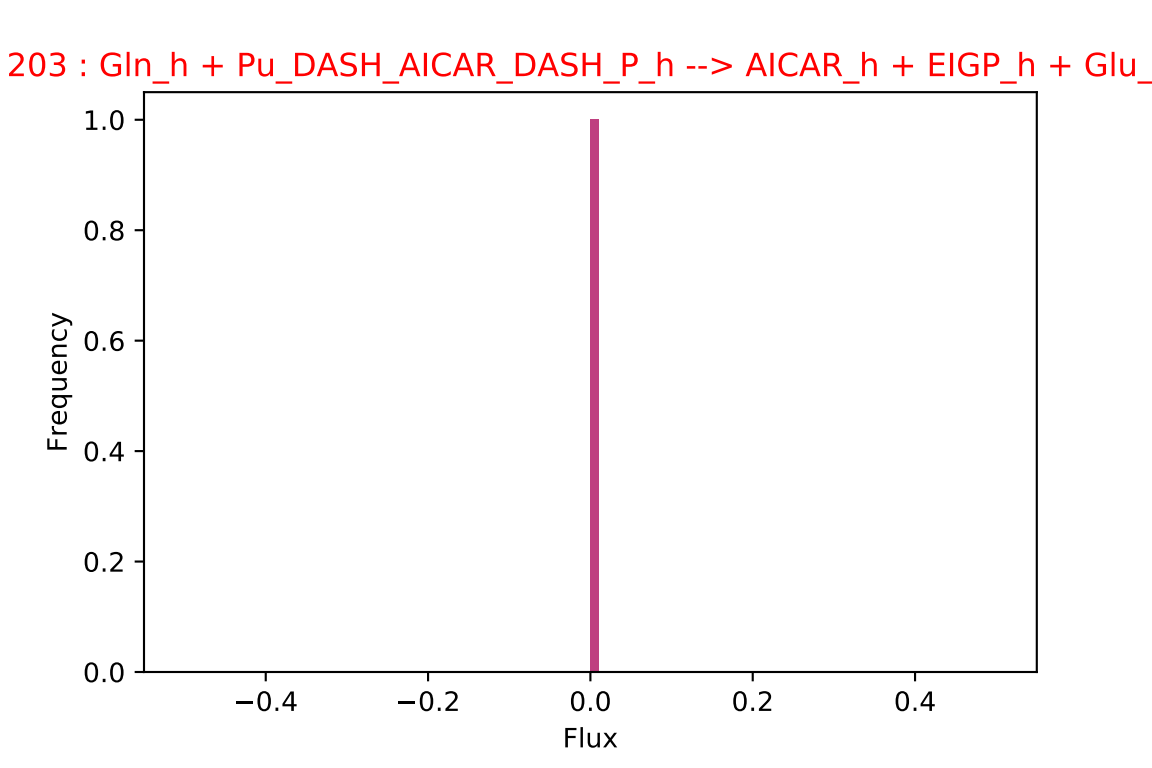

198 : GLX_h + Glu_h --> Gly_h + KG_h
Frequency
0.00
0.02
0.04
0.06
0.08
0.10
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

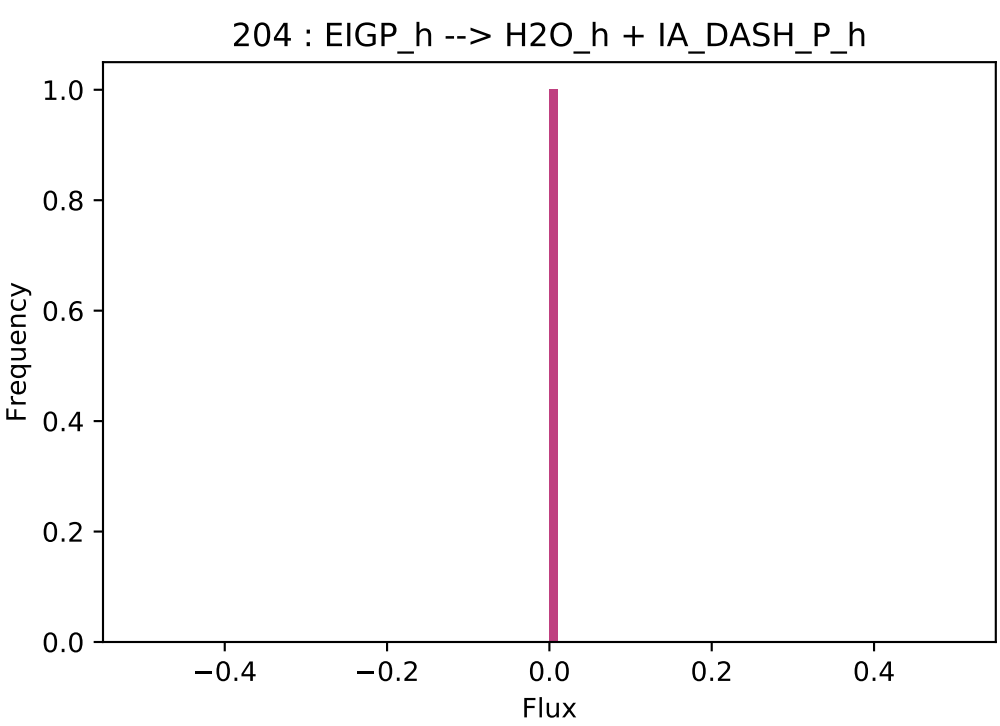

199 : ATP_h + PRPP_h --> H_h + PPi_h + PR_DASH_ATP_h
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

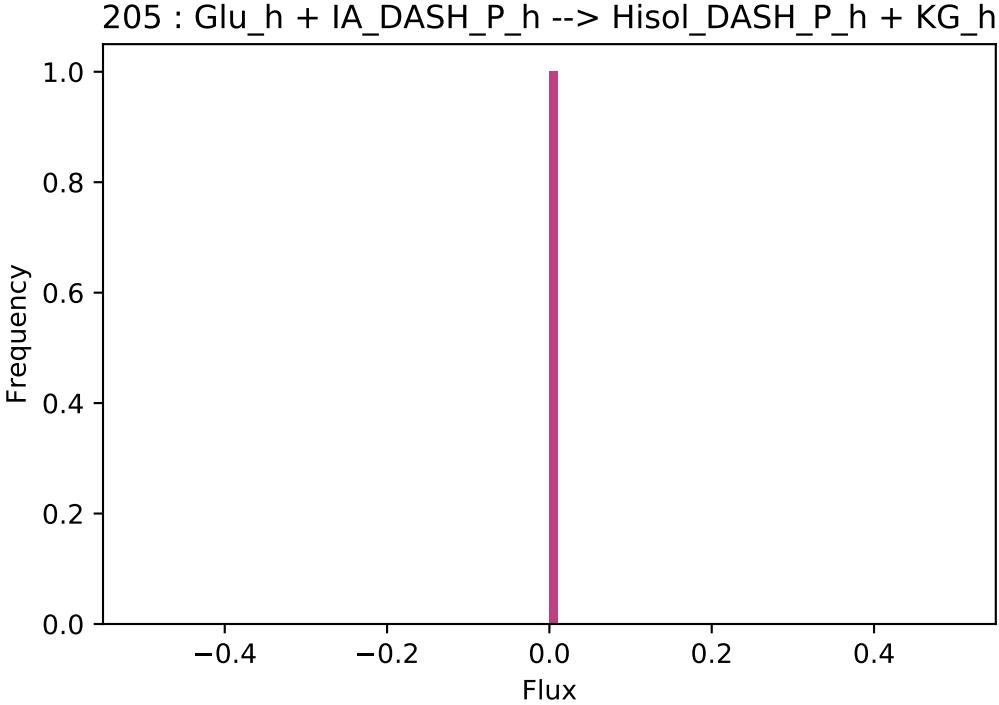

200 : H2O_h + PR_DASH_ATP_h --> 2.0 H_h + PPi_h + PR_DASH_AMP_h
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

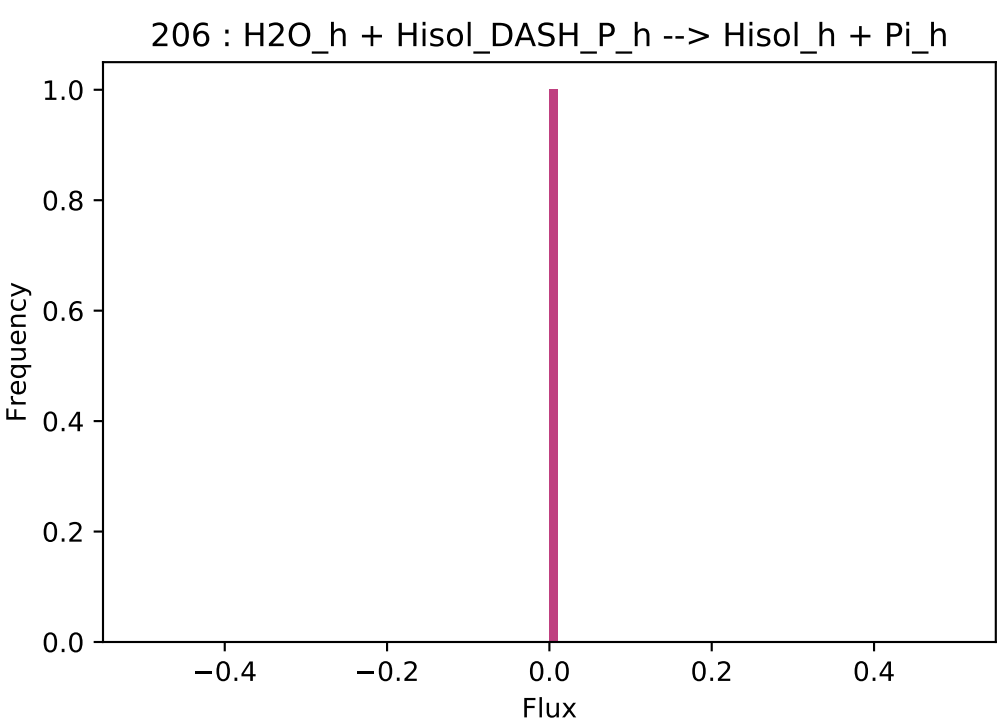

201 : H2O_h + PR_DASH_AMP_h --> P_DASH_AICAR_DASH_P_h
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

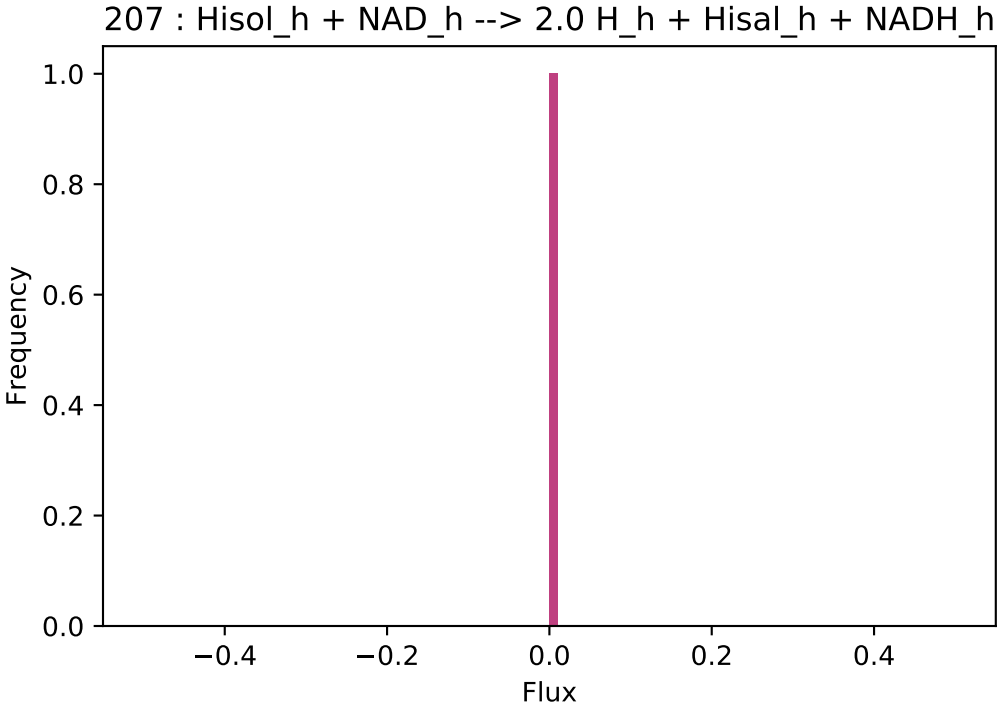

202 : P_DASH_AICAR_DASH_P_h --> Pu_DASH_AICAR_DASH_P_h
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

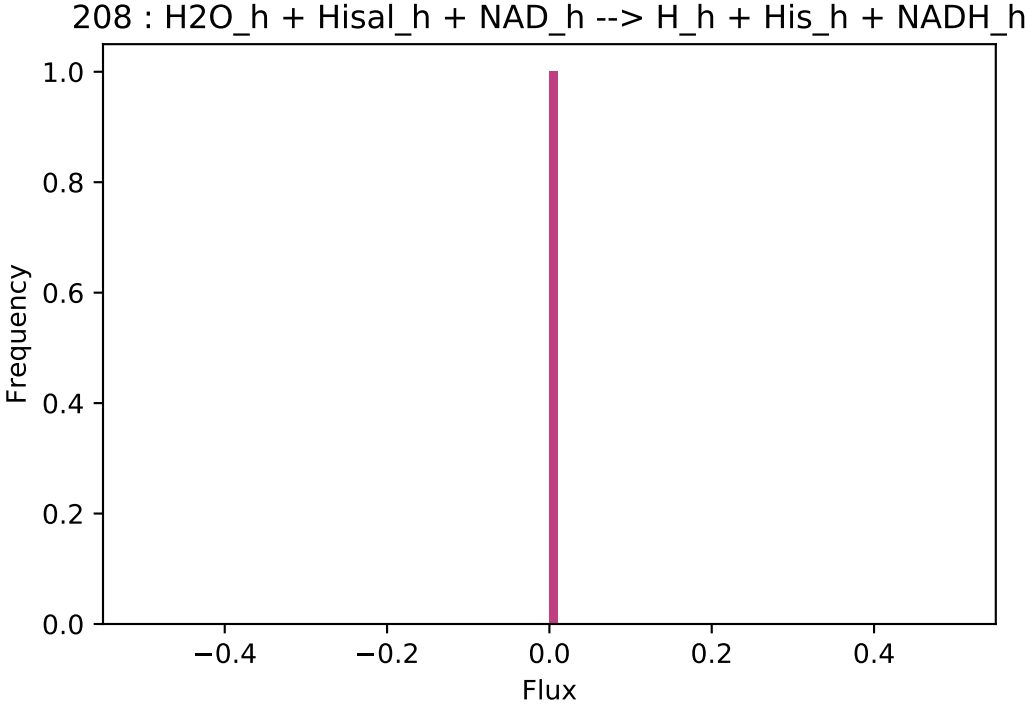

203 : Gln_h + Pu_DASH_AICAR_DASH_P_h --> AICAR_h + EIGP_h + Glu_
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

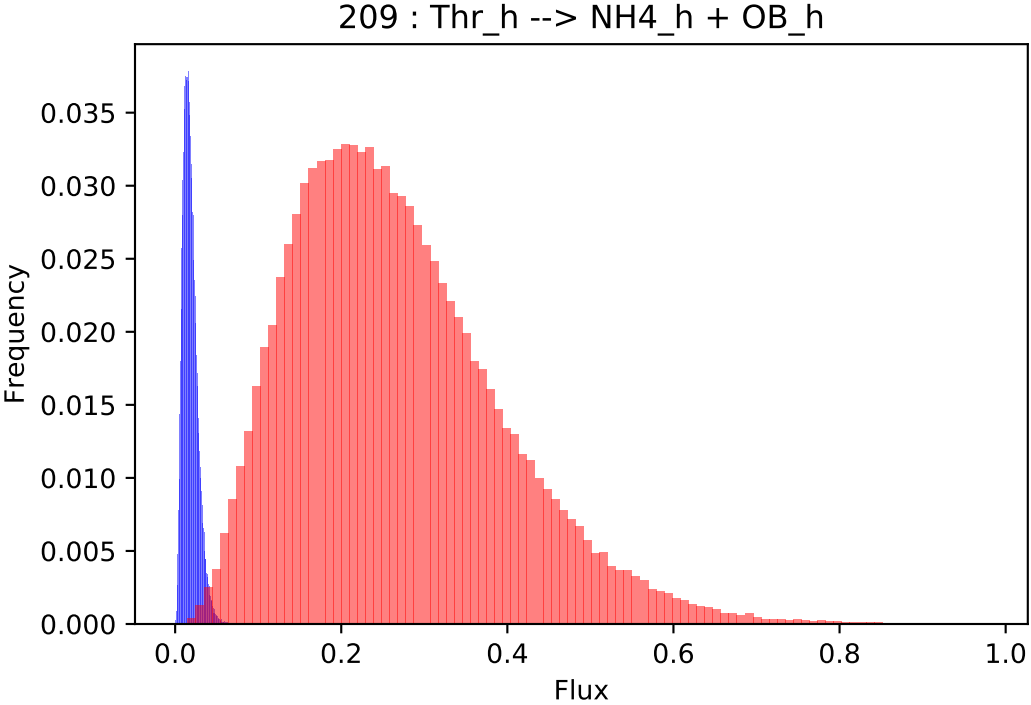

204 : EIGP_h --> H2O_h + IA_DASH_P_h
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

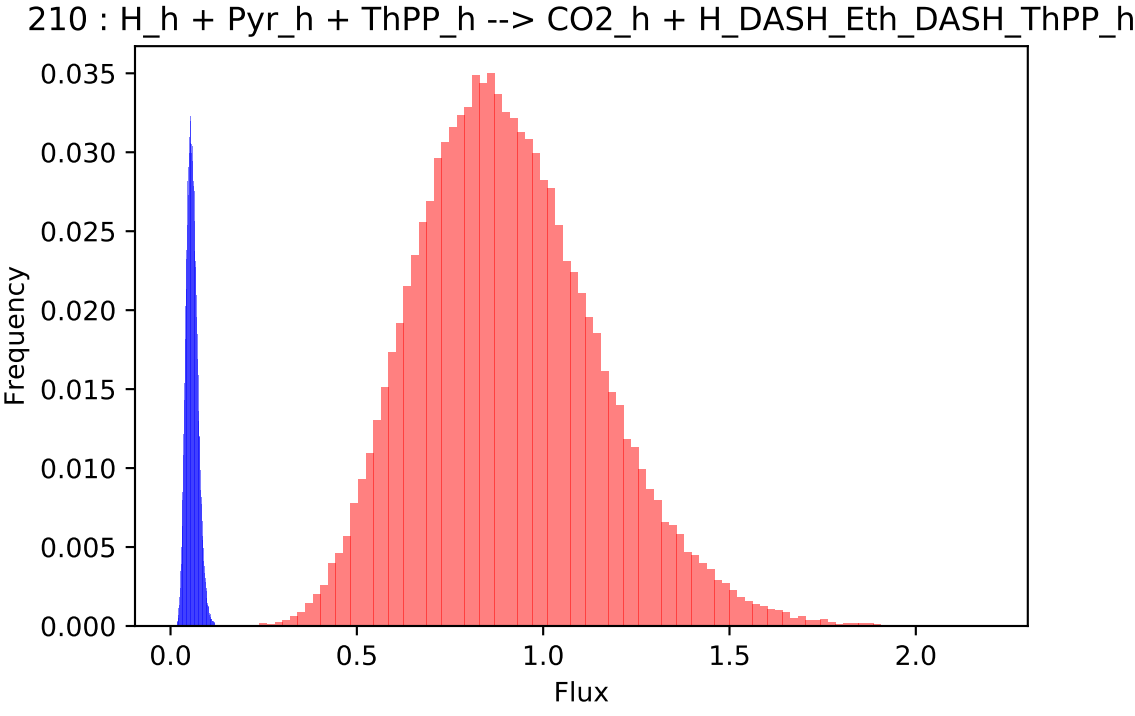

205 : Glu_h + IA_DASH_P_h --> Hisol_DASH_P_h + KG_h
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

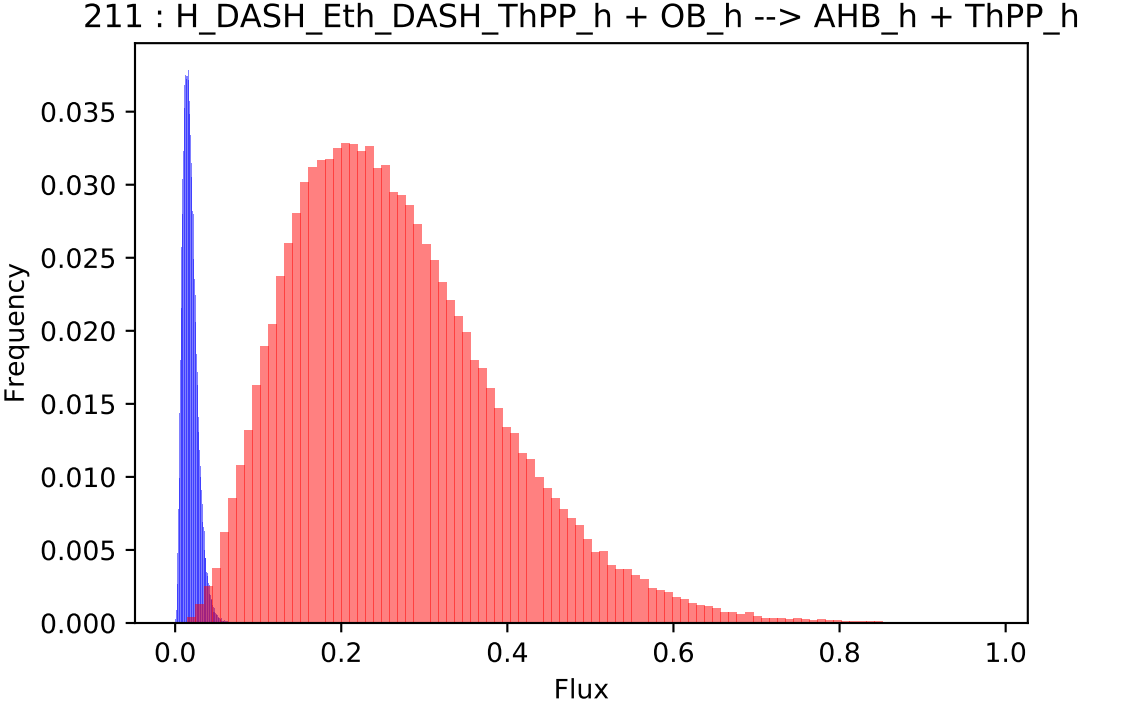

206 : H2O_h + Hisol_DASH_P_h --> Hisol_h + Pi_h
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

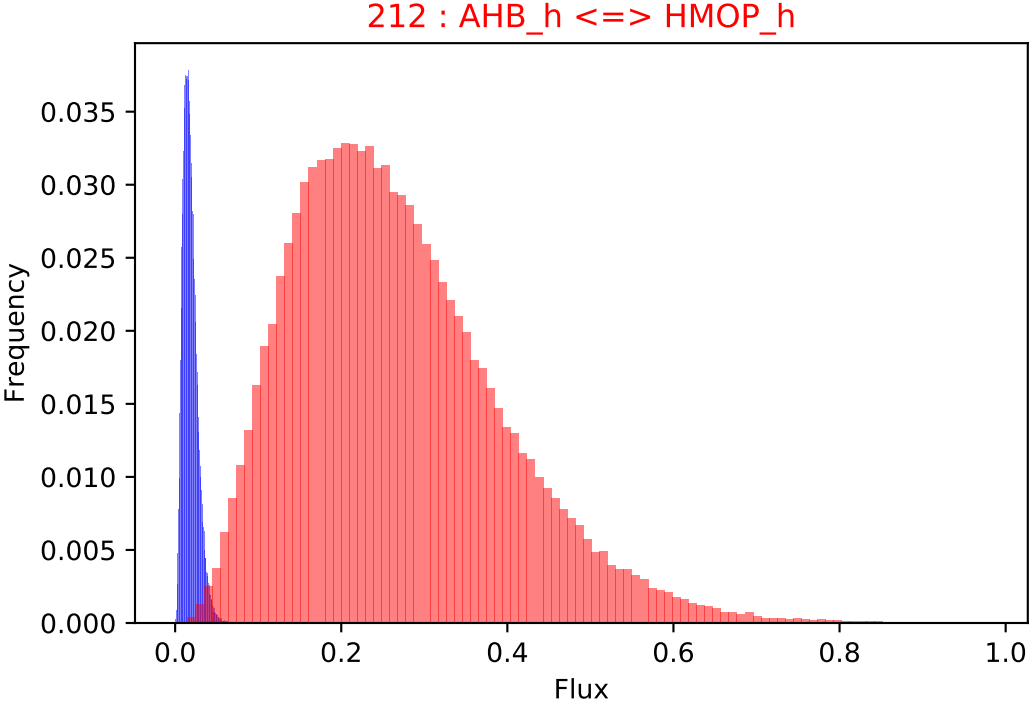

207 : Hisol_h + NAD_h --> 2.0 H_h + Hisal_h + NADH_h
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

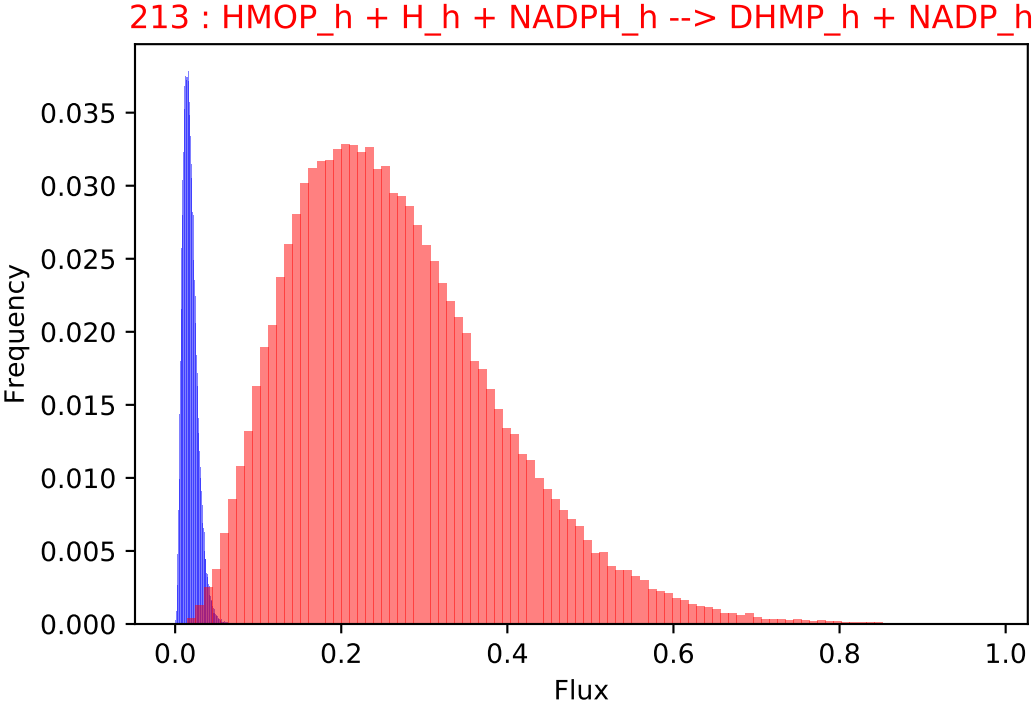

208 : H2O_h + Hisal_h + NAD_h --> H_h + His_h + NADH_h
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

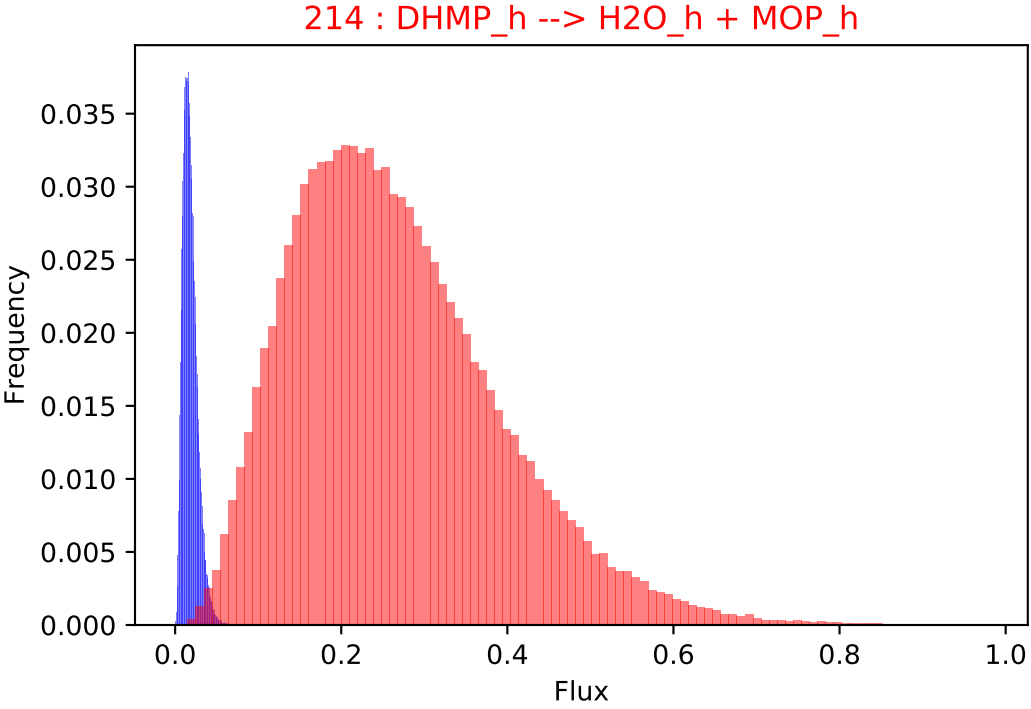

209 : Thr_h --> NH4_h + OB_h
Frequency
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.2
0.4
0.6
0.8
1.0
Flux

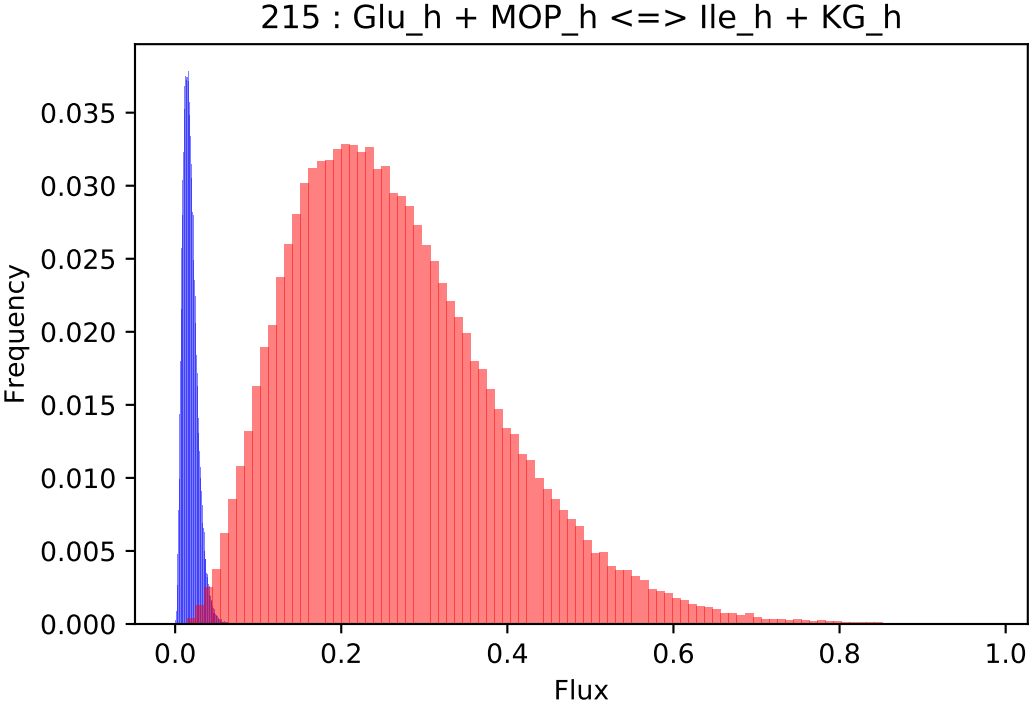

210 : H_h + Pyr_h + ThPP_h --> CO2_h + H_DASH_Eth_DASH_ThPP_h
Frequency
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.5
1.0
1.5
2.0
Flux

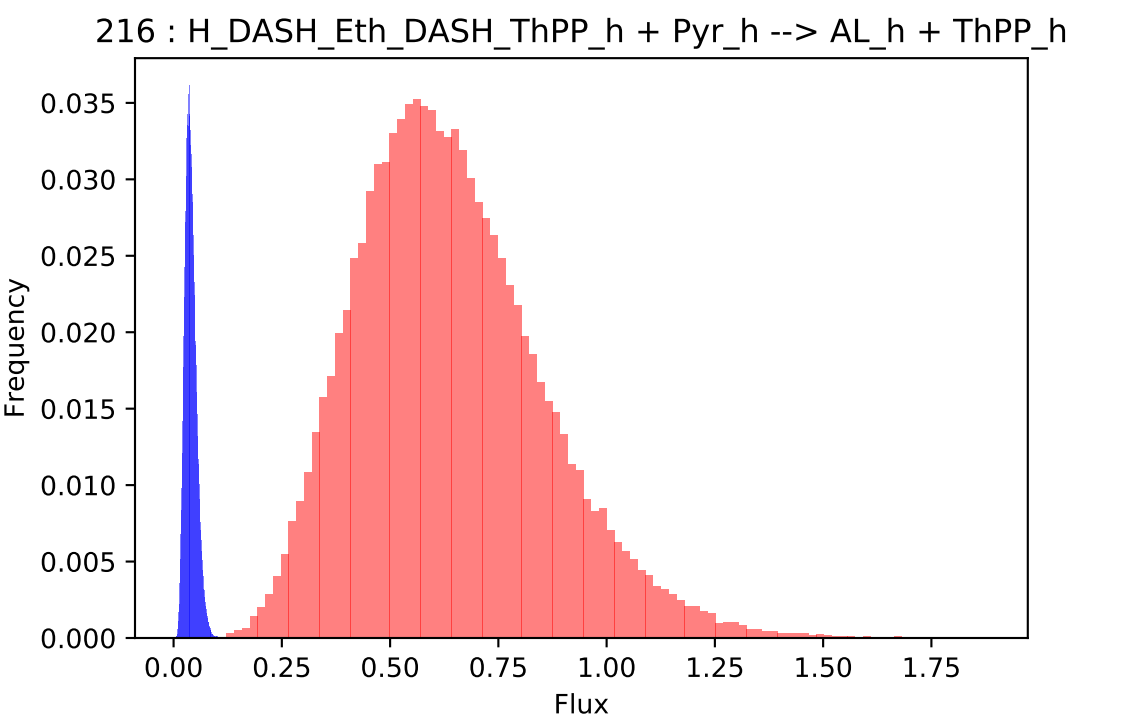

211 : H_DASH_Eth_DASH_ThPP_h + OB_h --> AHB_h + ThPP_h
Frequency
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.2
0.4
0.6
0.8
1.0
Flux

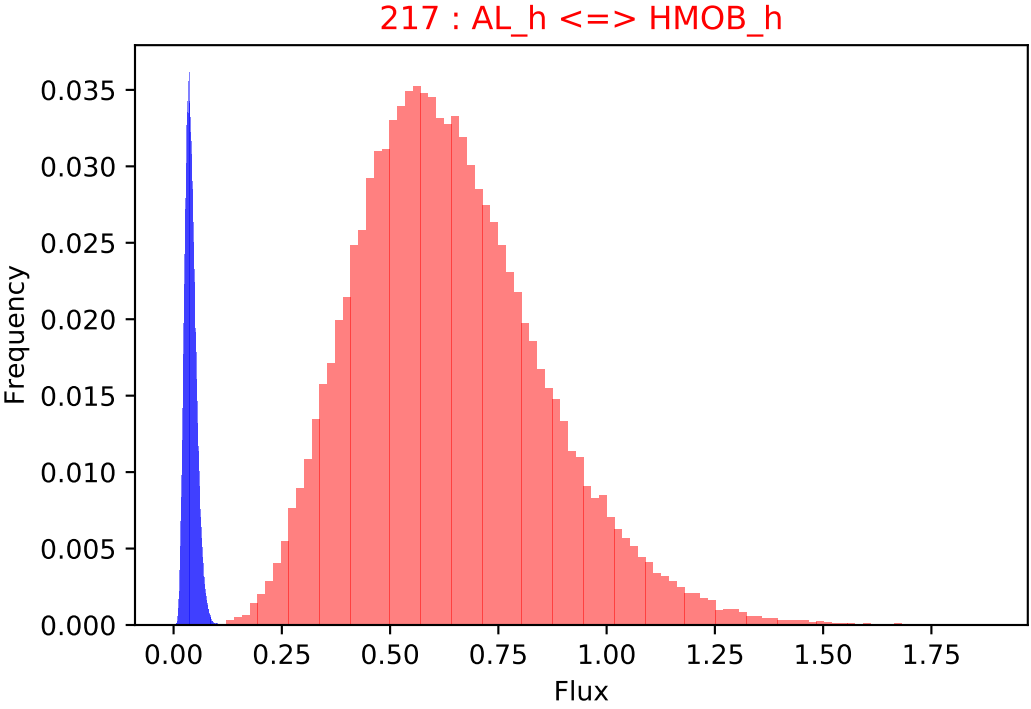

212 : AHB_h <=> HMOP_h
Frequency
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.2
0.4
0.6
0.8
1.0
Flux

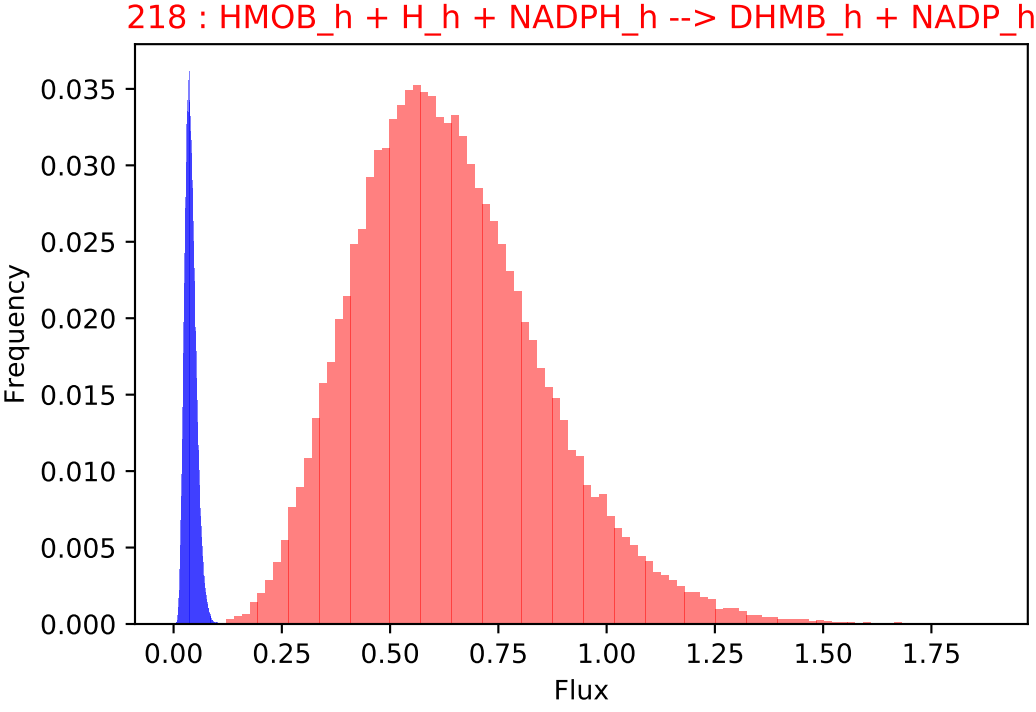

213 : HMOP_h + H_h + NADPH_h --> DHMP_h + NADP_h
Frequency
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.2
0.4
0.6
0.8
1.0
Flux

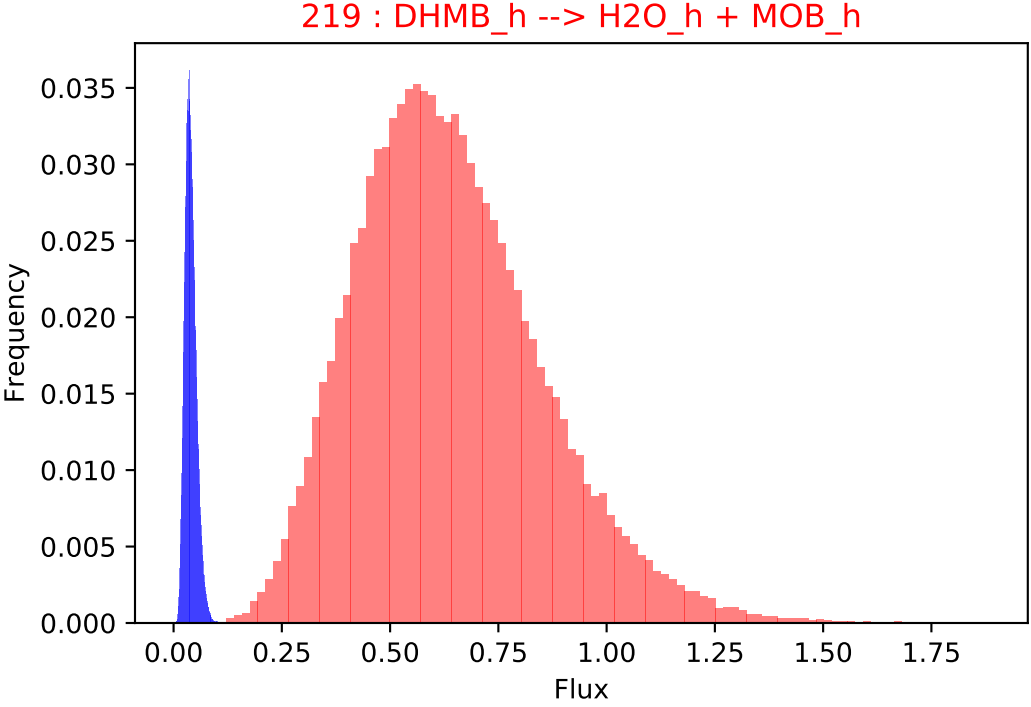

214 : DHMP_h --> H2O_h + MOP_h
Frequency
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.2
0.4
0.6
0.8
1.0
Flux

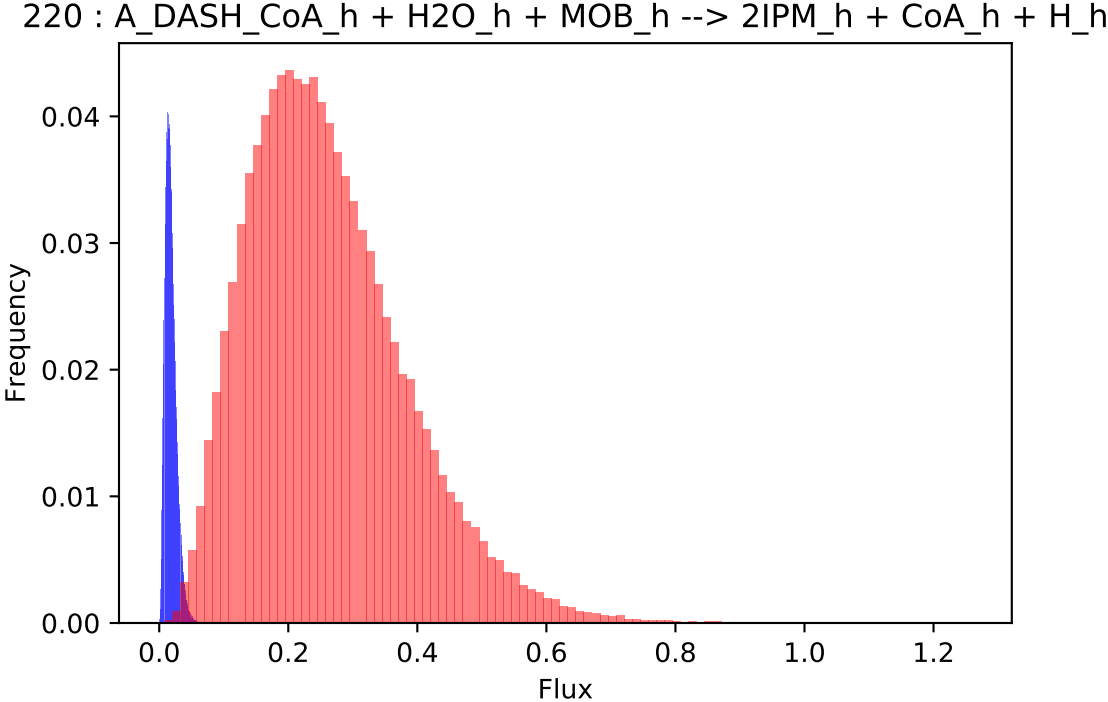

215 : Glu_h + MOP_h <=> Ile_h + KG_h
Frequency
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.2
0.4
0.6
0.8
1.0
Flux

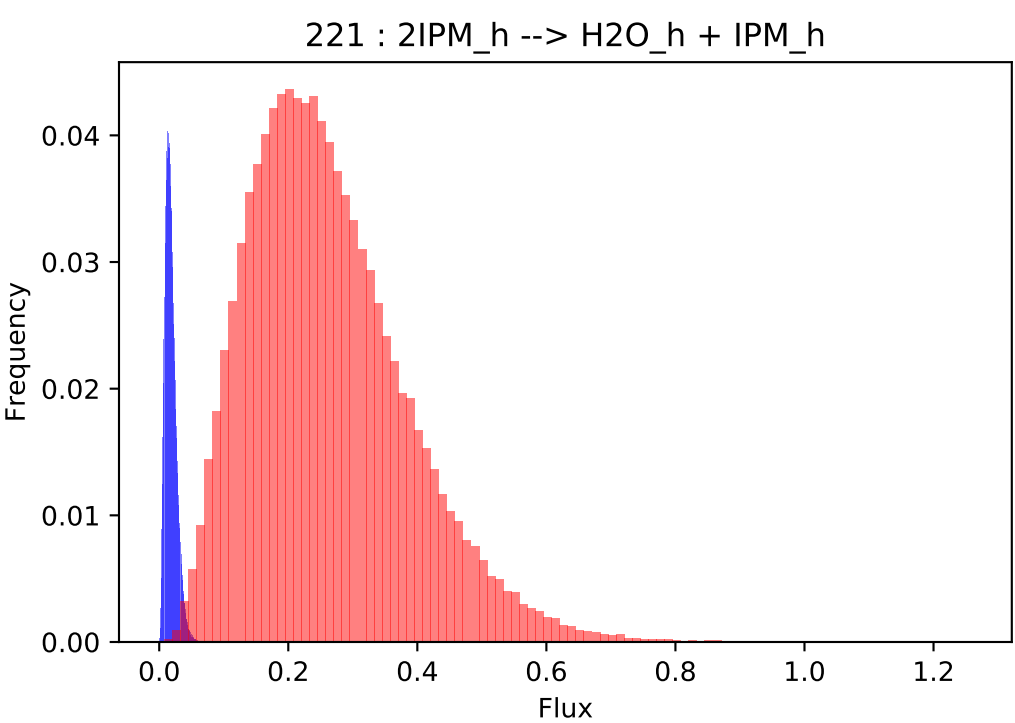

216 : H_DASH_Eth_DASH_ThPP_h + Pyr_h --> AL_h + ThPP_h
Frequency
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
Flux

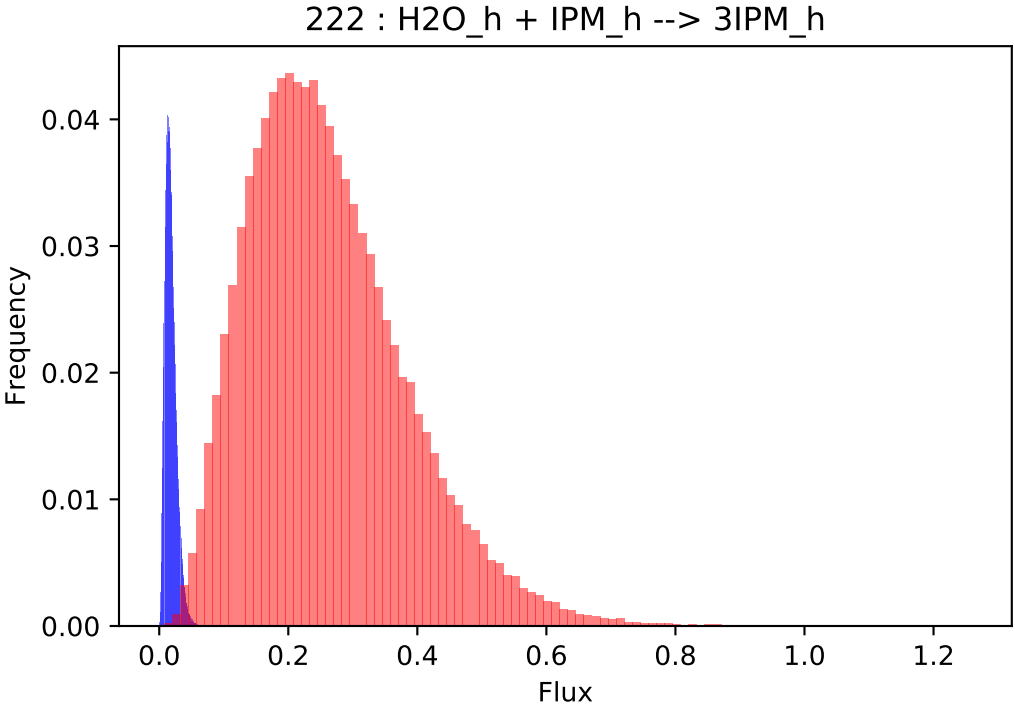

217 : AL_h <=> HMOB_h
Frequency
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
Flux

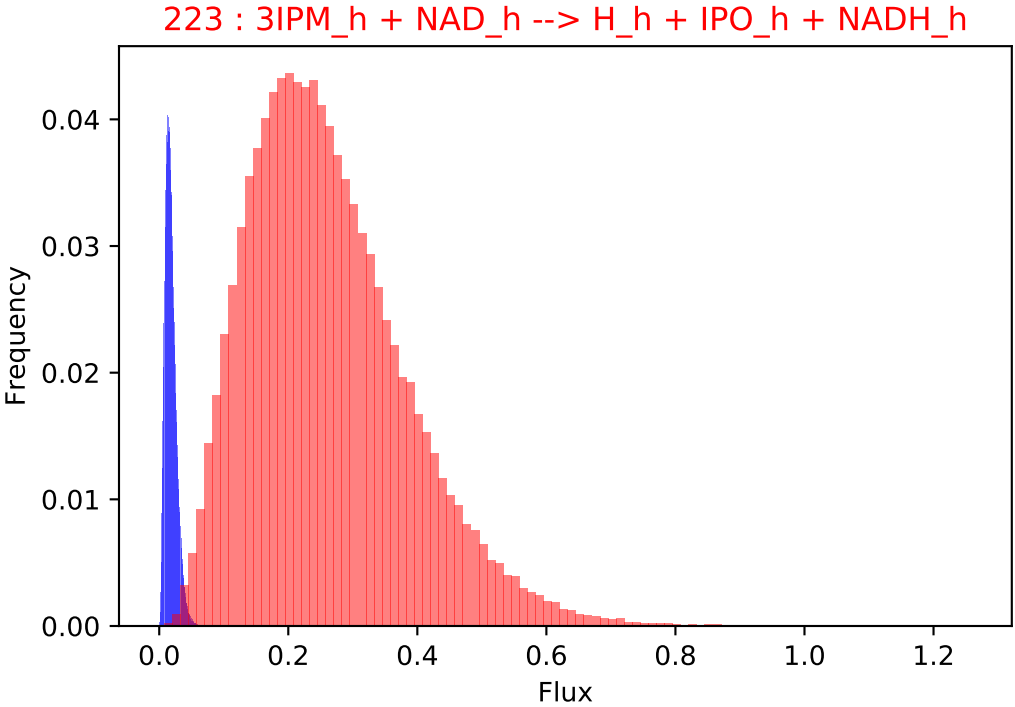

218 : HMOB_h + H_h + NADPH_h --> DHMB_h + NADP_h
Frequency
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
Flux

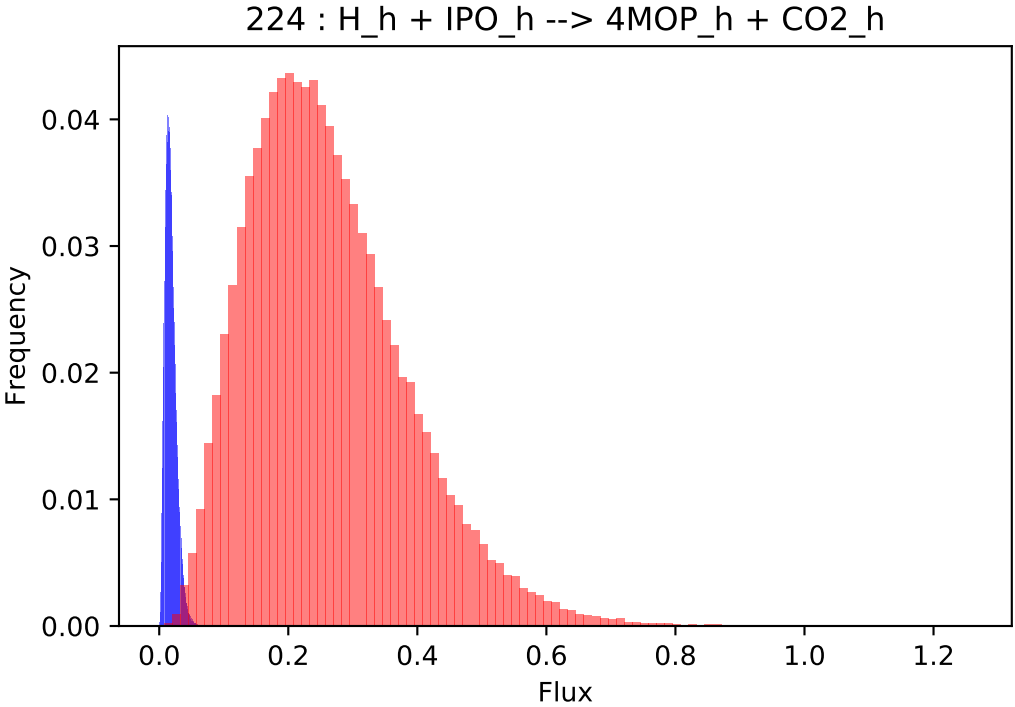

219 : DHMB_h --> H2O_h + MOB_h
Frequency
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
Flux

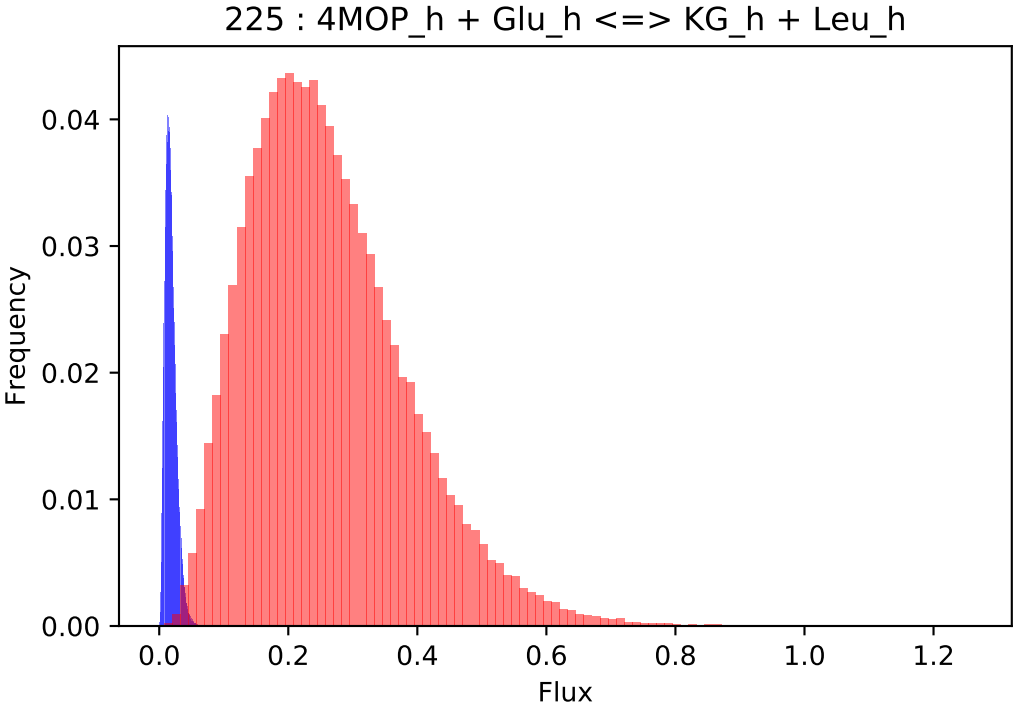

220 : A_DASH_CoA_h + H2O_h + MOB_h --> 2IPM_h + CoA_h + H_h
Frequency
0.00
0.01
0.02
0.03
0.04
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

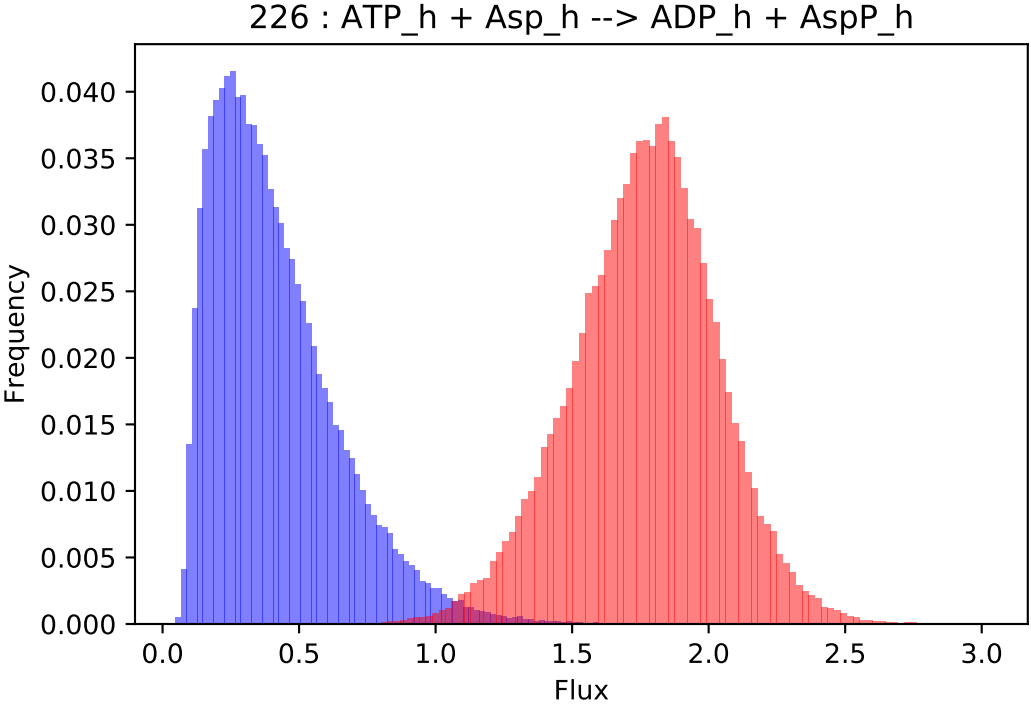

221 : 2IPM_h --> H2O_h + IPM_h
Frequency
0.00
0.01
0.02
0.03
0.04
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

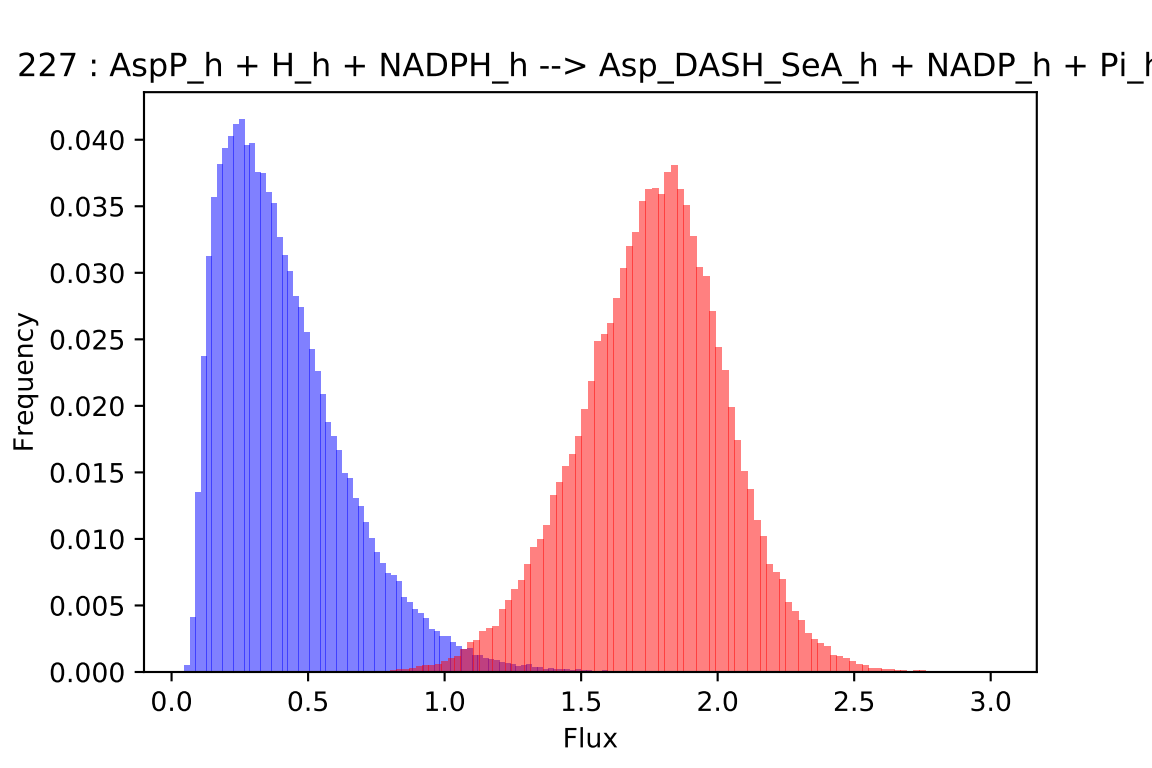

222 : H2O_h + IPM_h --> 3IPM_h
Frequency
0.00
0.01
0.02
0.03
0.04
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

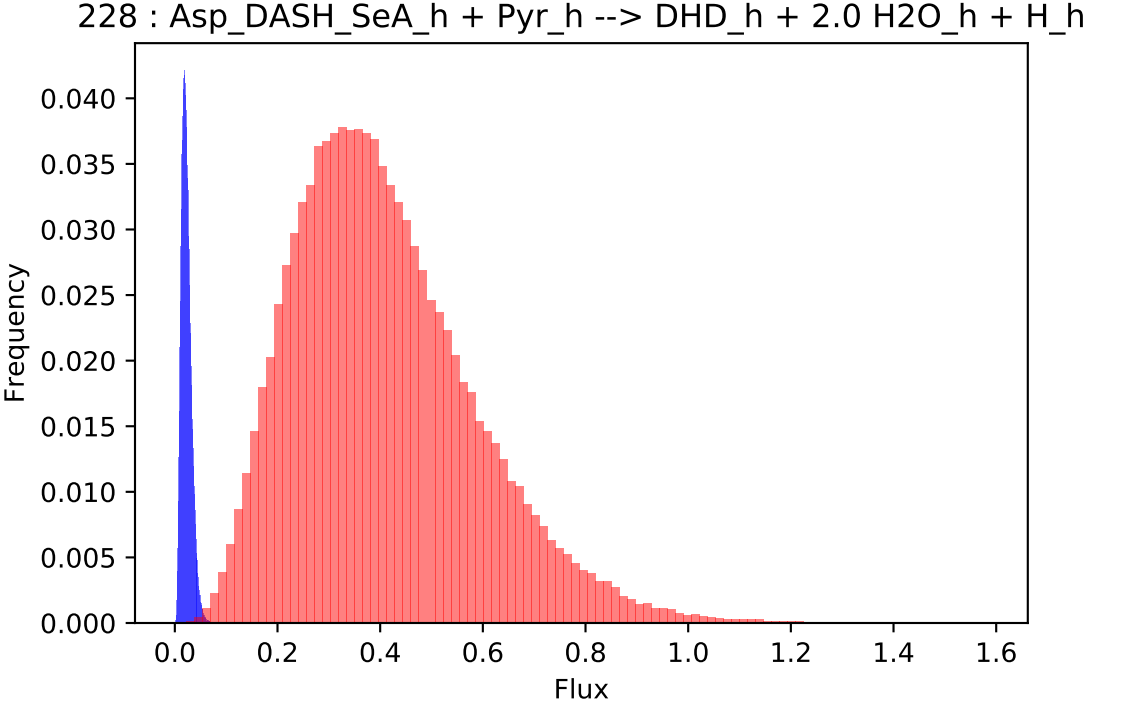

223 : 3IPM_h + NAD_h --> H_h + IPO_h + NADH_h
Frequency
0.00
0.01
0.02
0.03
0.04
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

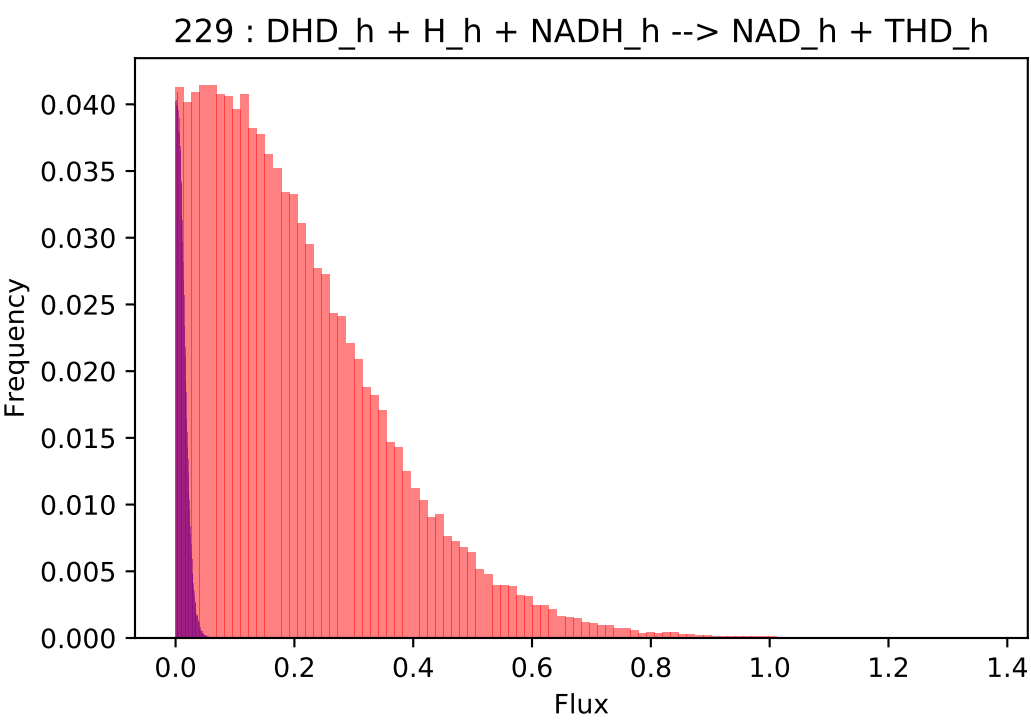

224 : H_h + IPO_h --> 4MOP_h + CO2_h
Frequency
0.00
0.01
0.02
0.03
0.04
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

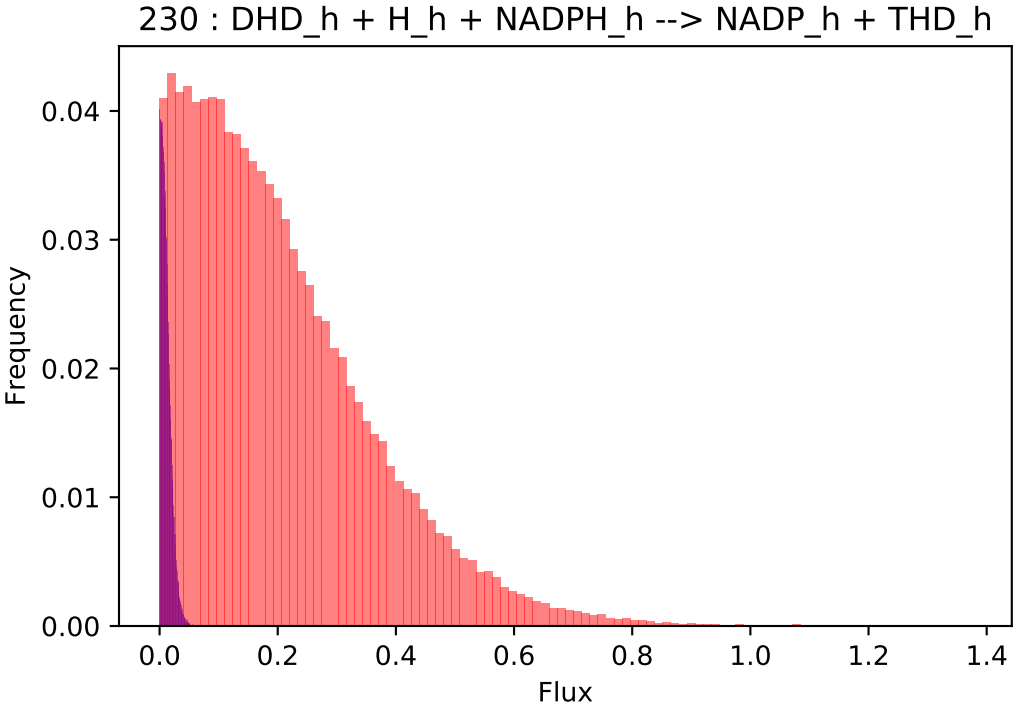

225 : 4MOP_h + Glu_h <=> KG_h + Leu_h
Frequency
0.00
0.01
0.02
0.03
0.04
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

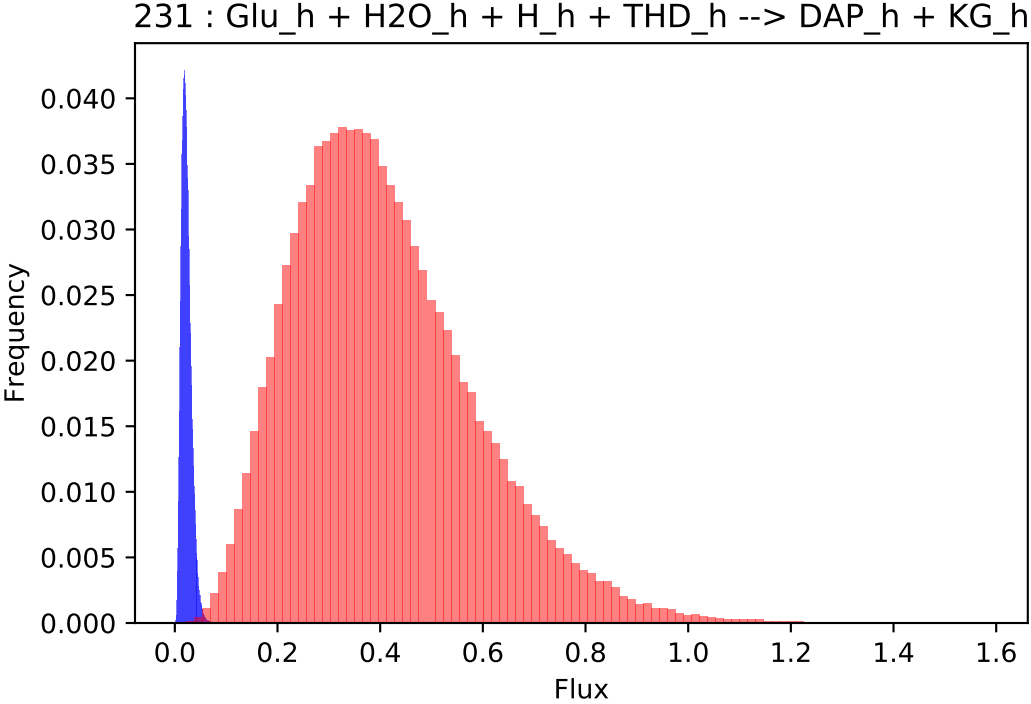

226 : ATP_h + Asp_h --> ADP_h + AspP_h
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Flux

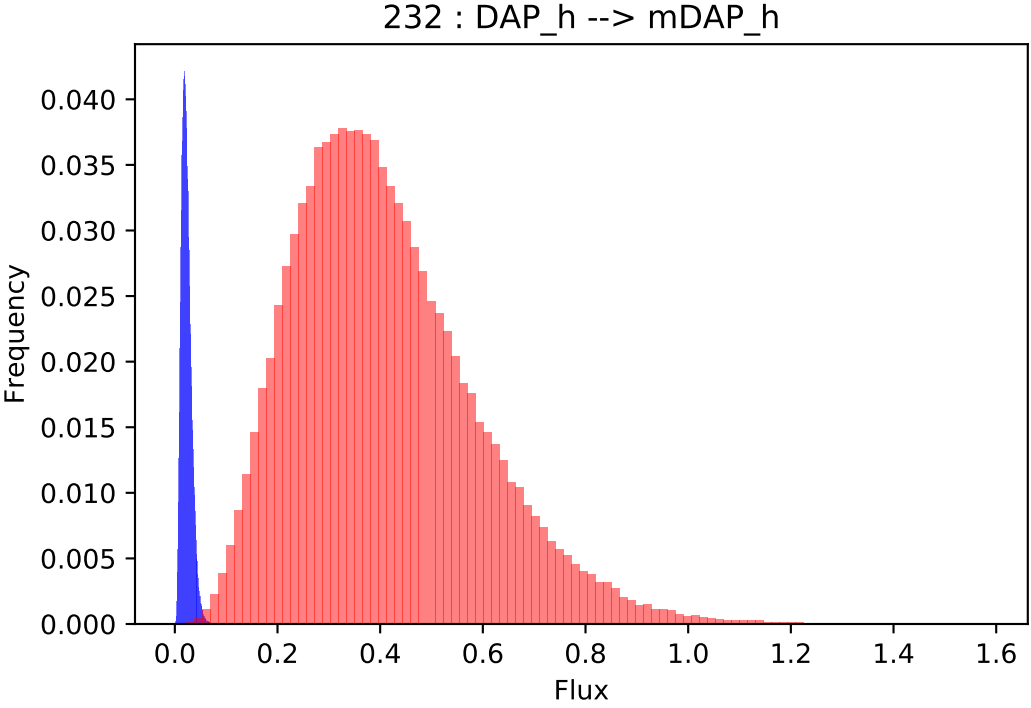

227 : AspP_h + H_h + NADPH_h --> Asp_DASH_SeA_h + NADP_h + Pi_h
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Flux

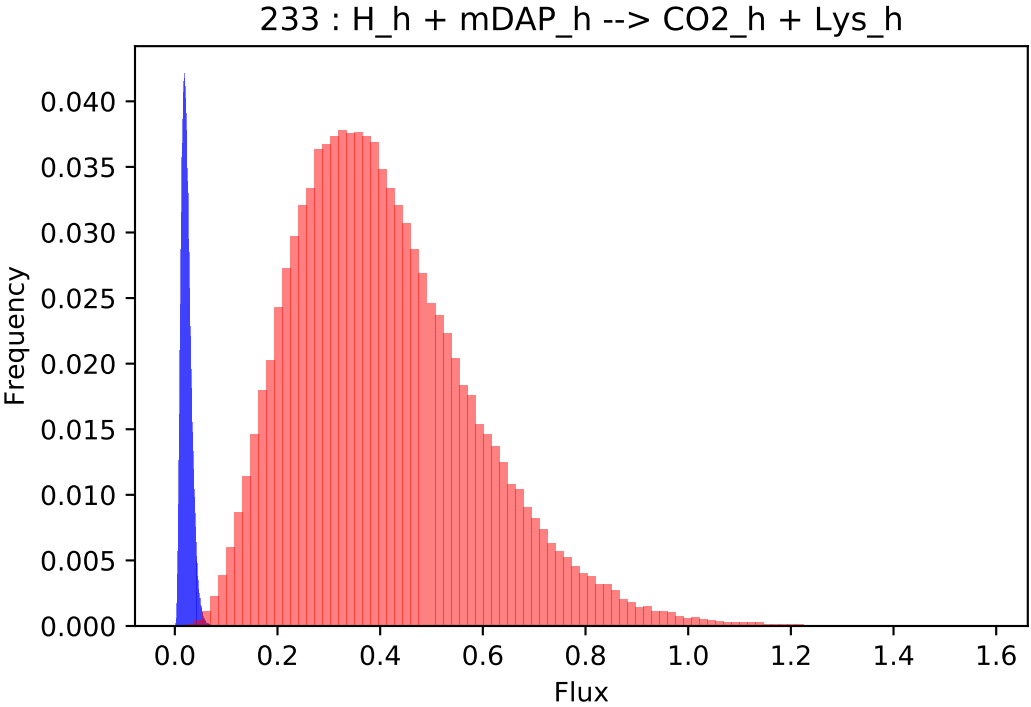

228 : Asp_DASH_SeA_h + Pyr_h --> DHD_h + 2.0 H2O_h + H_h
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
Flux

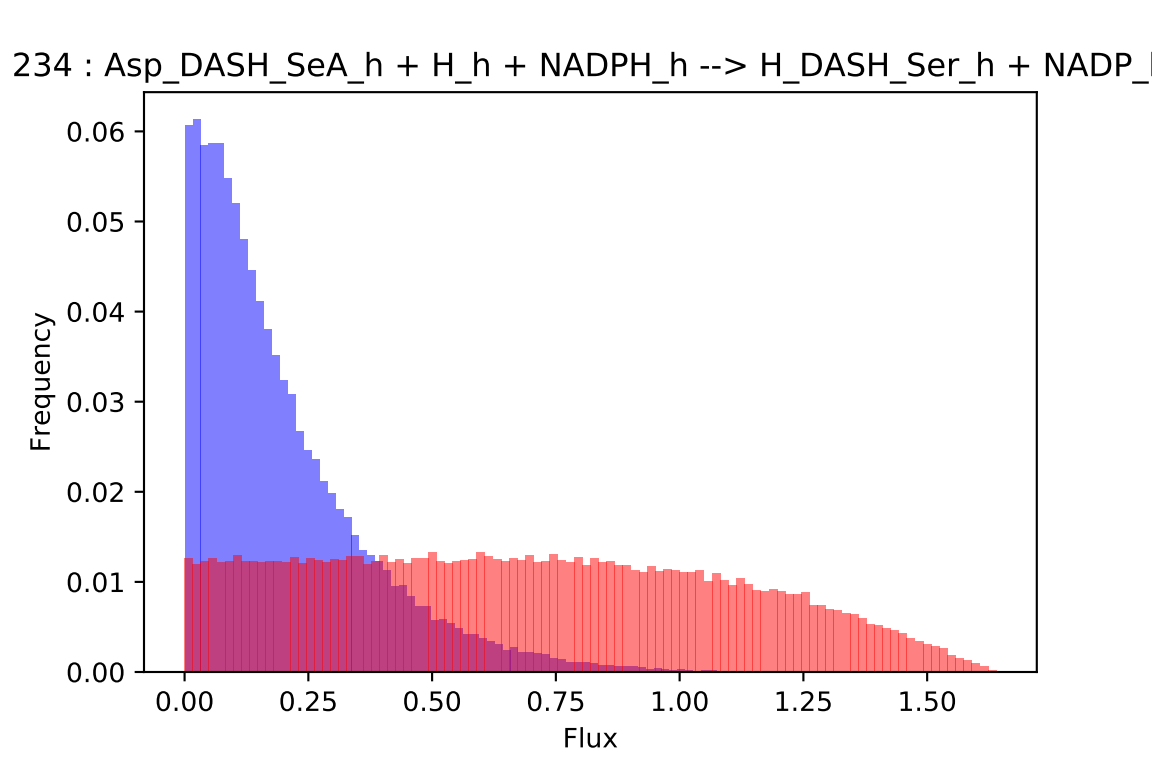

229 : DHD_h + H_h + NADH_h --> NAD_h + THD_h
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
Flux

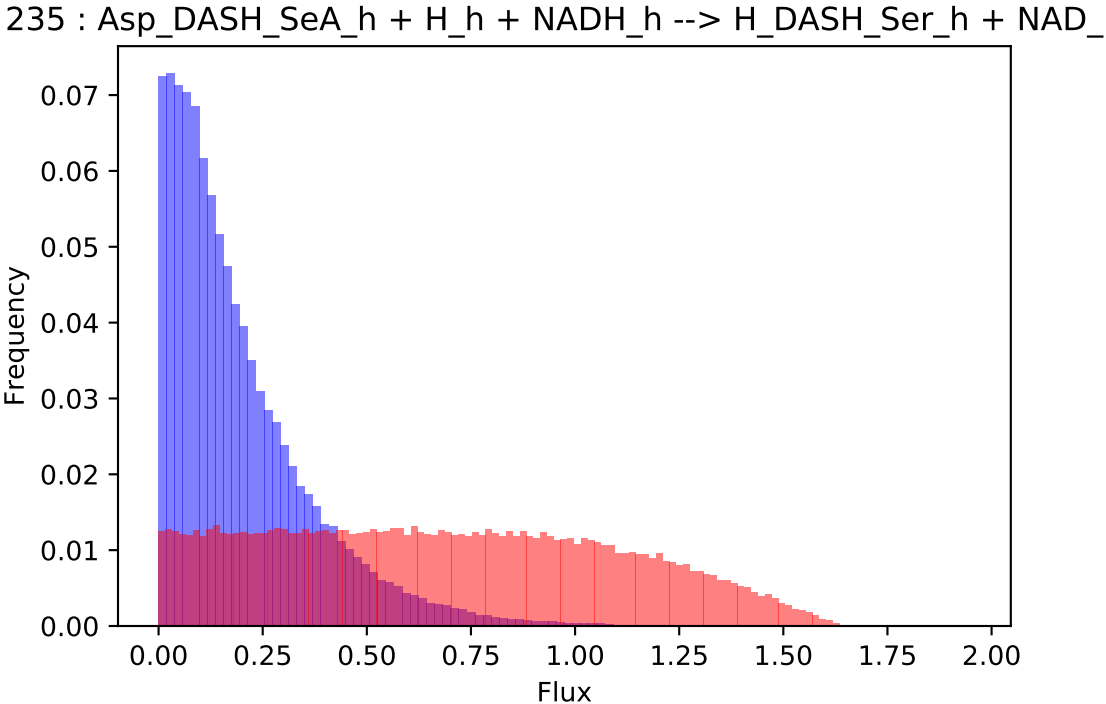

230 : DHD_h + H_h + NADPH_h --> NADP_h + THD_h
Frequency
0.00
0.01
0.02
0.03
0.04
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
Flux

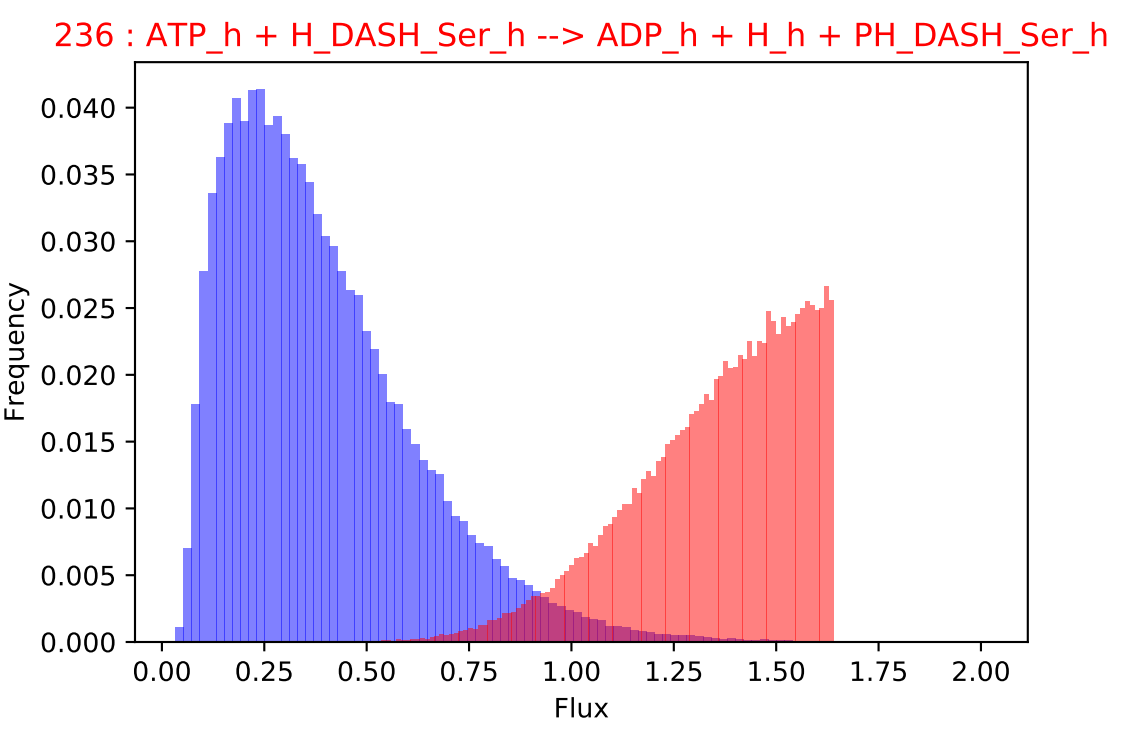

231 : Glu_h + H2O_h + H_h + THD_h --> DAP_h + KG_h
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
Flux

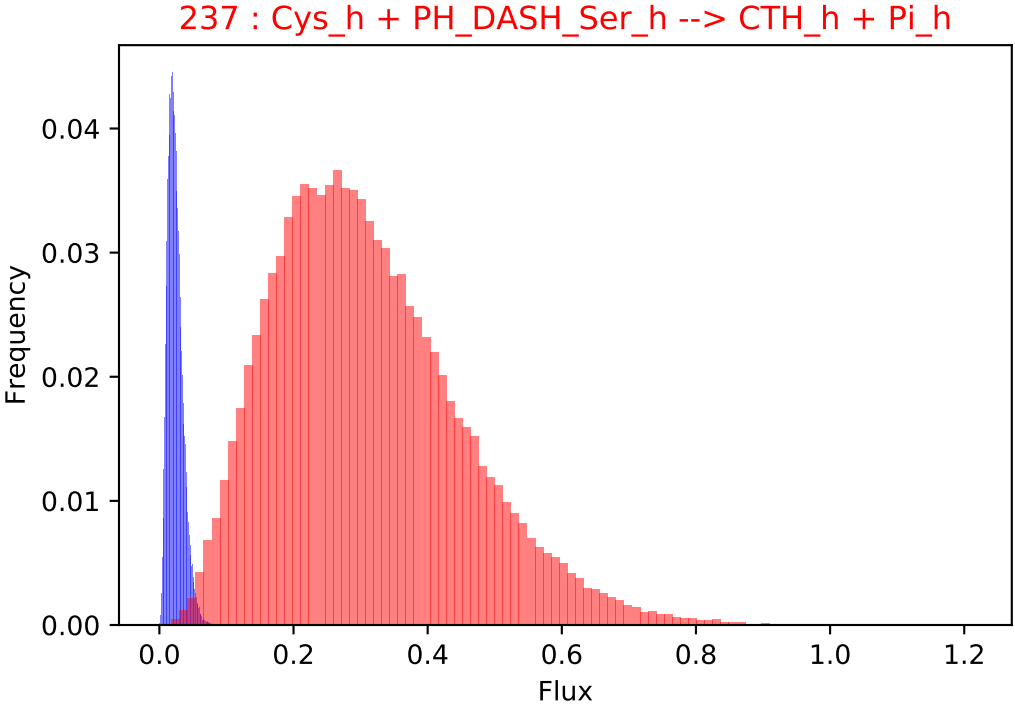

232 : DAP_h --> mDAP_h
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
Flux

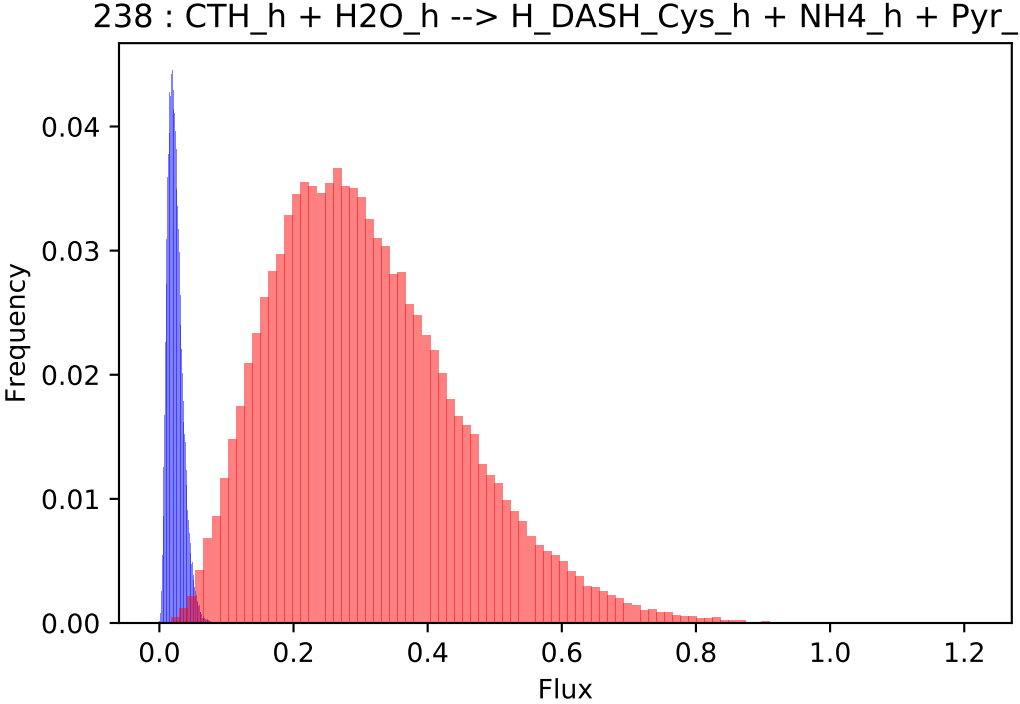

233 : H_h + mDAP_h --> CO2_h + Lys_h
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
Flux

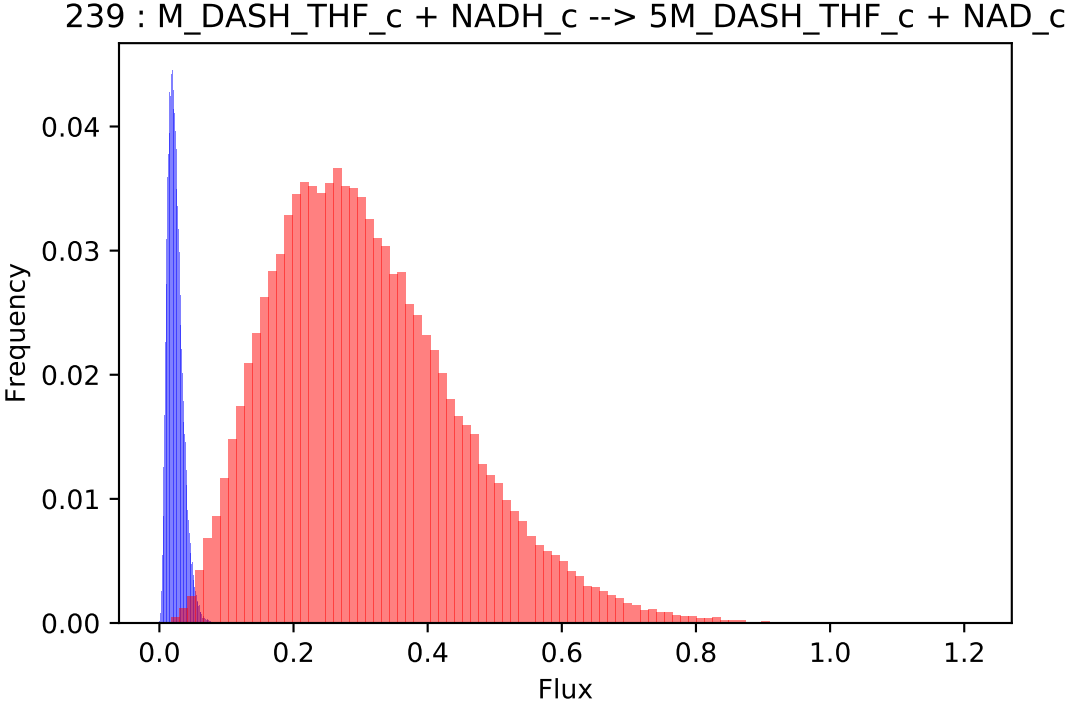

234 : Asp_DASH_SeA_h + H_h + NADPH_h --> H_DASH_Ser_h + NADP_
Frequency
0.06
0.05
0.04
0.03
0.02
0.01
0.00
0.00
0.25
0.50
0.75
1.00
1.25
1.50
Flux

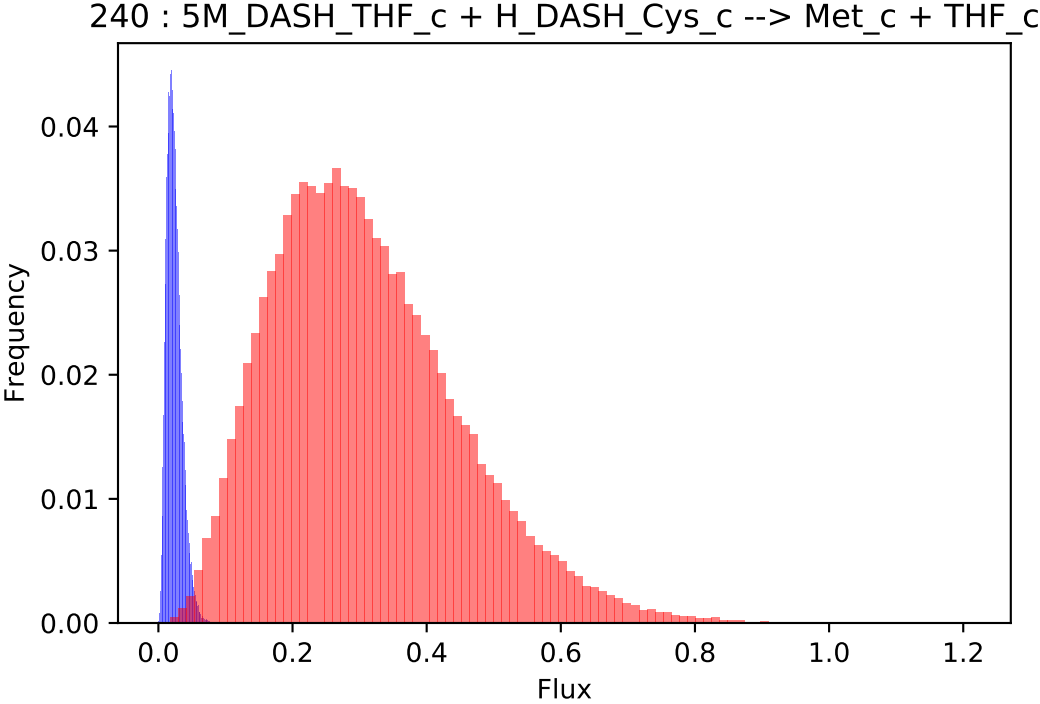

235 : Asp_DASH_SeA_h + H_h + NADH_h --> H_DASH_Ser_h + NAD_h
Frequency
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
Flux

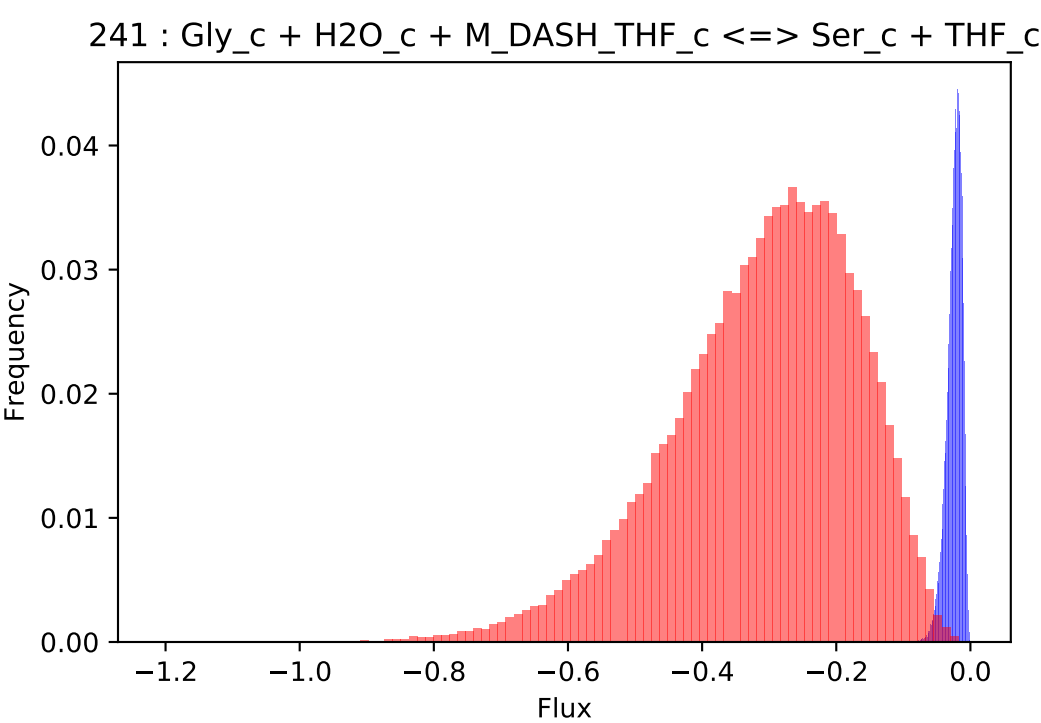

236 : ATP_h + H_DASH_Ser_h --> ADP_h + H_h + PH_DASH_Ser_h
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
Flux

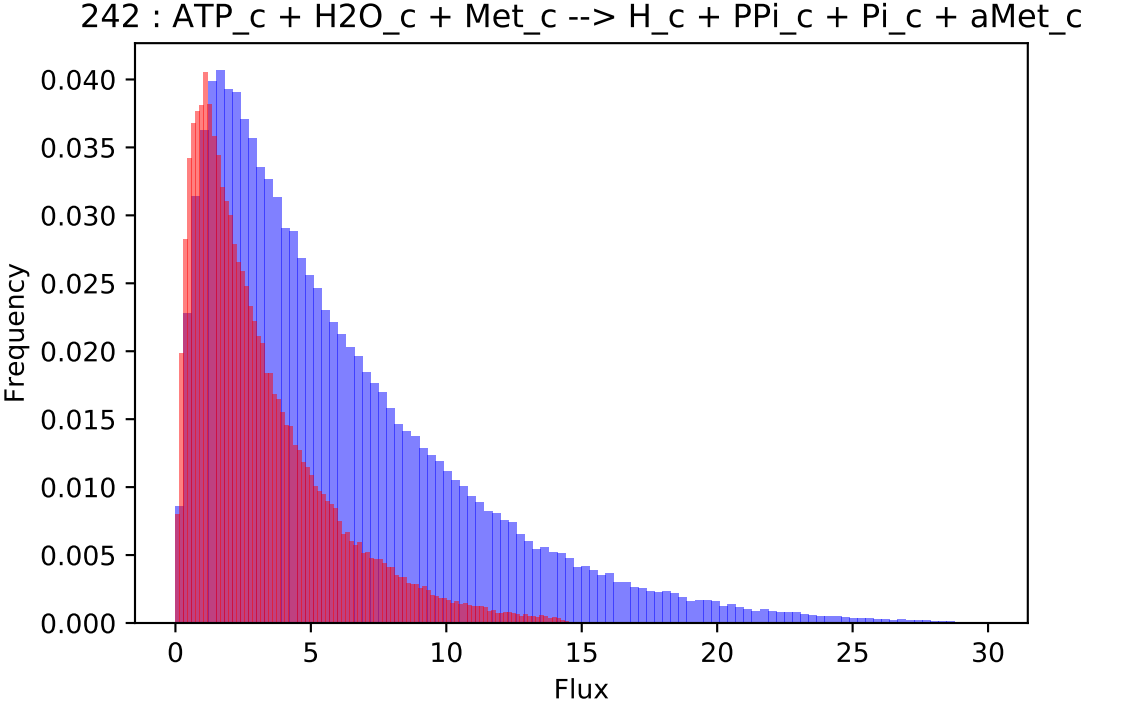

237 : Cys_h + PH_DASH_Ser_h --> CTH_h + Pi_h
Frequency
0.00
0.01
0.02
0.03
0.04
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

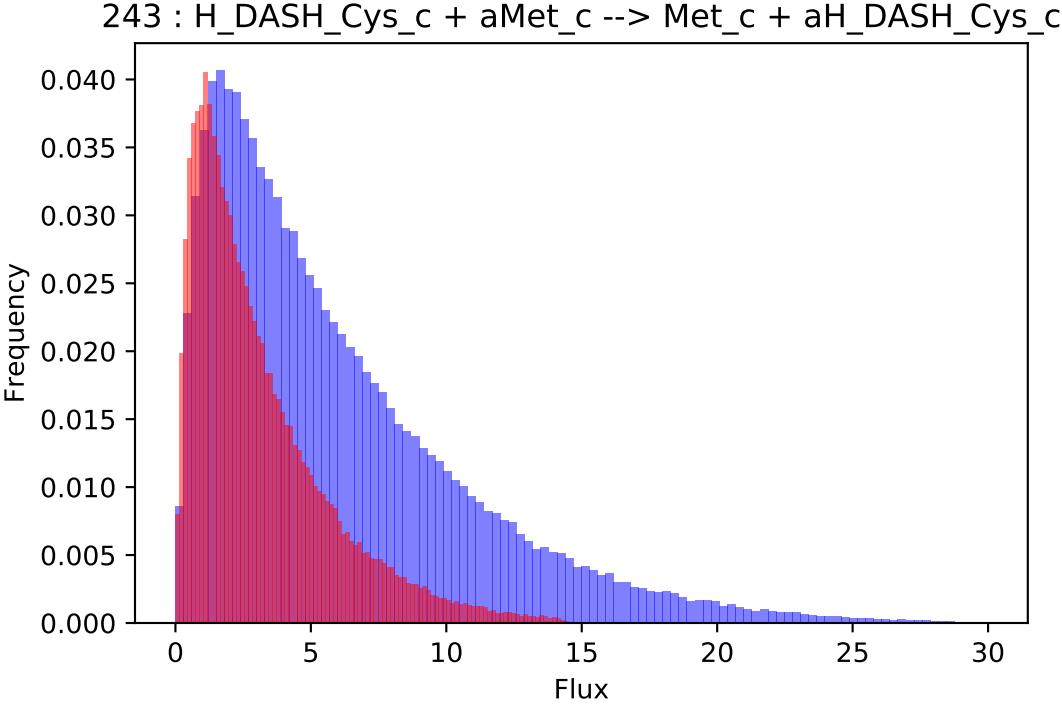

238 : CTH_h + H2O_h --> H_DASH_Cys_h + NH4_h + Pyr_h
Frequency
0.00
0.01
0.02
0.03
0.04
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

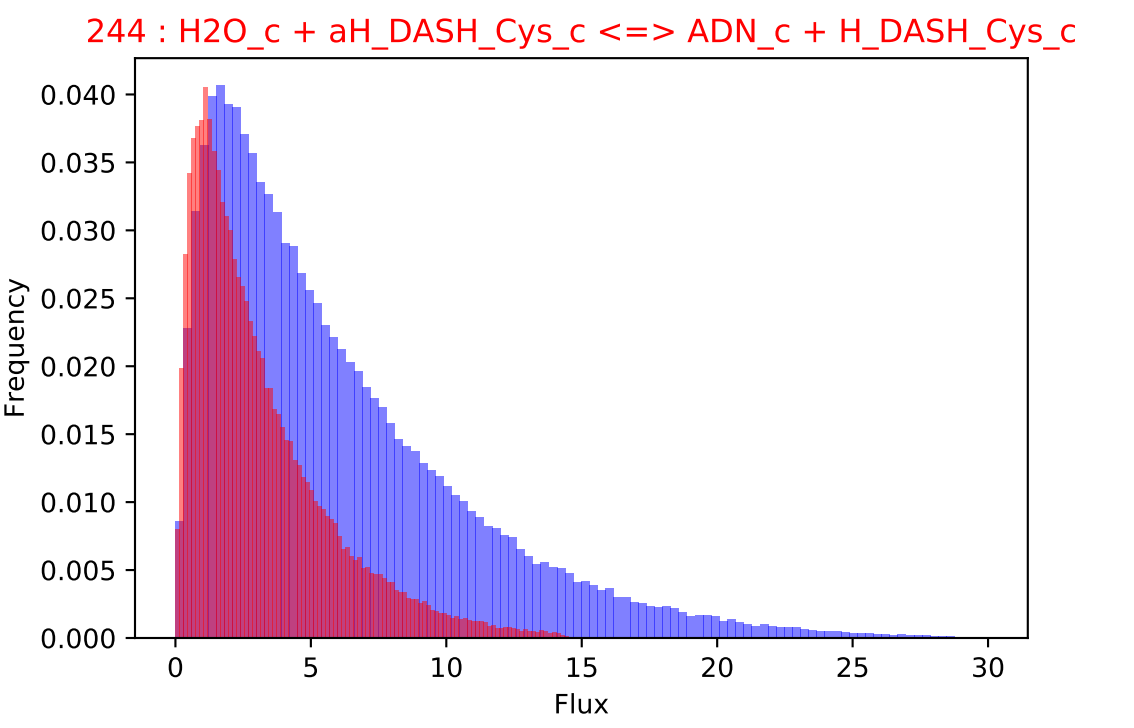

239 : M_DASH_THF_c + NADH_c --> 5M_DASH_THF_c + NAD_c
Frequency
0.00
0.01
0.02
0.03
0.04
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

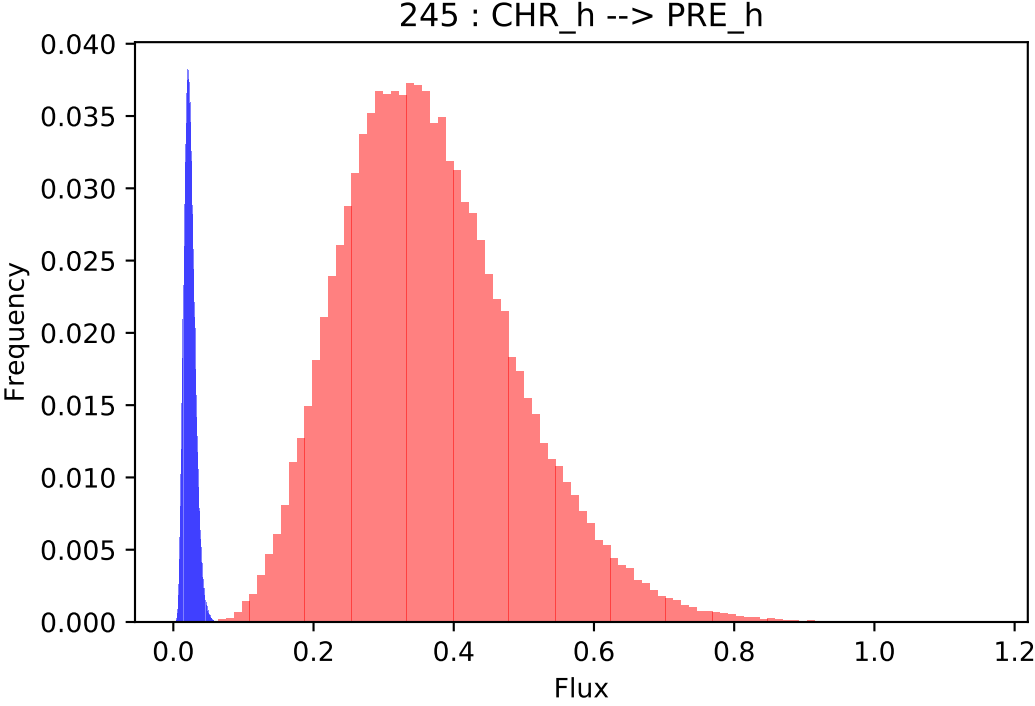

240 : 5M_DASH_THF_c + H_DASH_Cys_c --> Met_c + THF_c
Frequency
0.00
0.01
0.02
0.03
0.04
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

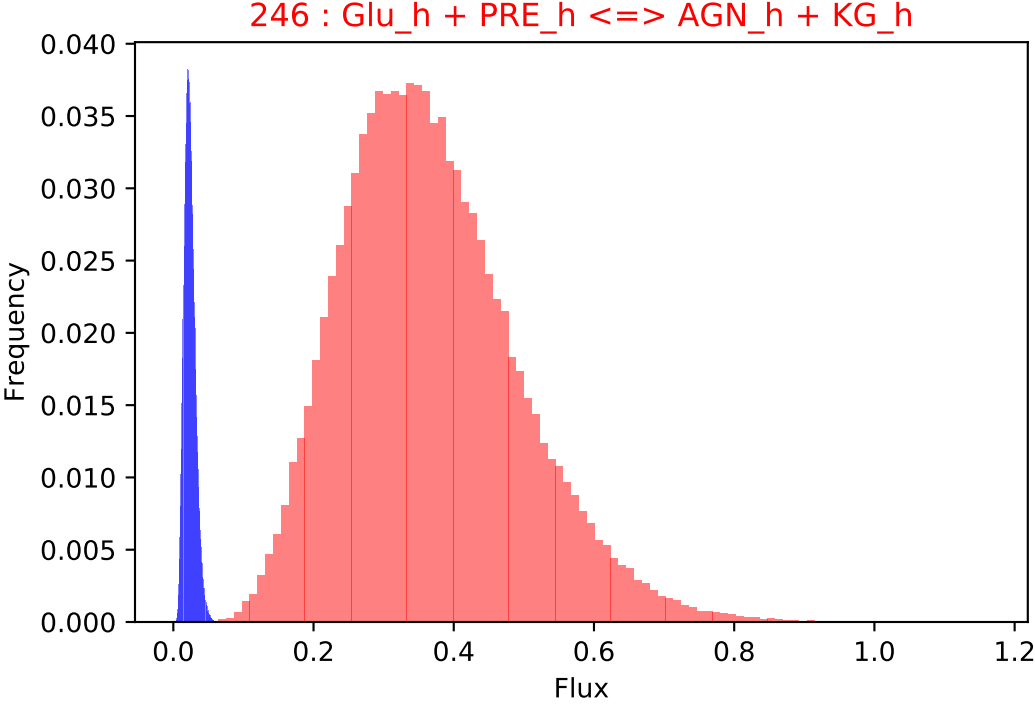

241 : Gly_c + H2O_c + M_DASH_THF_c <=> Ser_c + THF_c
Frequency
0.00
0.01
0.02
0.03
0.04
−1.2
−1.0
−0.8
−0.6
−0.4
−0.2
0.0
Flux

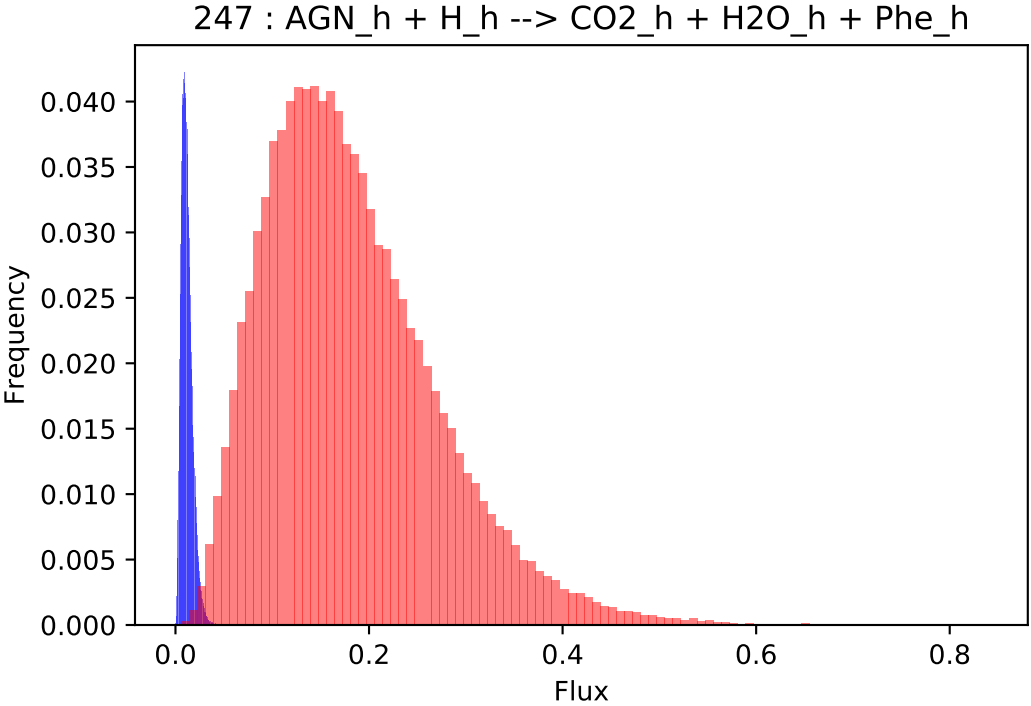

242 : ATP_c + H2O_c + Met_c --> H_c + PPi_c + Pi_c + aMet_c
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0
5
10
15
20
25
30
Flux

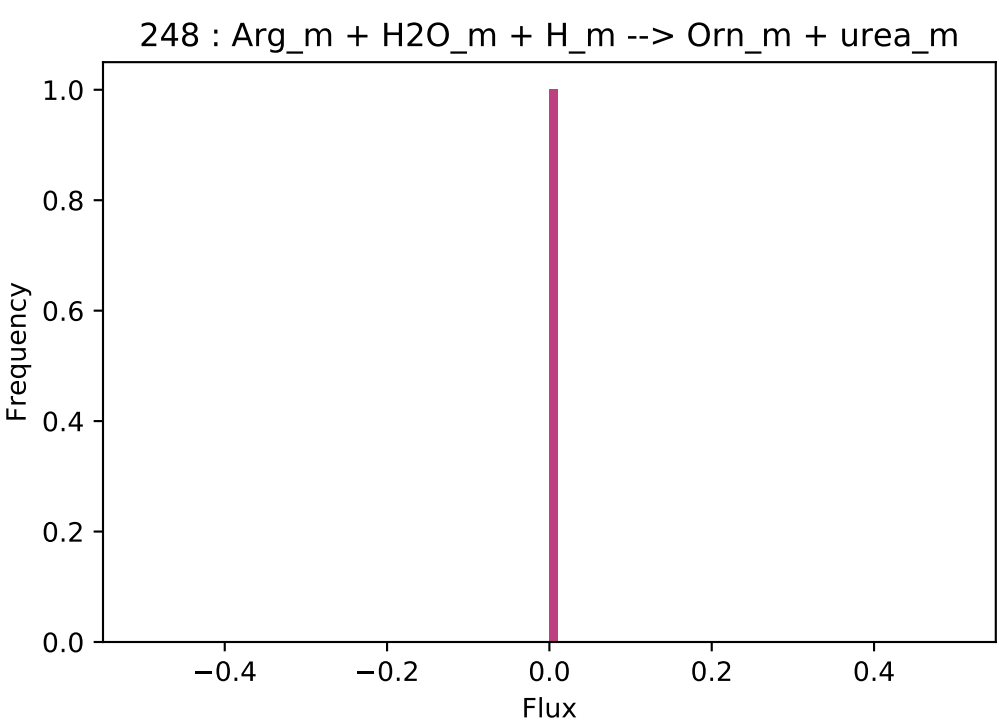

243 : H_DASH_Cys_c + aMet_c --> Met_c + aH_DASH_Cys_c
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0
5
10
15
20
25
30
Flux

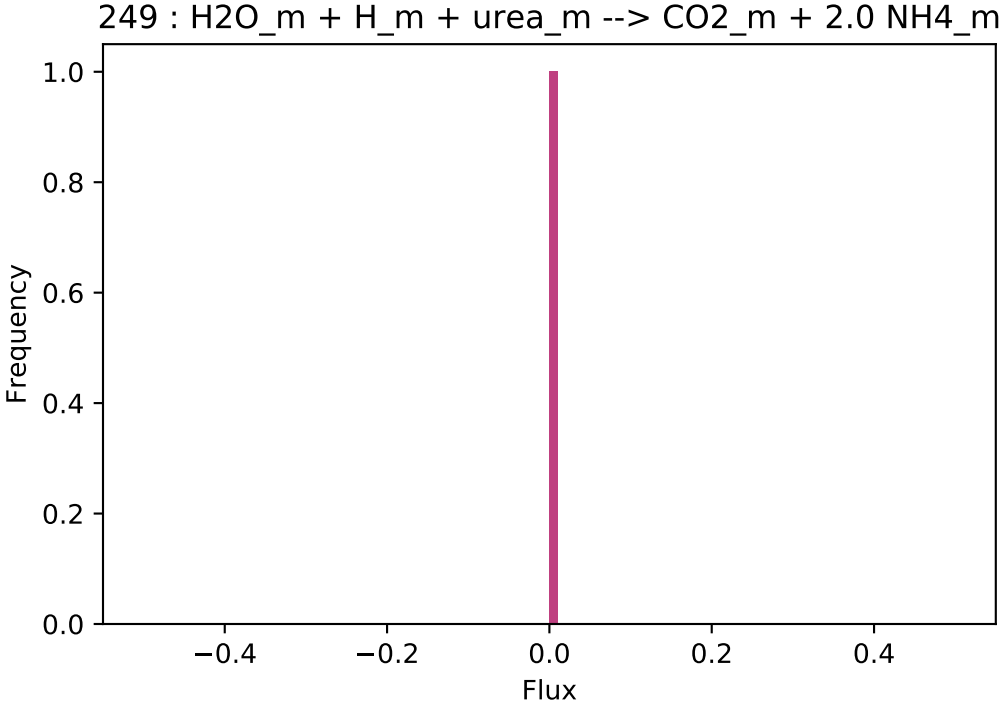

244 : H2O_c + aH_DASH_Cys_c <=> ADN_c + H_DASH_Cys_c
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0
5
10
15
20
25
30
Flux

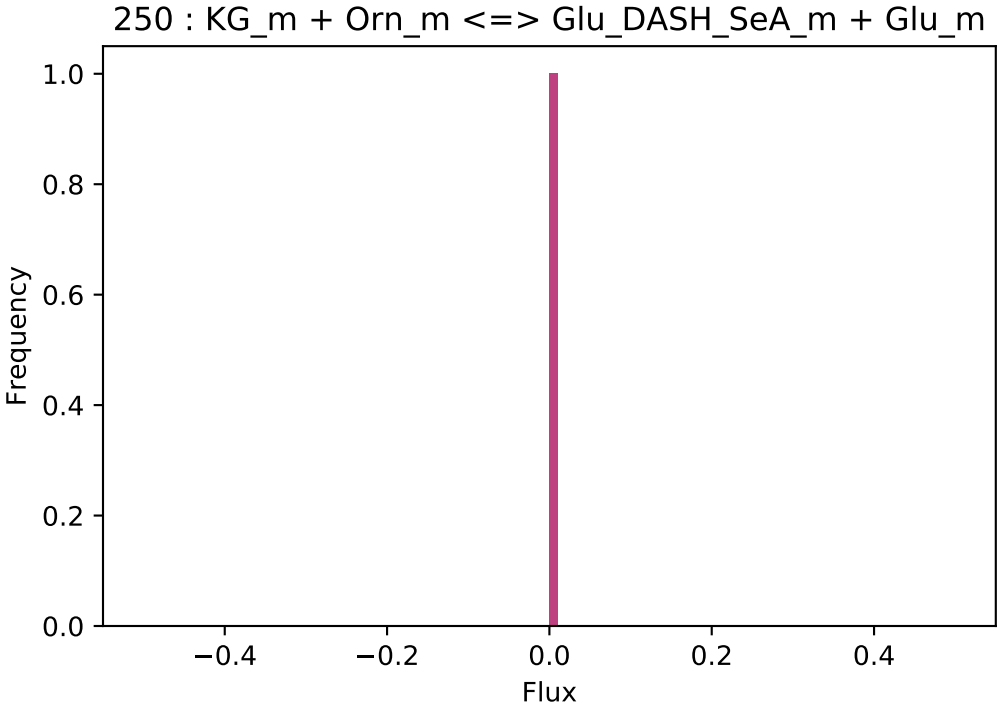

245 : CHR_h --> PRE_h
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

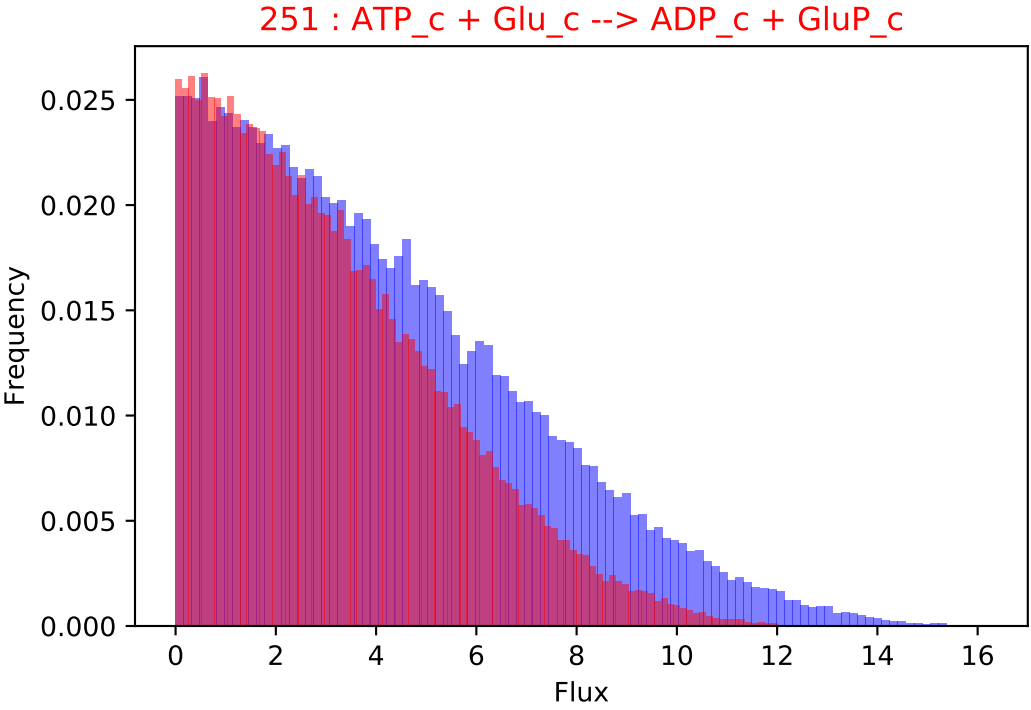

246 : Glu_h + PRE_h <=> AGN_h + KG_h
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

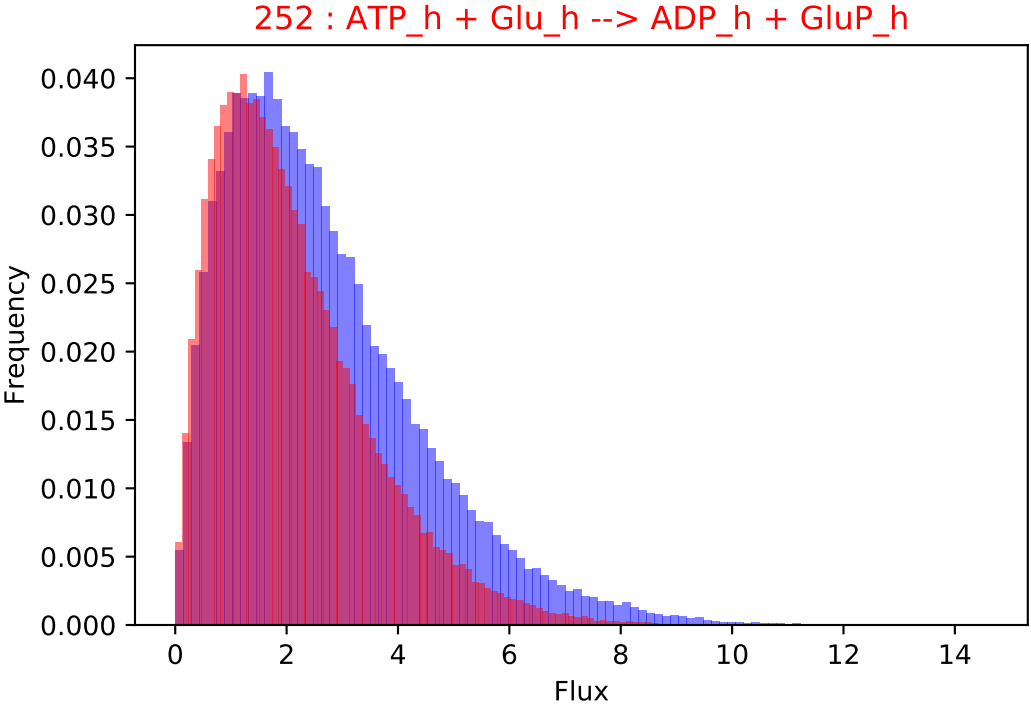

247 : AGN_h + H_h --> CO2_h + H2O_h + Phe_h
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.2
0.4
0.6
0.8
Flux

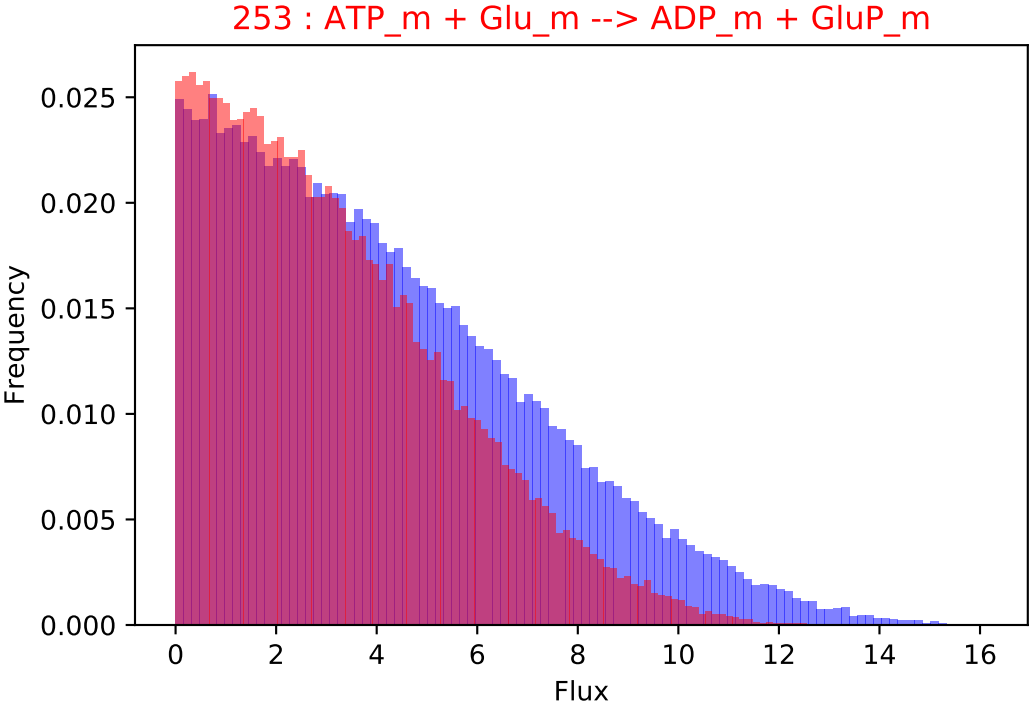

248 : Arg_m + H2O_m + H_m --> Orn_m + urea_m
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

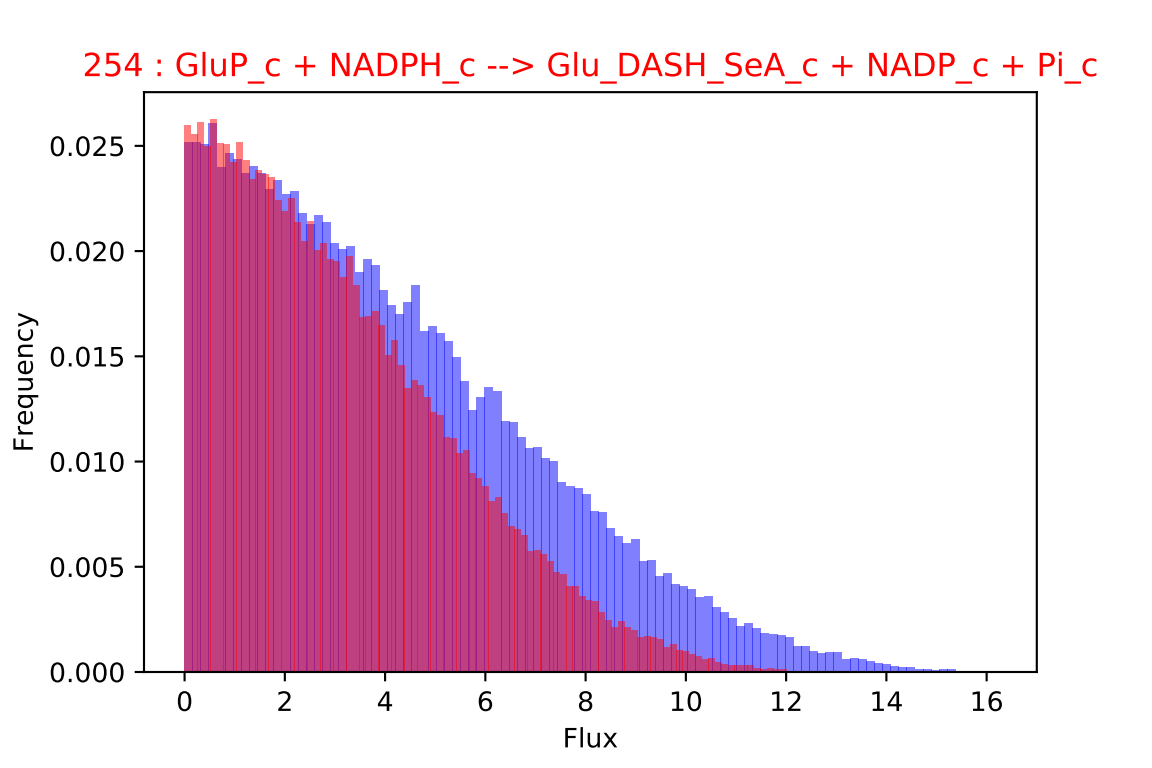

249 : H2O_m + H_m + urea_m --> CO2_m + 2.0 NH4_m
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

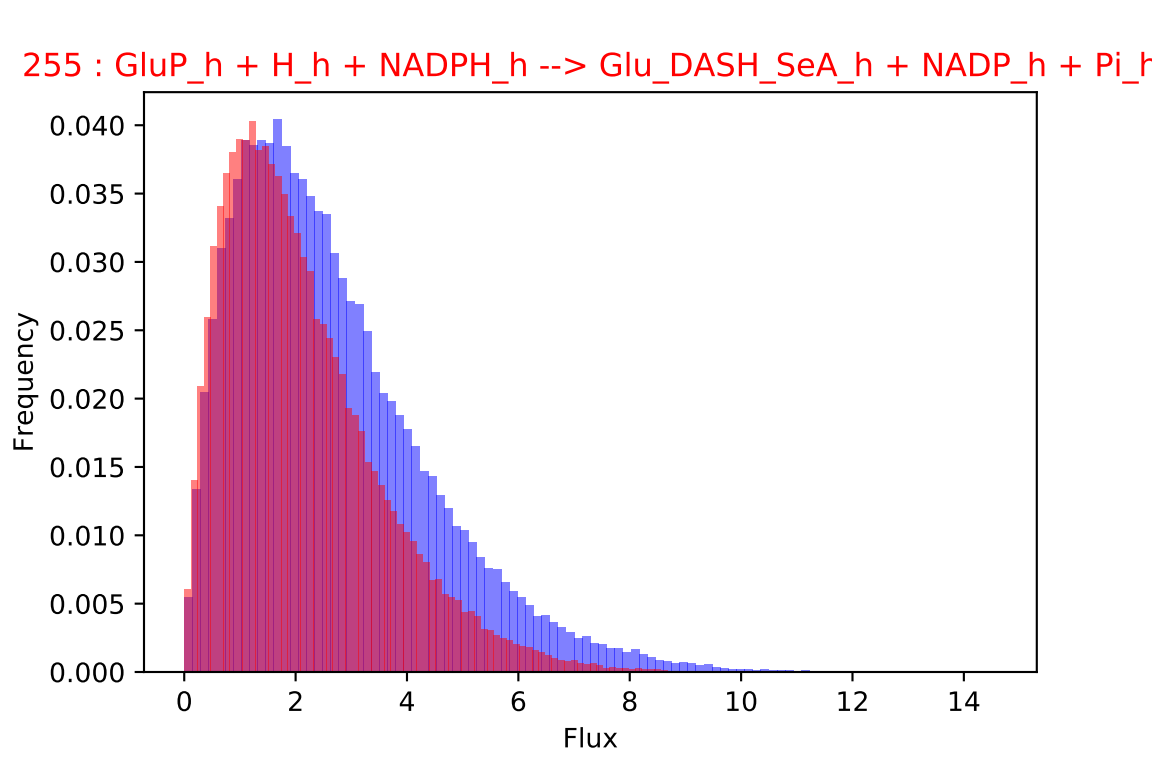

250 : KG_m + Orn_m <=> Glu_DASH_SeA_m + Glu_m
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

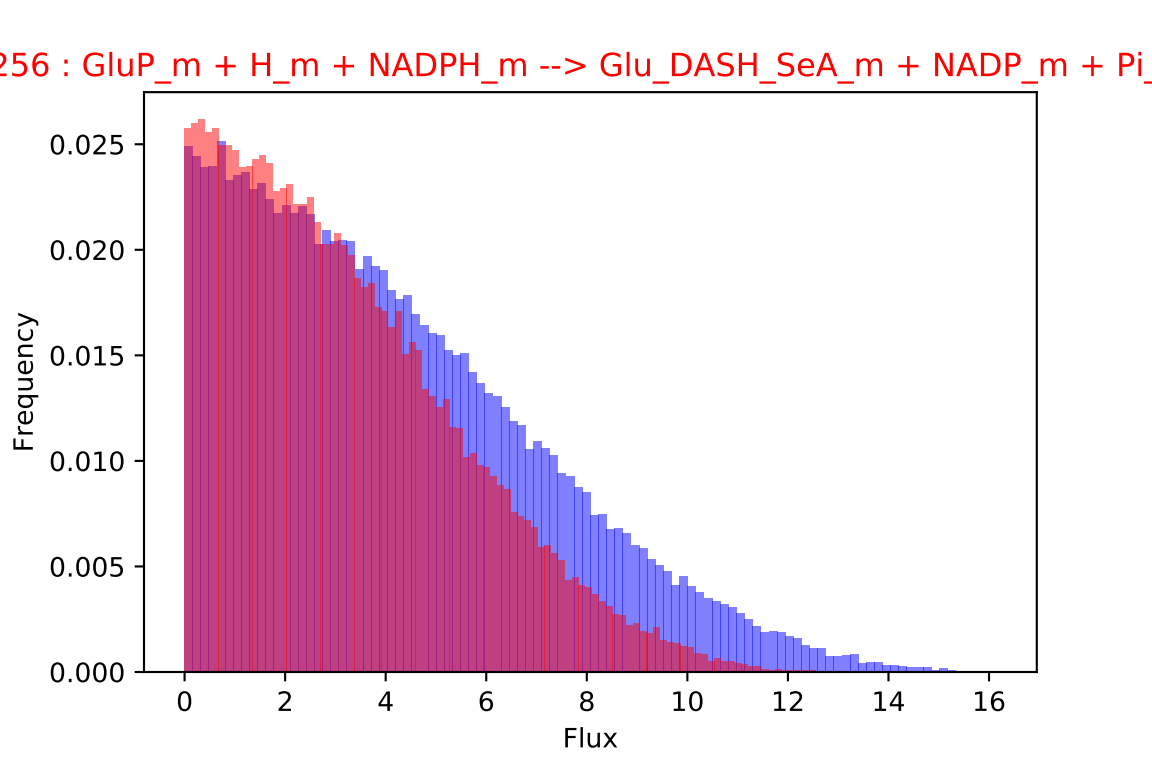

251 : ATP_c + Glu_c --> ADP_c + GluP_c
Frequency
0.025
0.020
0.015
0.010
0.005
0.000
0
2
4
6
8
10
12
14
16
Flux

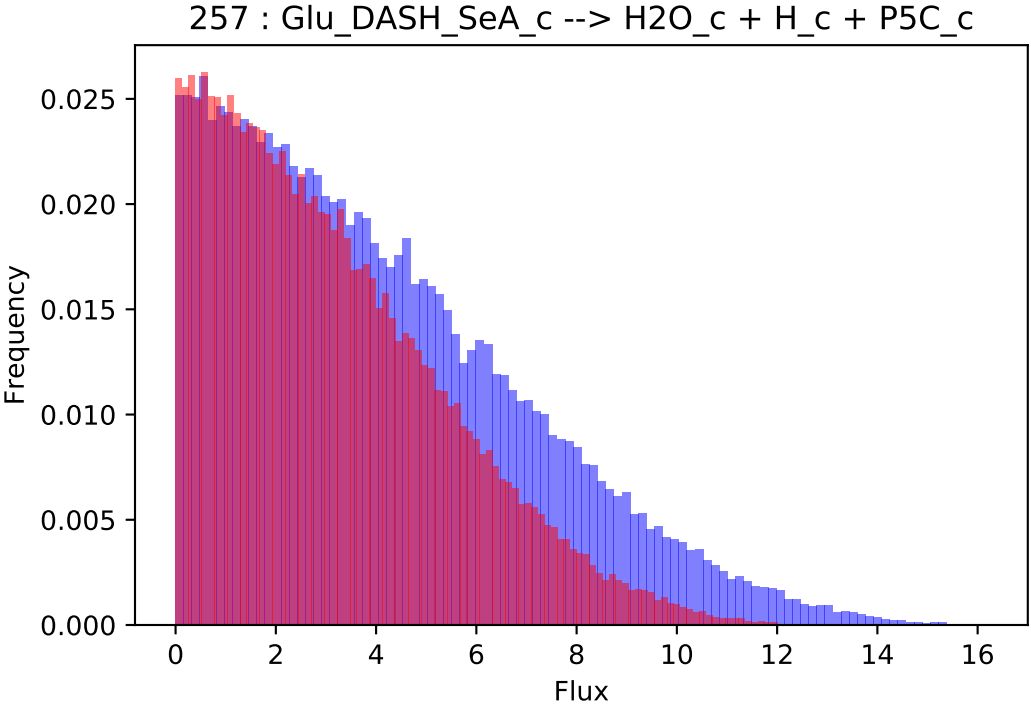

252 : ATP_h + Glu_h --> ADP_h + GluP_h
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0
2
4
6
8
10
12
14
Flux

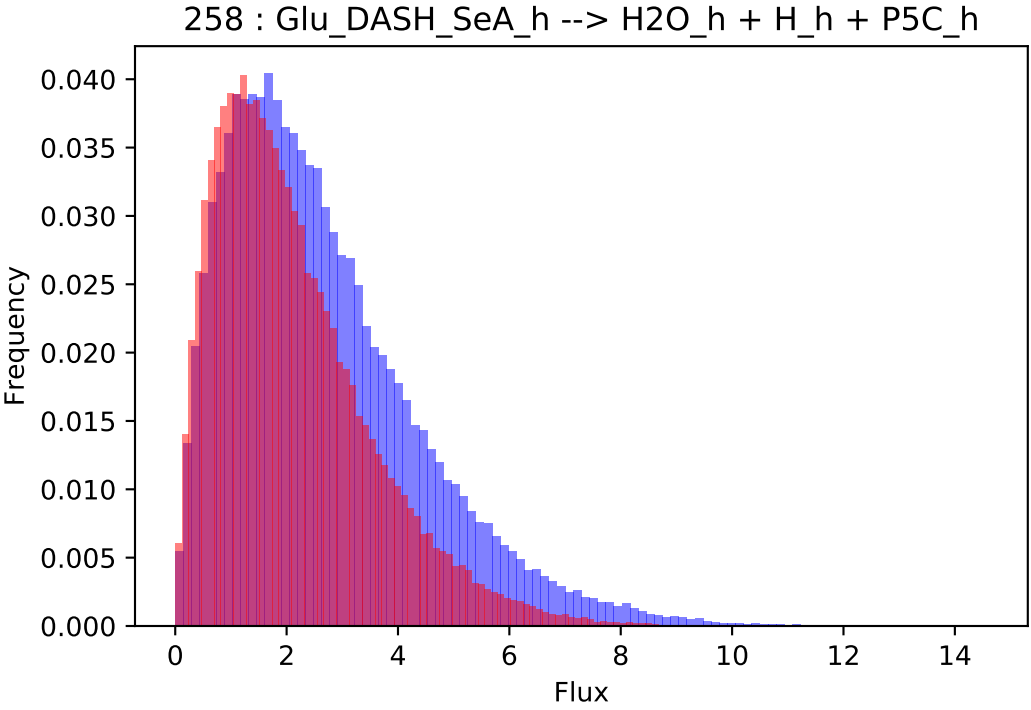

253 : ATP_m + Glu_m --> ADP_m + GluP_m
Frequency
0.025
0.020
0.015
0.010
0.005
0.000
0
2
4
6
8
10
12
14
16
Flux

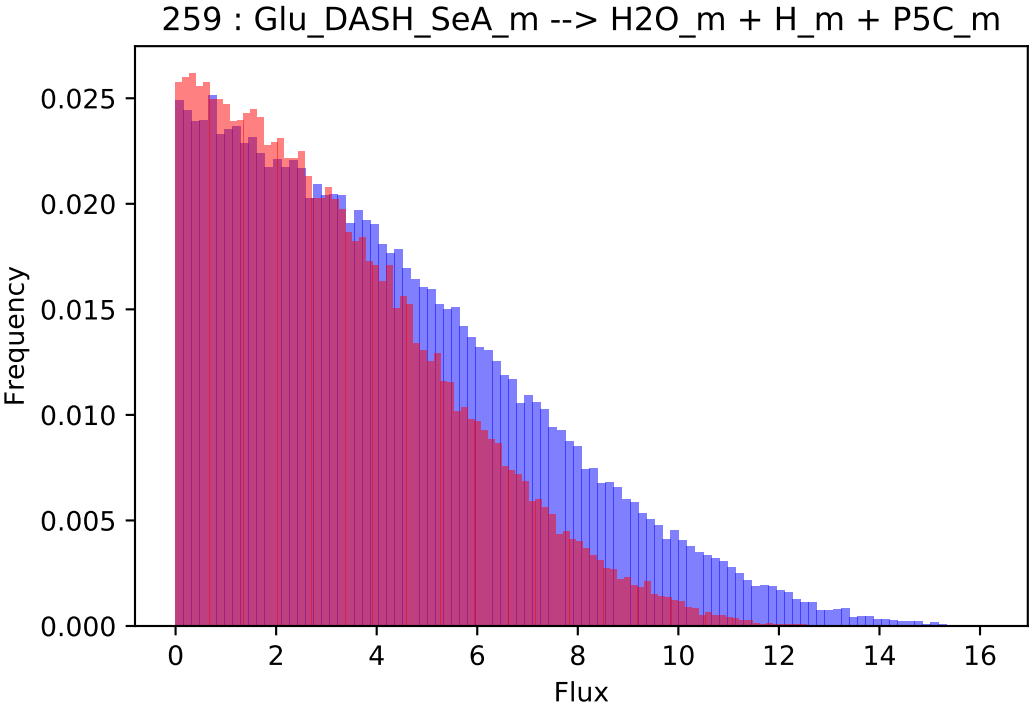

254 : GluP_c + NADPH_c --> Glu_DASH_SeA_c + NADP_c + Pi_c
Frequency
0.025
0.020
0.015
0.010
0.005
0.000
0
2
4
6
8
10
12
14
16
Flux

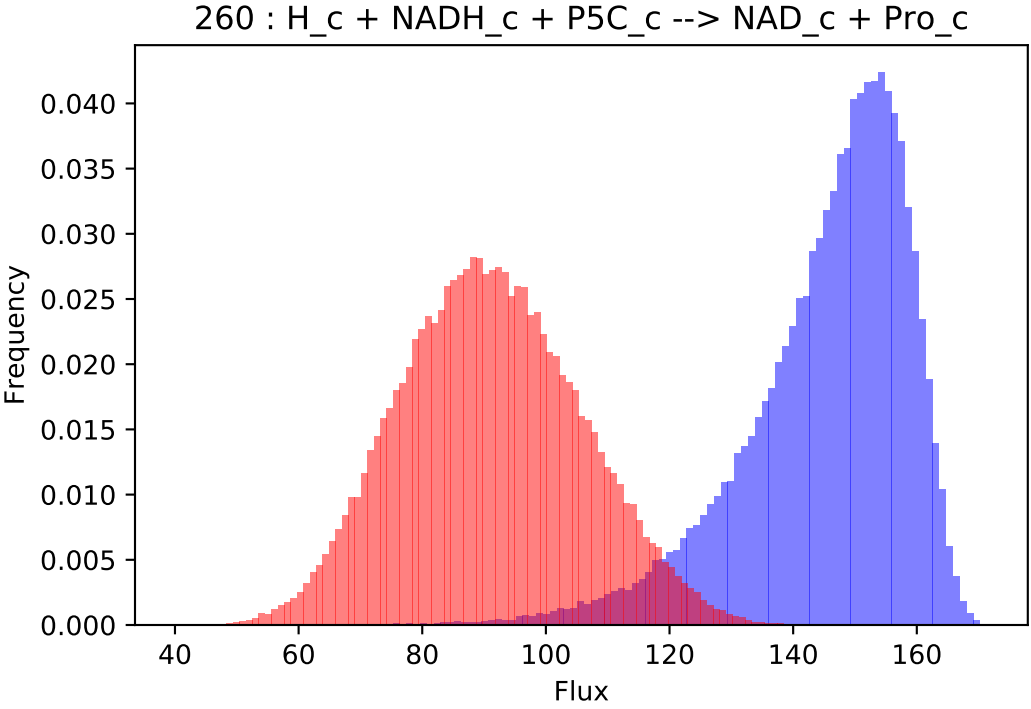

255 : GluP_h + H_h + NADPH_h --> Glu_DASH_SeA_h + NADP_h + Pi_h
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0
2
4
6
8
10
12
14
Flux

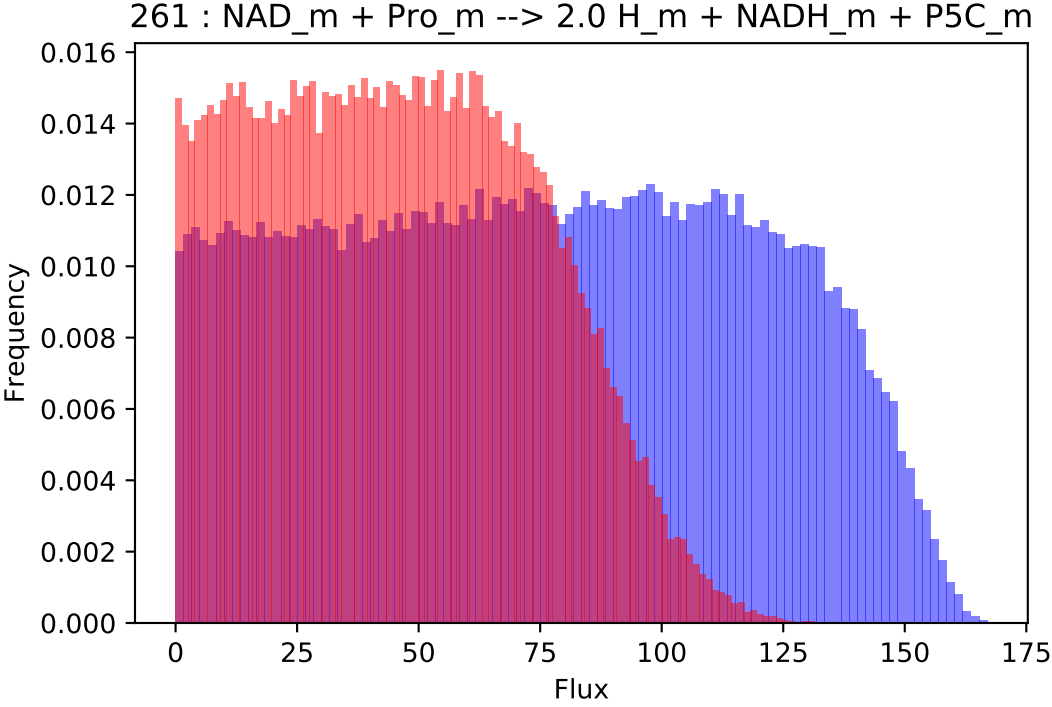

256 : GluP_m + H_m + NADPH_m --> Glu_DASH_SeA_m + NADP_m + Pi_
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
0
2
4
6
8
10
12
14
16
Flux

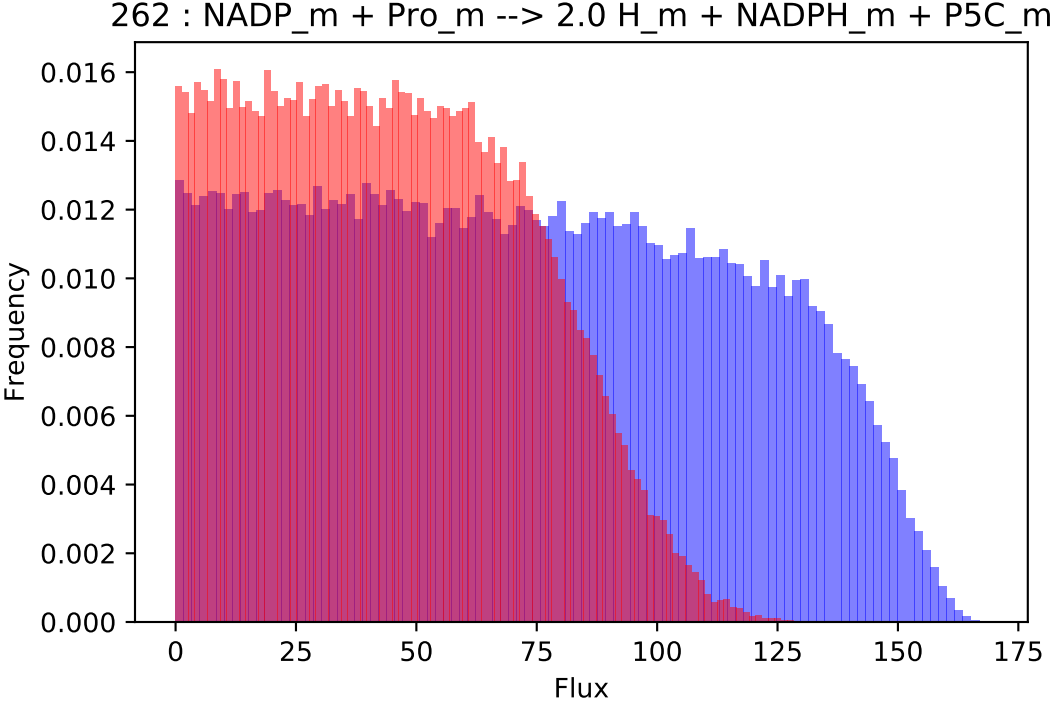

257 : Glu_DASH_SeA_c --> H2O_c + H_c + P5C_c
Frequency
0.025
0.020
0.015
0.010
0.005
0.000
0
2
4
6
8
10
12
14
16
Flux

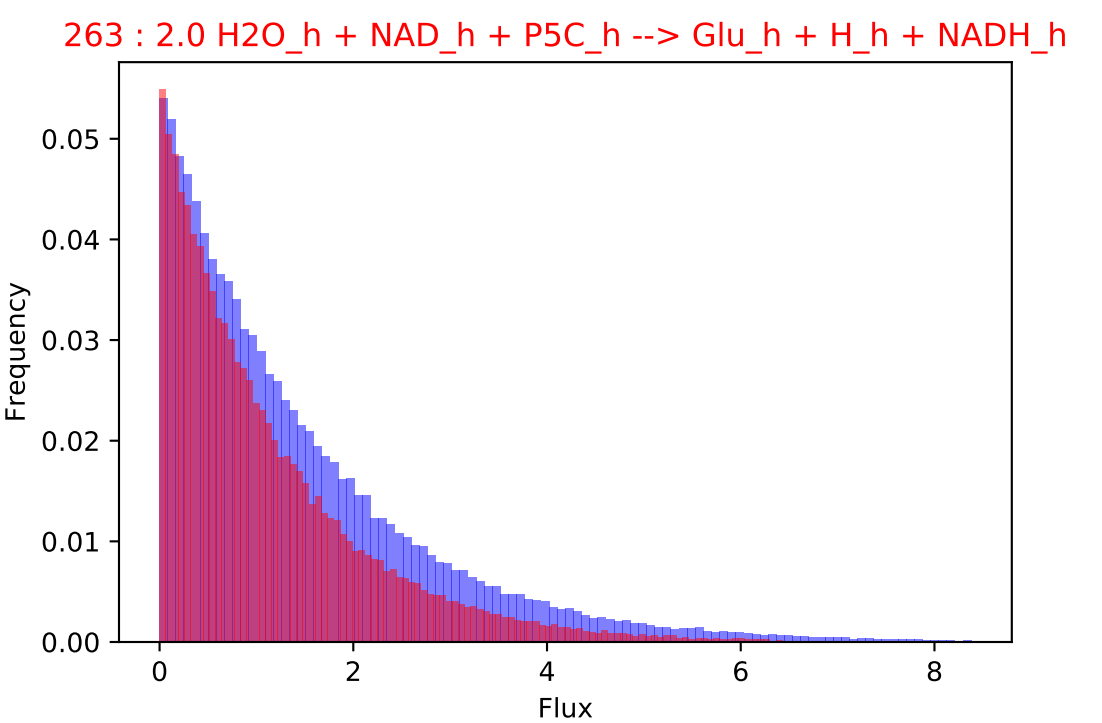

258 : Glu_DASH_SeA_h --> H2O_h + H_h + P5C_h
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0
2
4
6
8
10
12
14
Flux

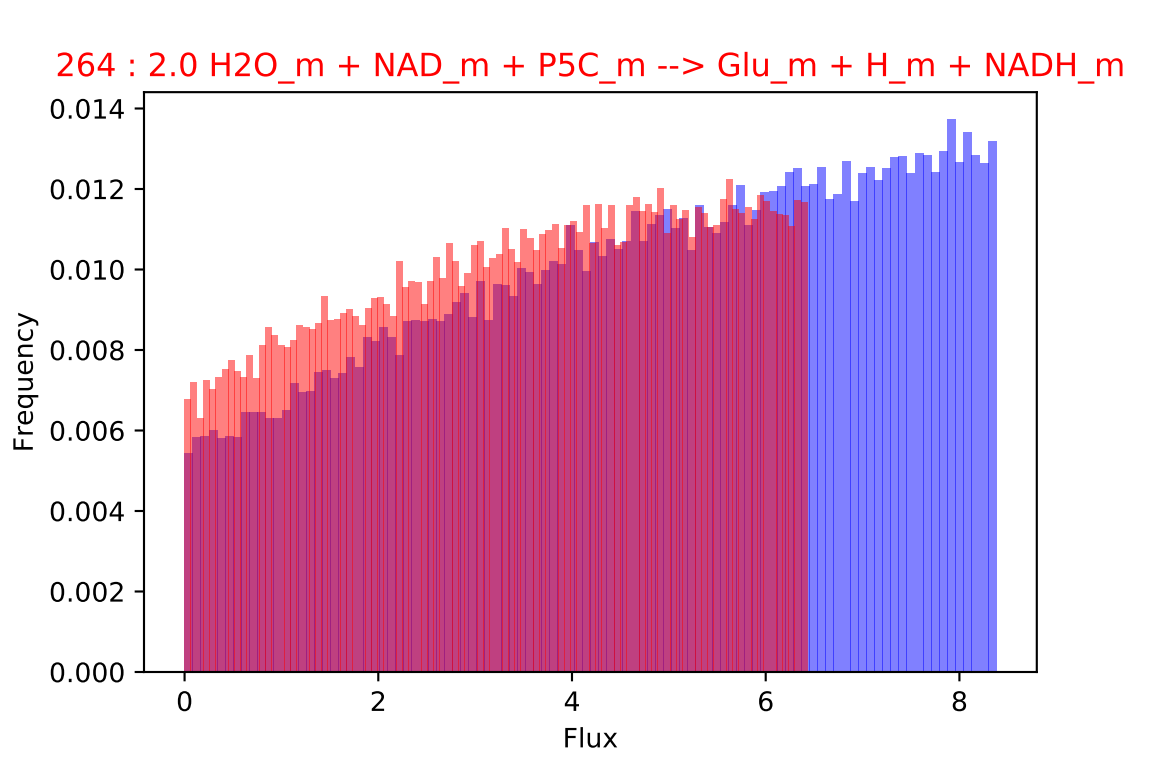

259 : Glu_DASH_SeA_m --> H2O_m + H_m + P5C_m
Frequency
0.025
0.020
0.015
0.010
0.005
0.000
0
2
4
6
8
10
12
14
16
Flux

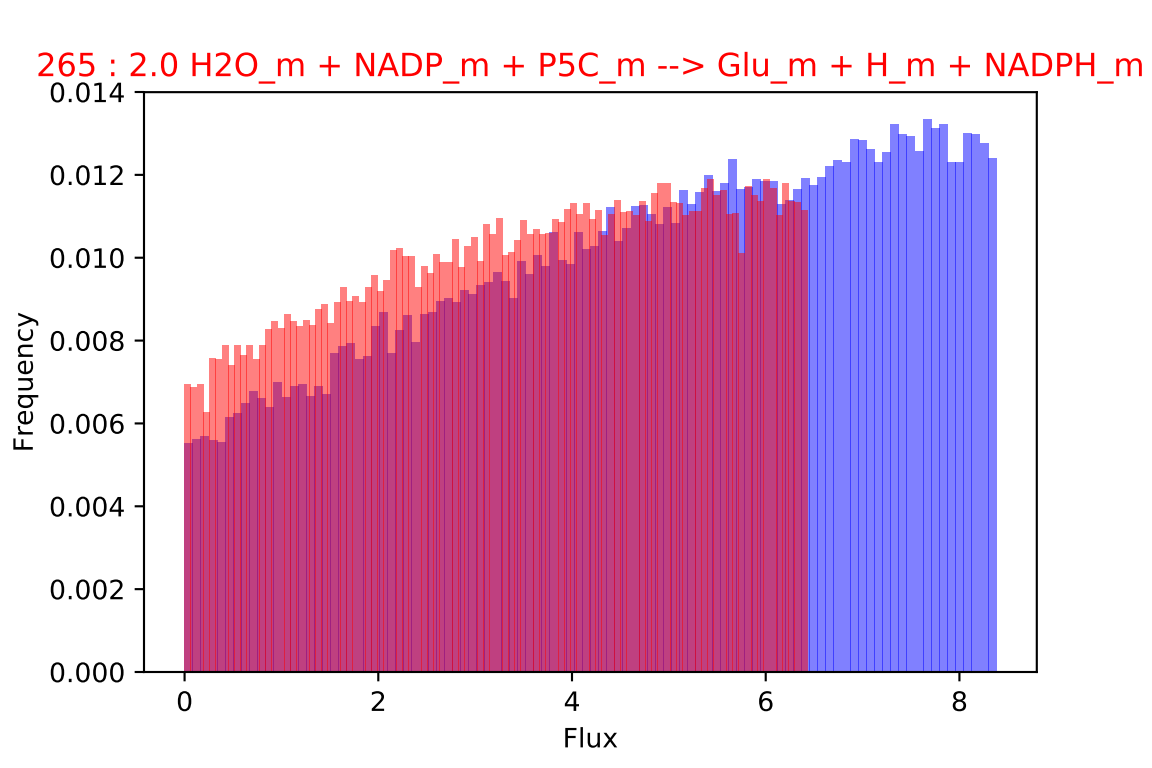

260 : H_c + NADH_c + P5C_c --> NAD_c + Pro_c
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
40
60
80
100
120
140
160
Flux

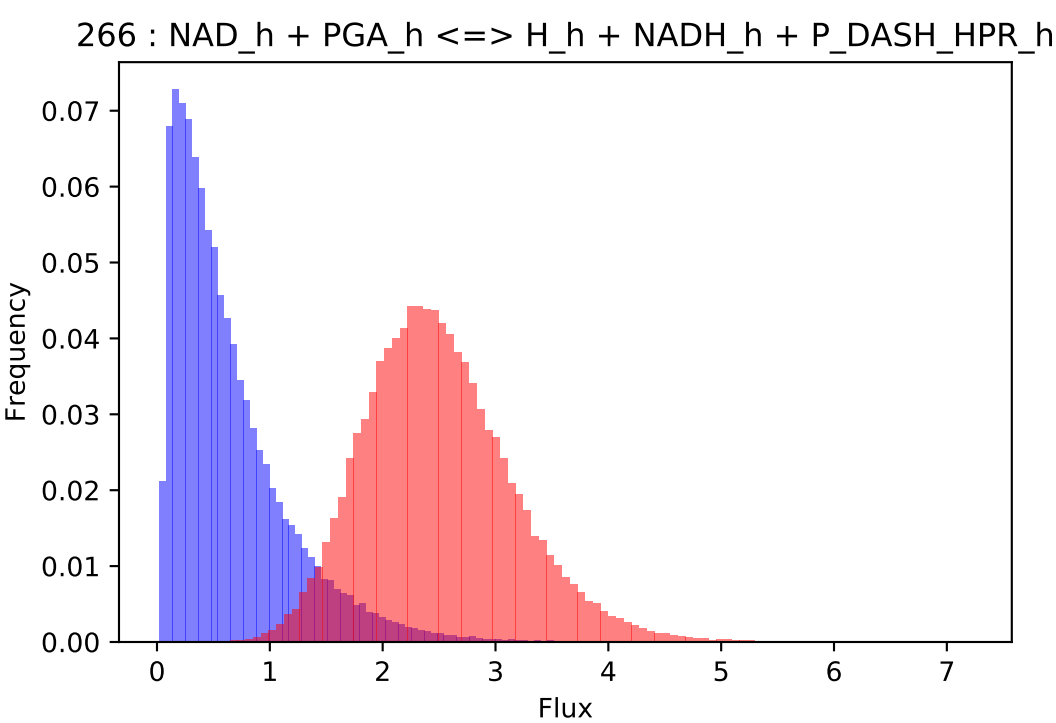

261 : NAD_m + Pro_m --> 2.0 H_m + NADH_m + P5C_m
Frequency
0.016
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
0
25
50
75
100
125
150
175
Flux

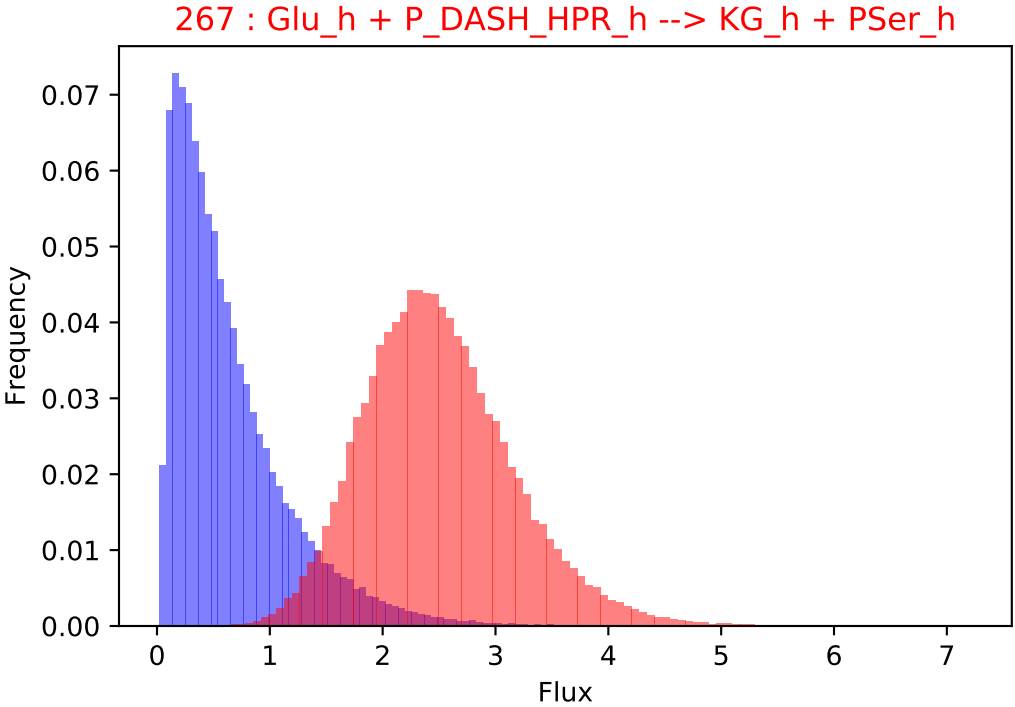

262 : NADP_m + Pro_m --> 2.0 H_m + NADPH_m + P5C_m
Frequency
0.016
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
0
25
50
75
100
125
150
175
Flux

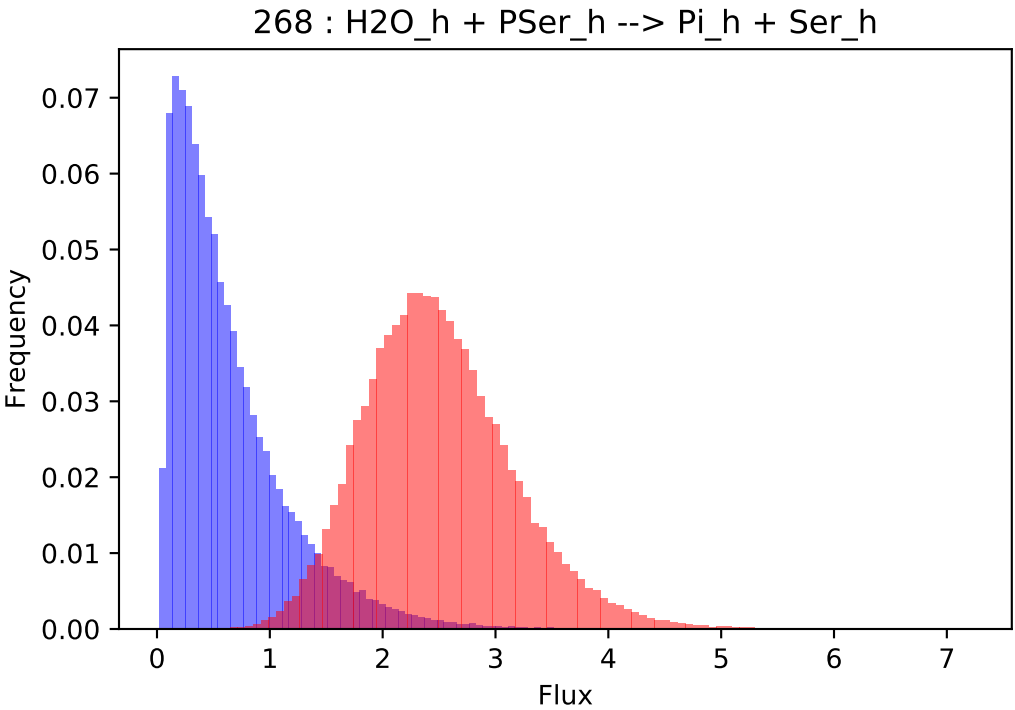

263 : 2.0 H2O_h + NAD_h + P5C_h --> Glu_h + H_h + NADH_h
Frequency
0.00
0.01
0.02
0.03
0.04
0.05
0
2
4
6
8
Flux

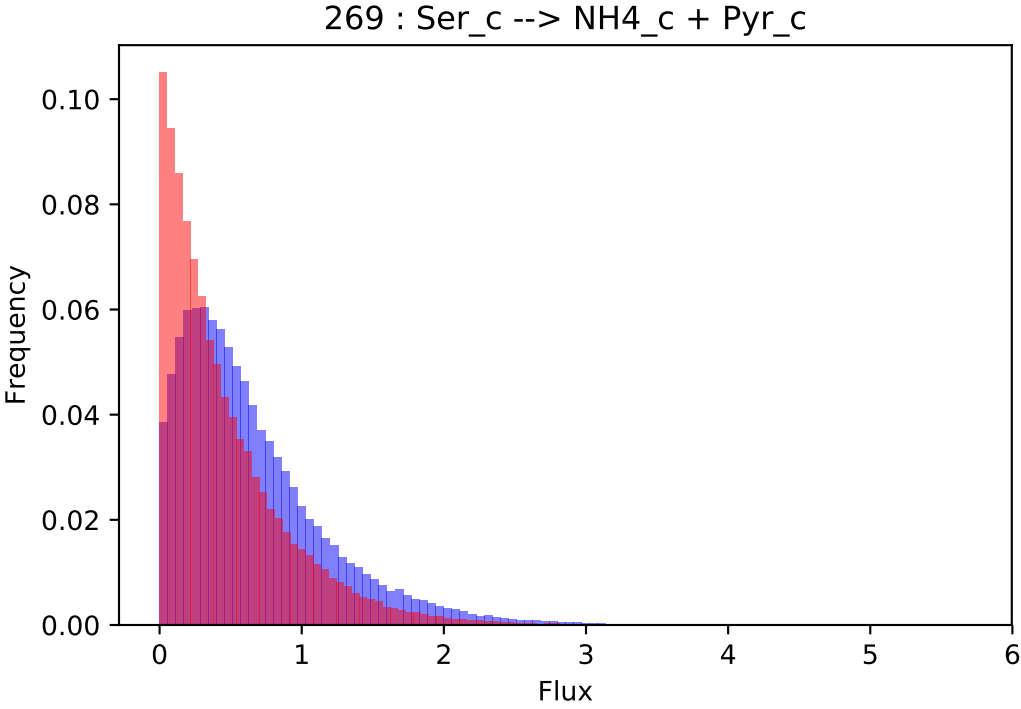

264 : 2.0 H2O_m + NAD_m + P5C_m --> Glu_m + H_m + NADH_m
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Frequency
0
2
4
6
8
Flux

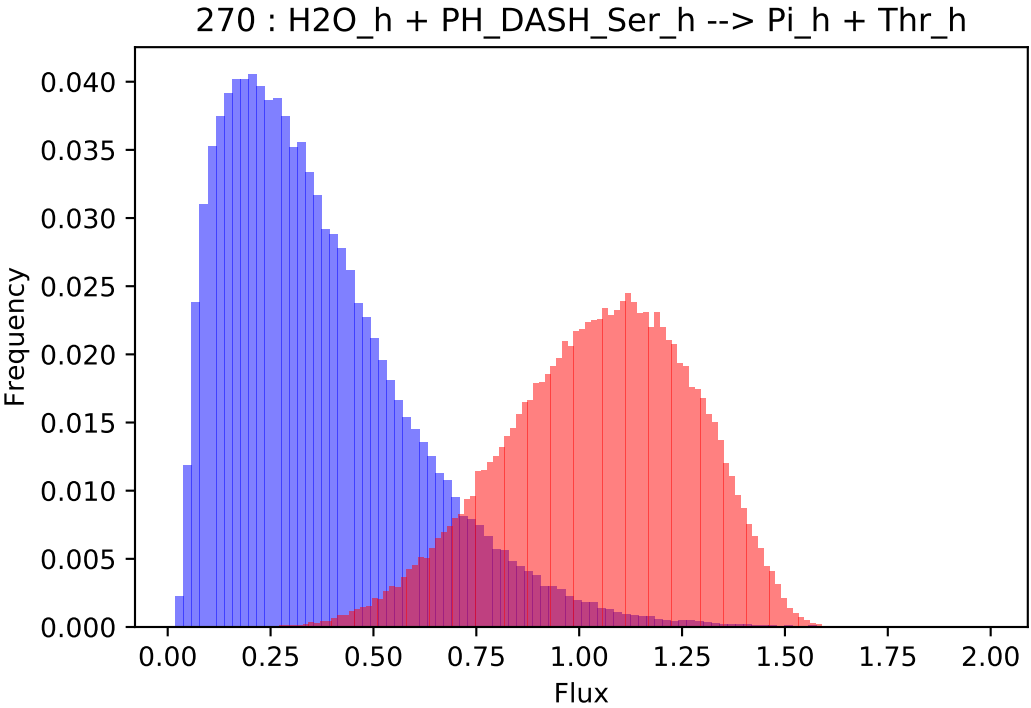

265 : 2.0 H2O_m + NADP_m + P5C_m --> Glu_m + H_m + NADPH_m
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Frequency
0
2
4
6
8
Flux

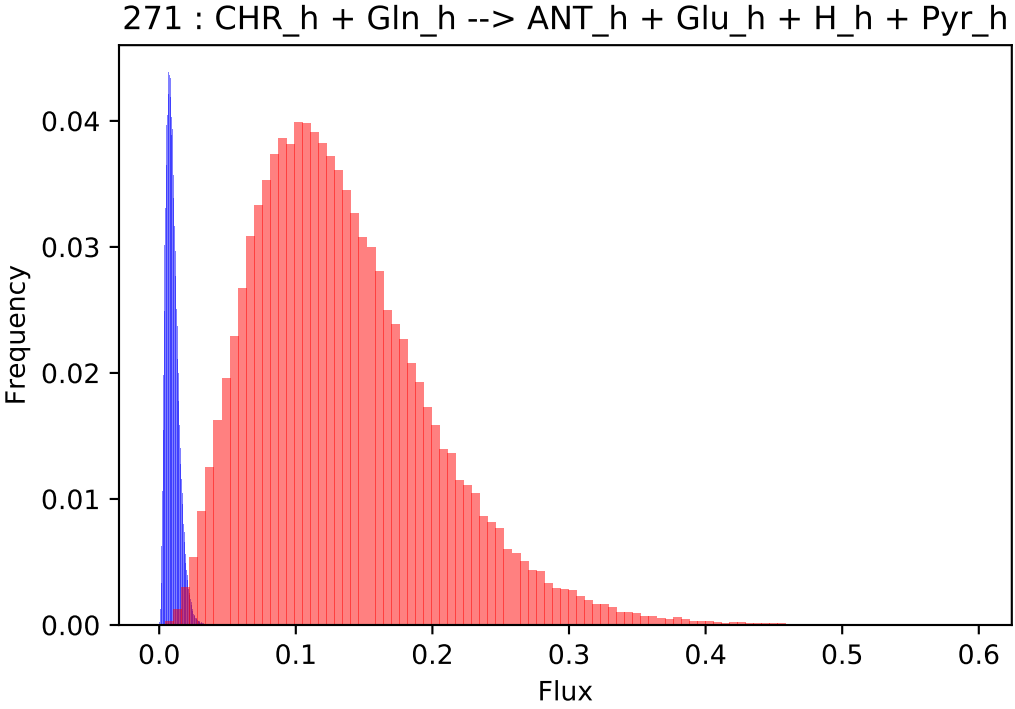

266 : NAD_h + PGA_h <=> H_h + NADH_h + P_DASH_HPR_h
Frequency
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0
1
2
3
4
5
6
7
Flux

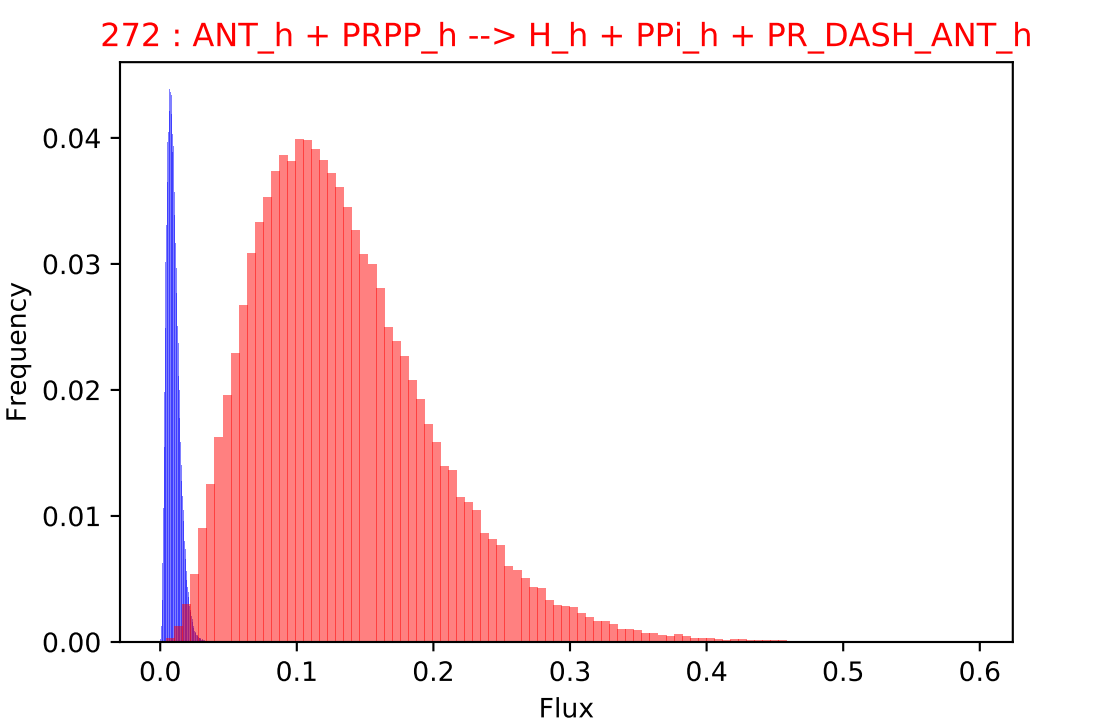

267 : Glu_h + P_DASH_HPR_h --> KG_h + PSer_h
Frequency
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0
1
2
3
4
5
6
7
Flux

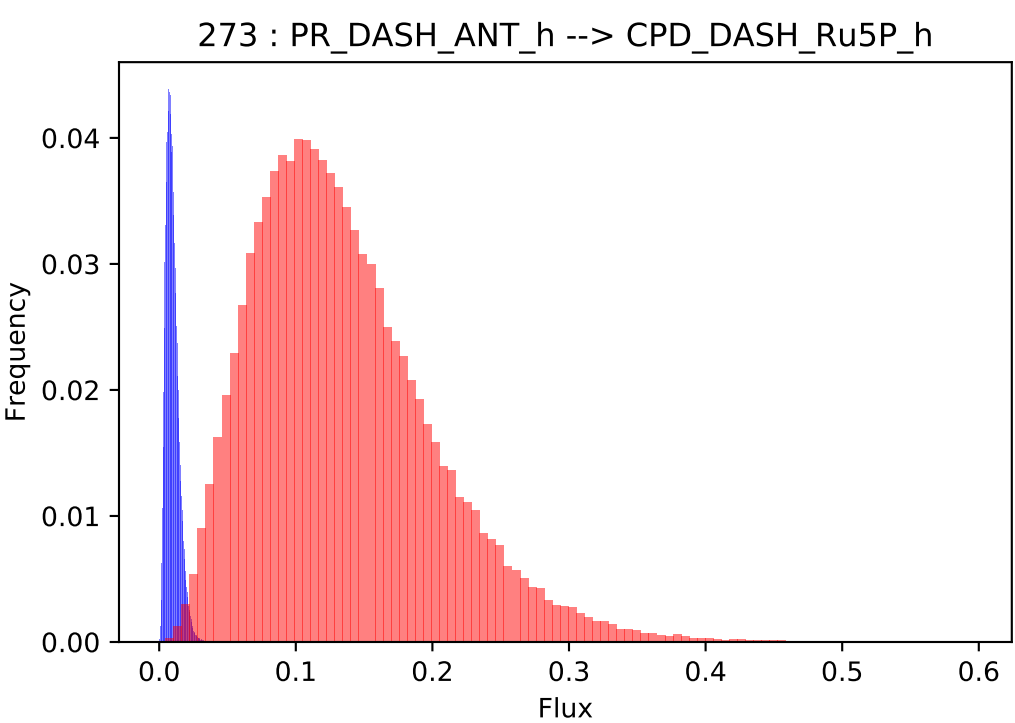

268 : H2O_h + PSer_h --> Pi_h + Ser_h
Frequency
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0
1
2
3
4
5
6
7
Flux

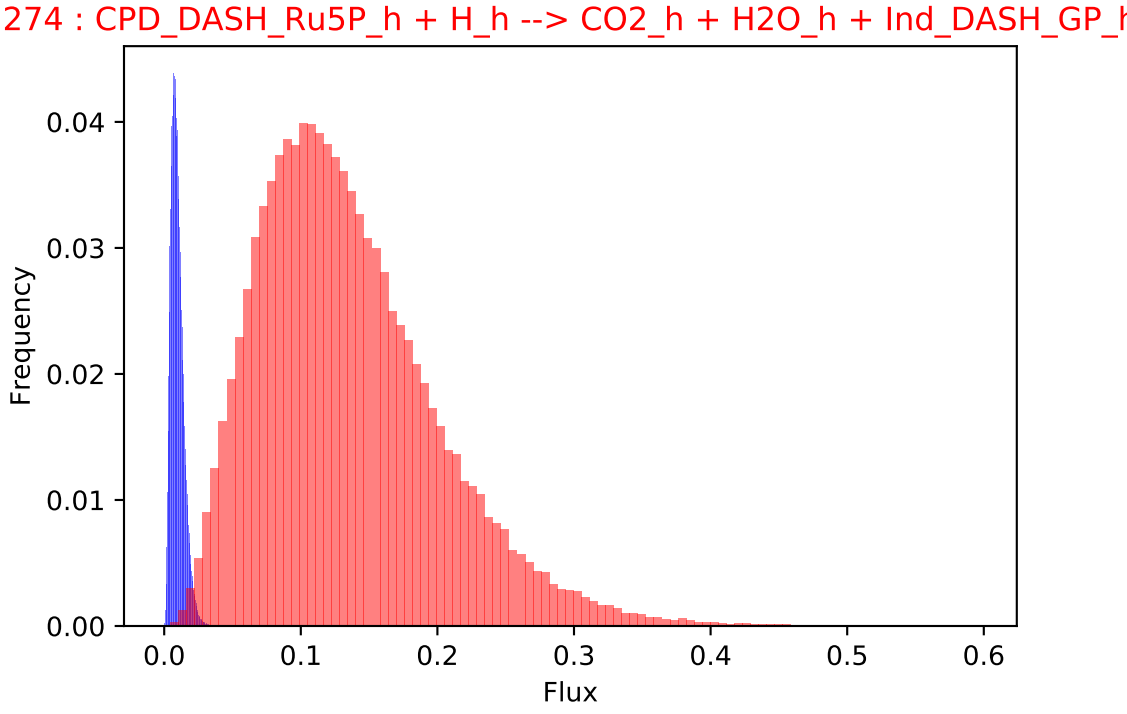

269 : Ser_c --> NH4_c + Pyr_c
Frequency
0.10
0.08
0.06
0.04
0.02
0.00
0
1
2
3
4
5
6
Flux

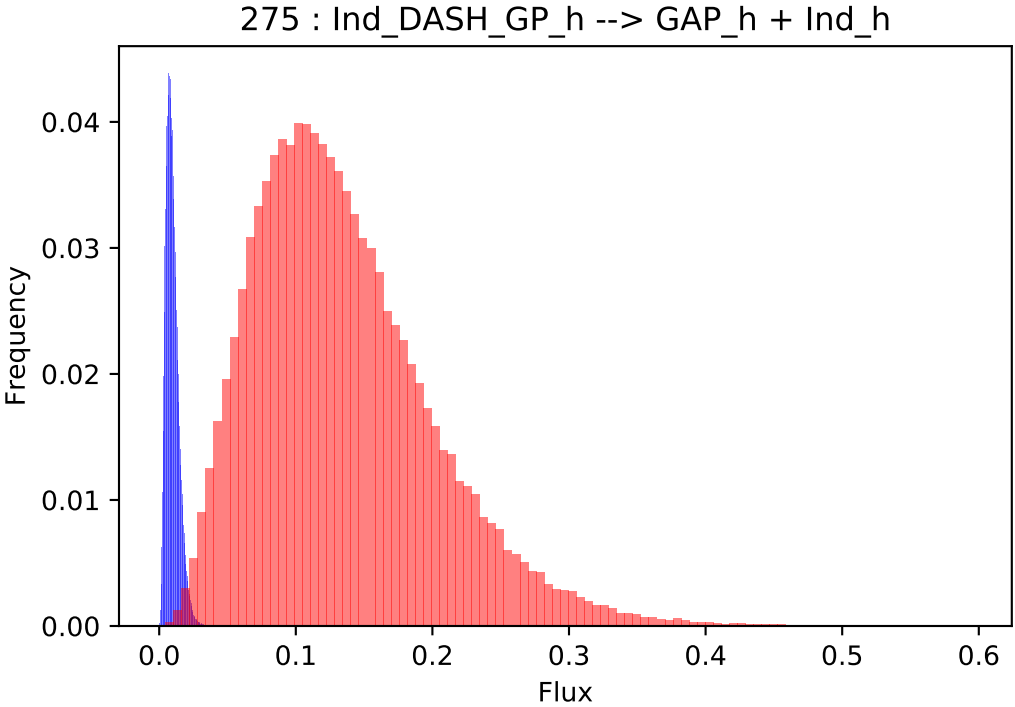

270 : H2O_h + PH_DASH_Ser_h --> Pi_h + Thr_h
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
Flux

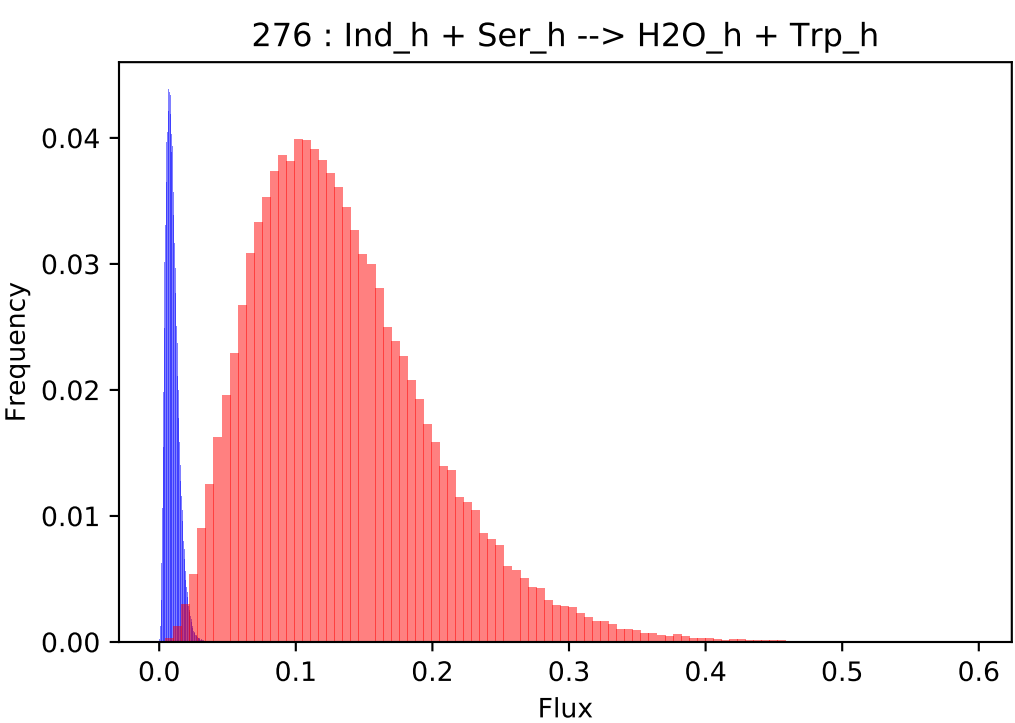

271 : CHR_h + Gln_h --> ANT_h + Glu_h + H_h + Pyr_h
Frequency
0.00
0.01
0.02
0.03
0.04
0.0
0.1
0.2
0.3
0.4
0.5
0.6
Flux

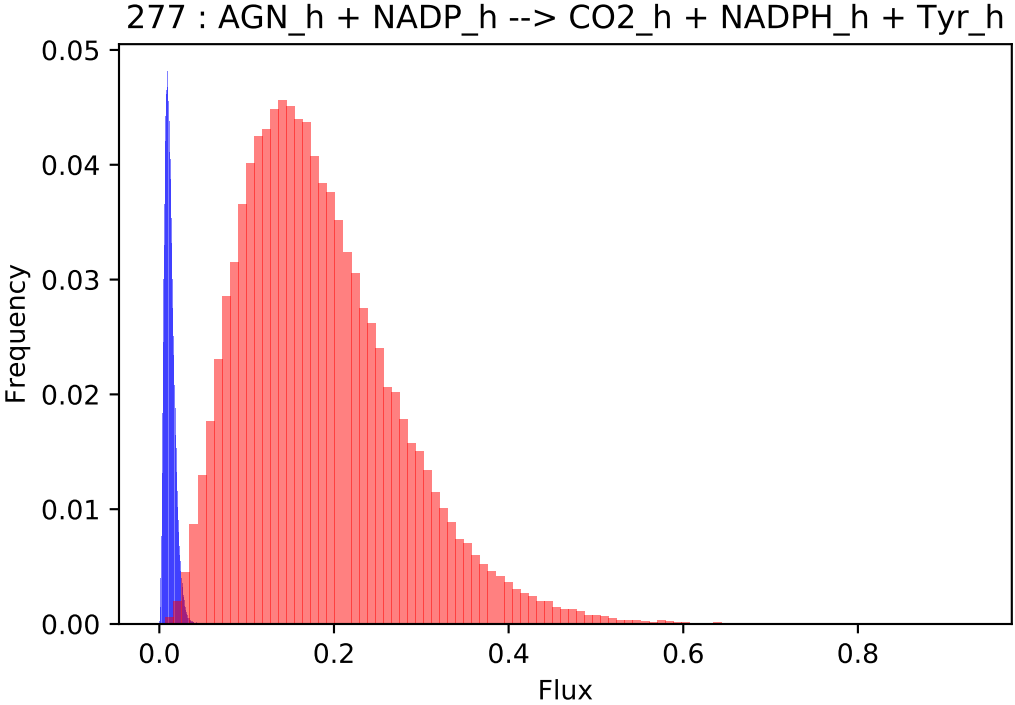

272 : ANT_h + PRPP_h --> H_h + PPi_h + PR_DASH_ANT_h
Frequency
0.00
0.01
0.02
0.03
0.04
0.0
0.1
0.2
0.3
0.4
0.5
0.6
Flux

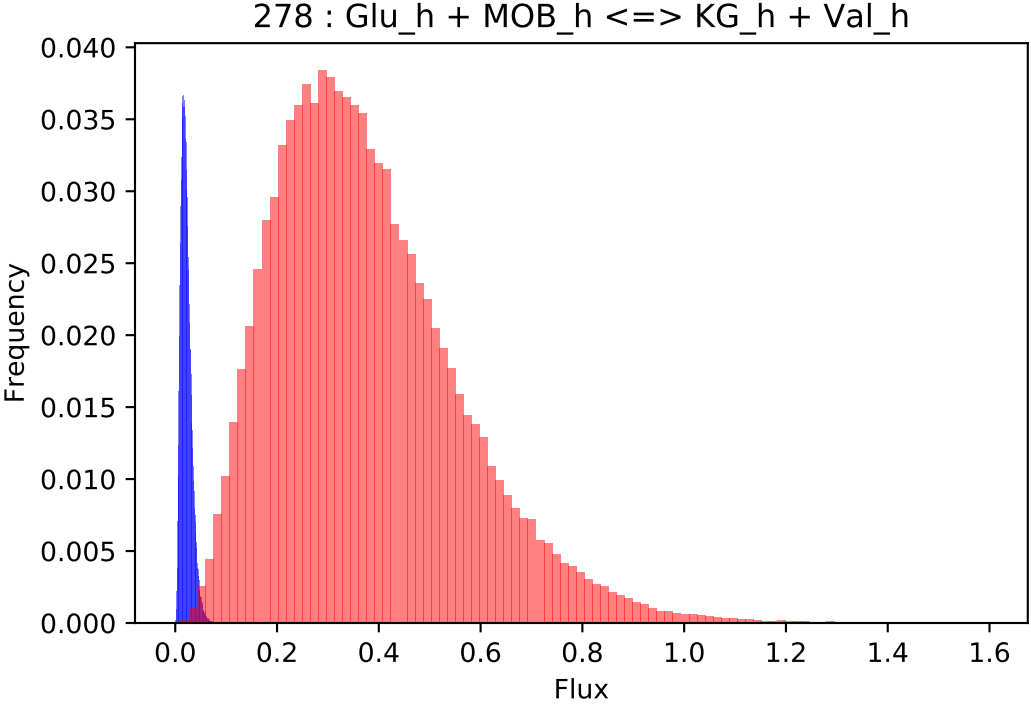

273 : PR_DASH_ANT_h --> CPD_DASH_Ru5P_h
Frequency
0.04
0.03
0.02
0.01
0.00
0.0
0.1
0.2
0.3
0.4
0.5
0.6
Flux

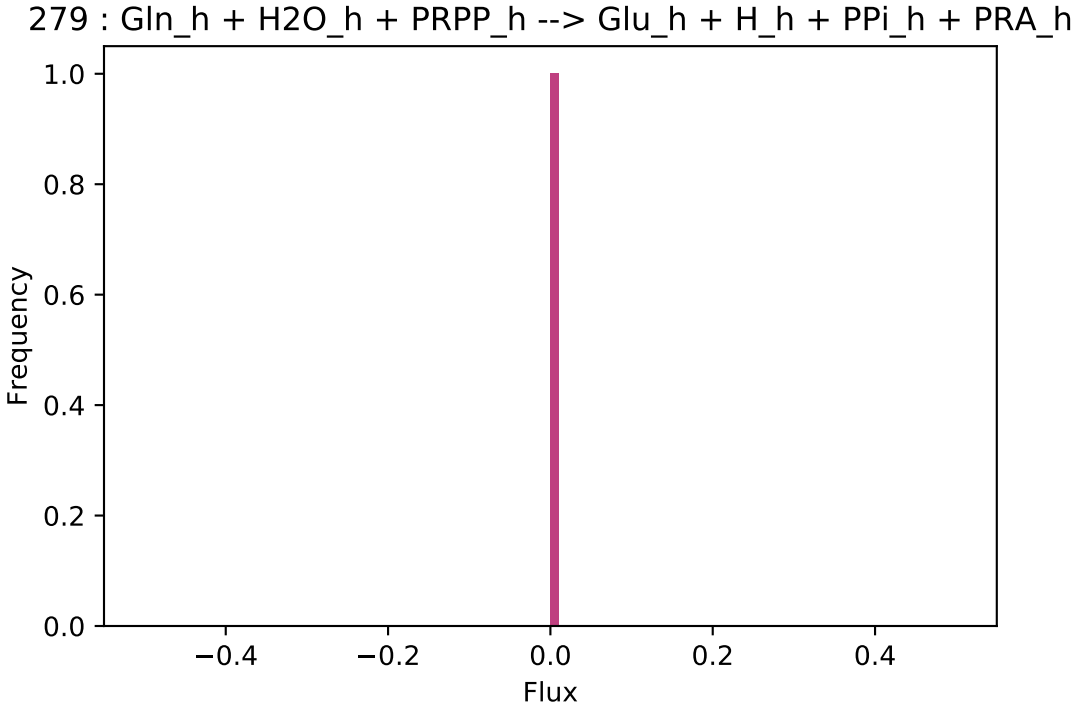

274 : CPD_DASH_Ru5P_h + H_h --> CO2_h + H2O_h + Ind_DASH_GP_h
Frequency
0.00
0.01
0.02
0.03
0.04
0.0
0.1
0.2
0.3
0.4
0.5
0.6
Flux

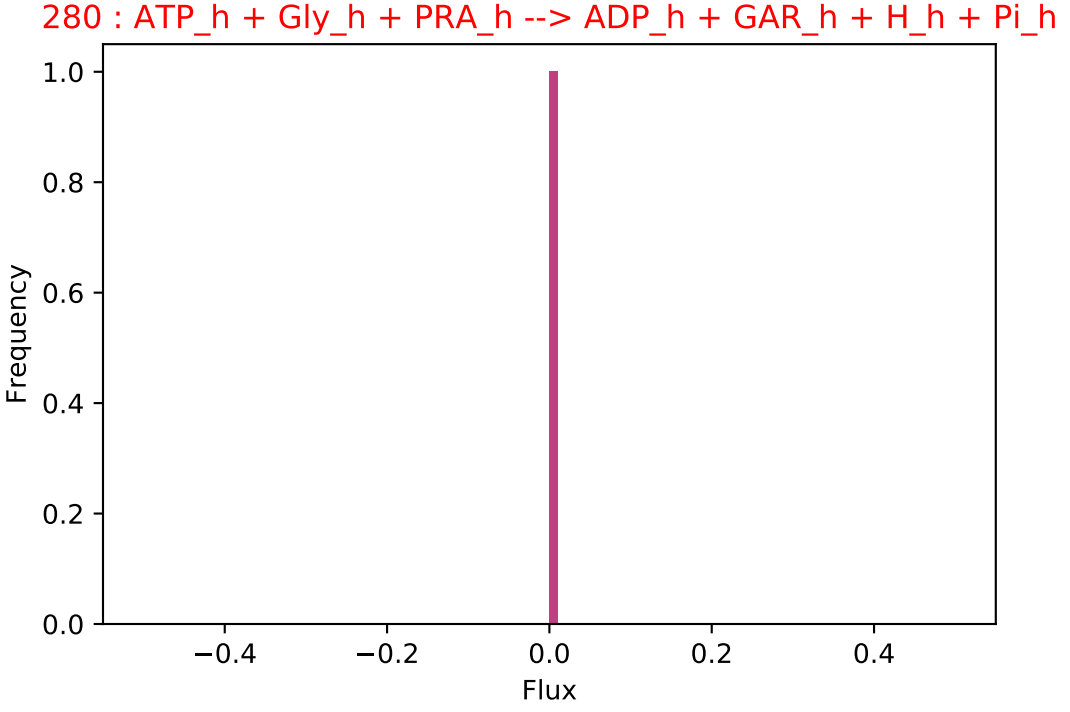

275 : Ind_DASH_GP_h --> GAP_h + Ind_h
Frequency
0.00
0.01
0.02
0.03
0.04
0.0
0.1
0.2
0.3
0.4
0.5
0.6
Flux

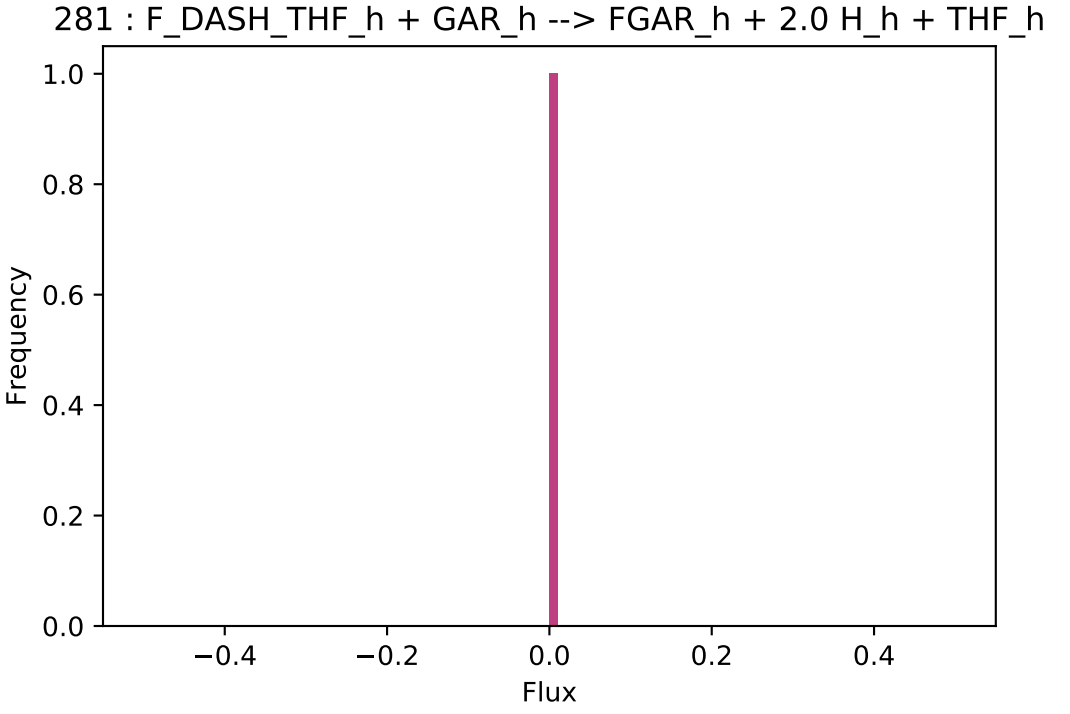

276 : Ind_h + Ser_h --> H2O_h + Trp_h
Frequency
0.00
0.01
0.02
0.03
0.04
0.0
0.1
0.2
0.3
0.4
0.5
0.6
Flux

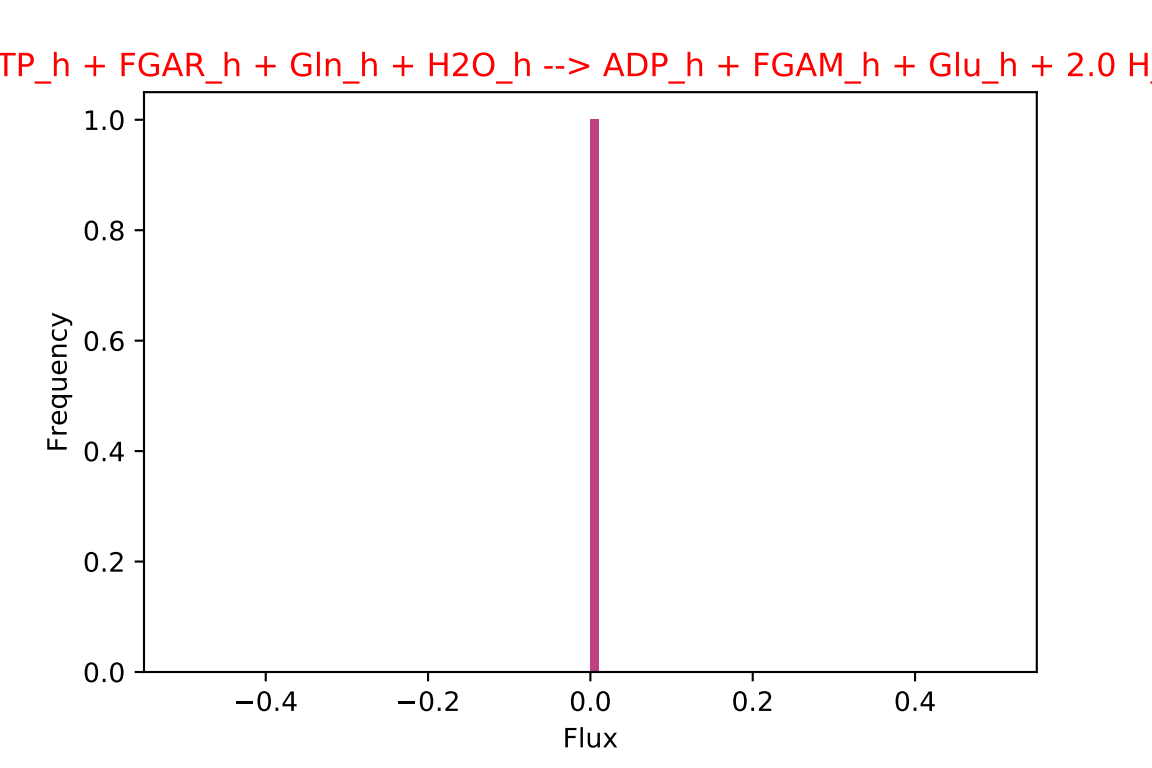

277 : AGN_h + NADP_h --> CO2_h + NADPH_h + Tyr_h
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
0.0
0.2
0.4
0.6
0.8
Flux

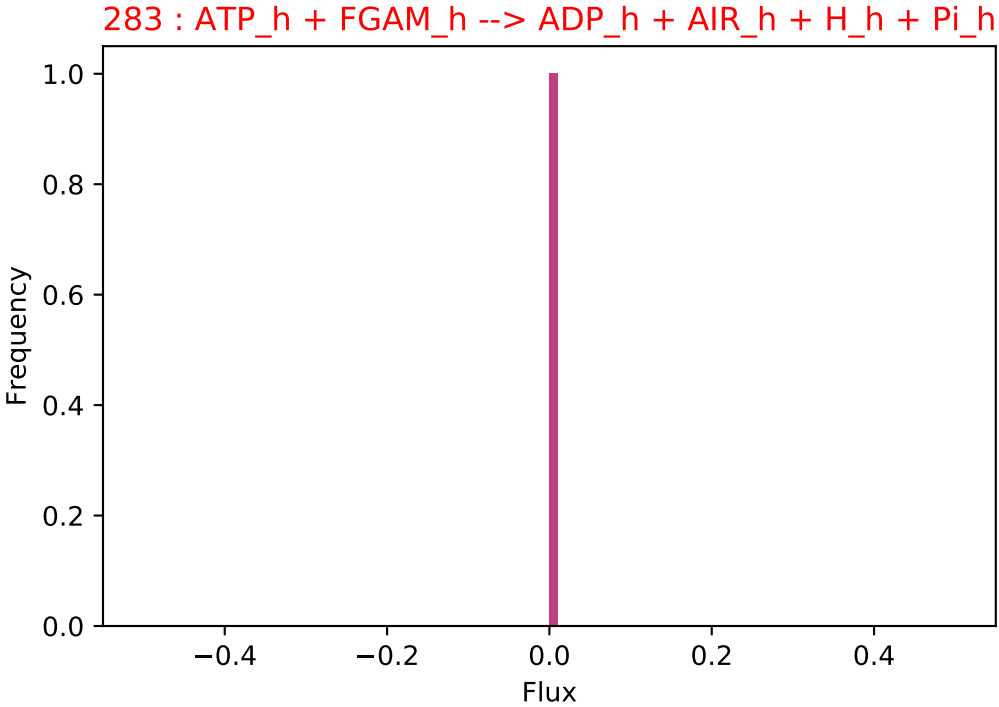

278 : Glu_h + MOB_h <=> KG_h + Val_h
Frequency
Flux
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6

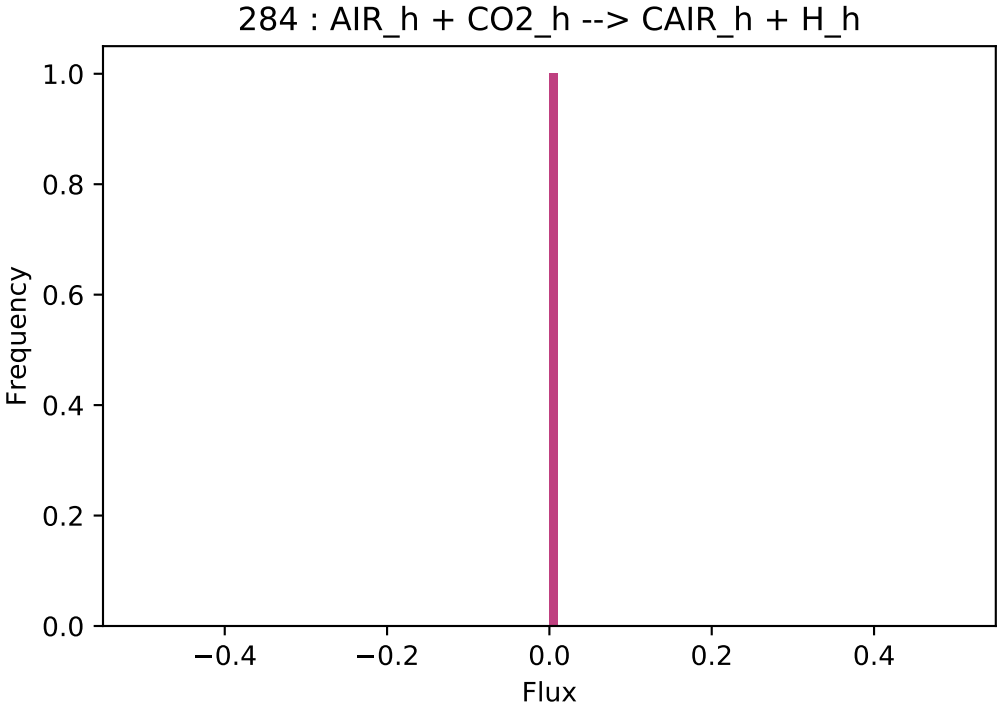

279 : Gln_h + H2O_h + PRPP_h --> Glu_h + H_h + PPi_h + PRA_h
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

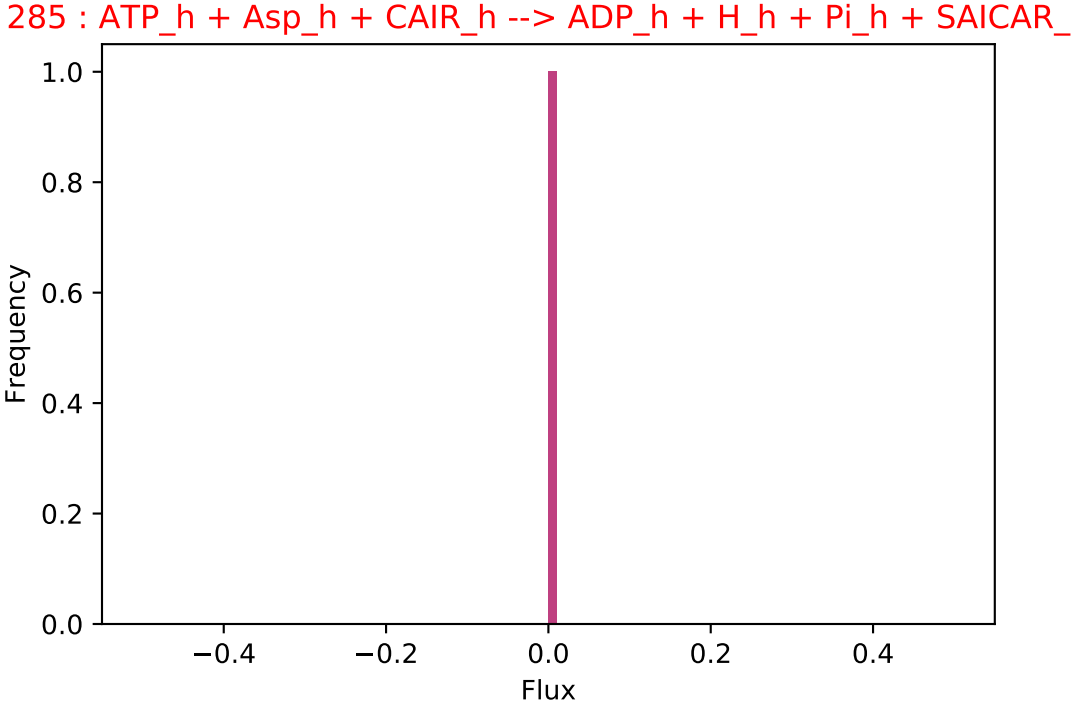

280 : ATP_h + Gly_h + PRA_h --> ADP_h + GAR_h + H_h + Pi_h
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

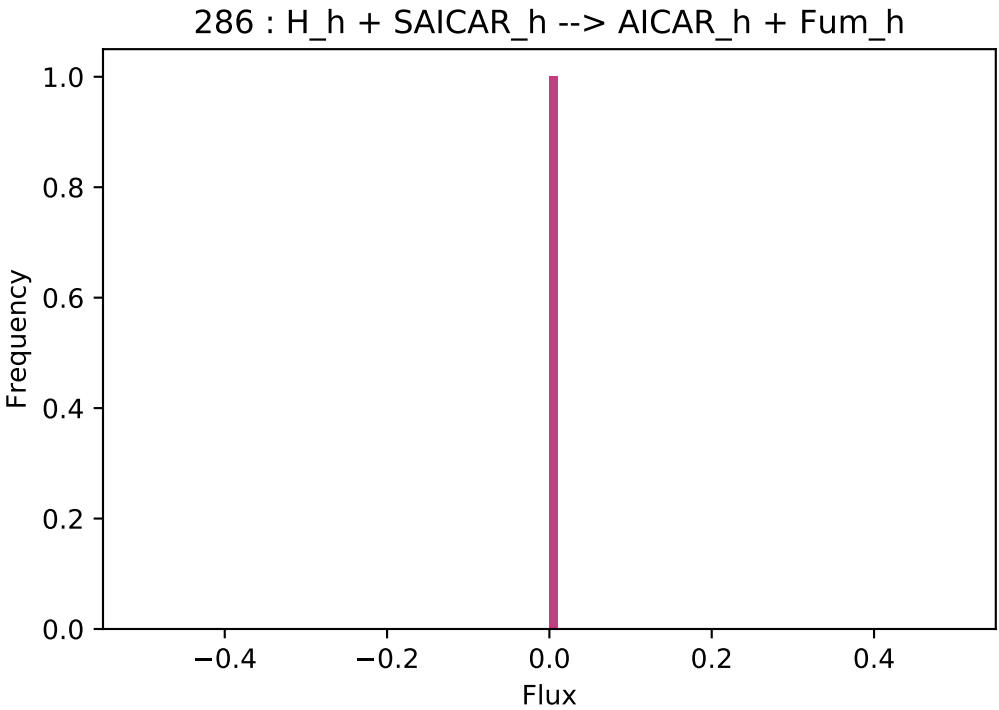

281 : F_DASH_THF_h + GAR_h --> FGAR_h + 2.0 H_h + THF_h
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

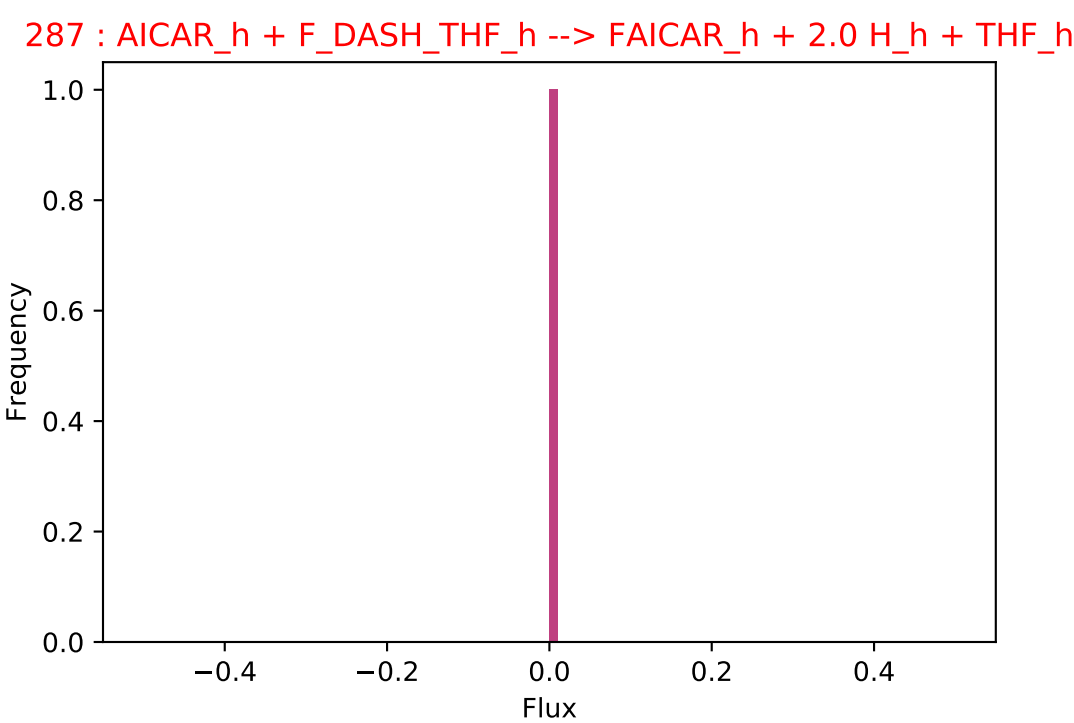

TP_h + FGAR_h + Gln_h + H2O_h --> ADP_h + FGAM_h + Glu_h + 2.0 H
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

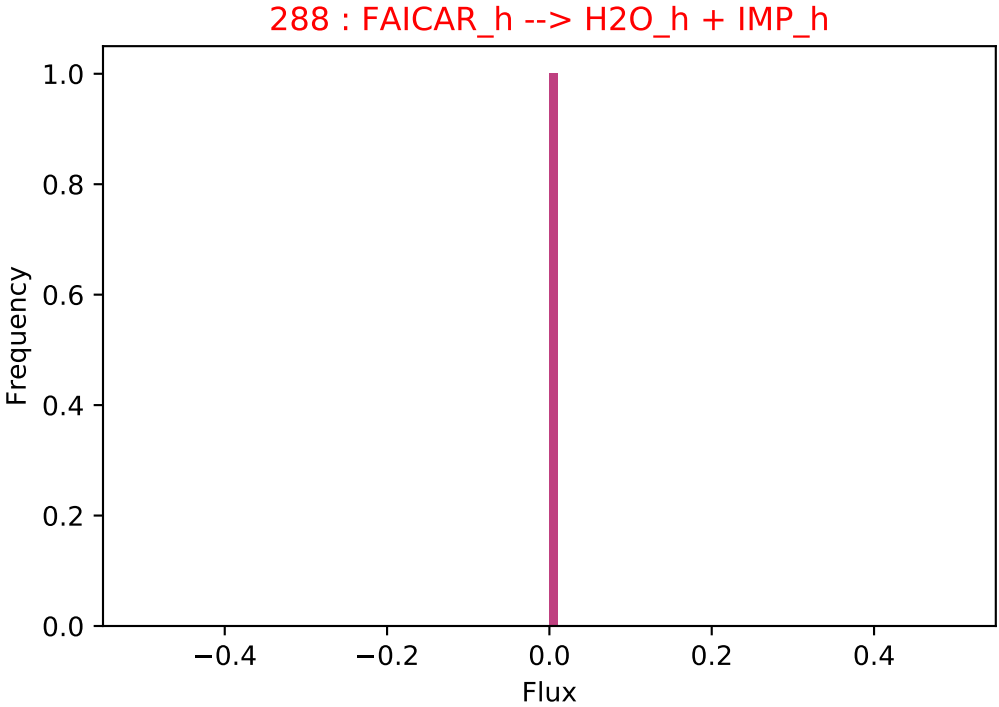

283 : ATP_h + FGAM_h --> ADP_h + AIR_h + H_h + Pi_h
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

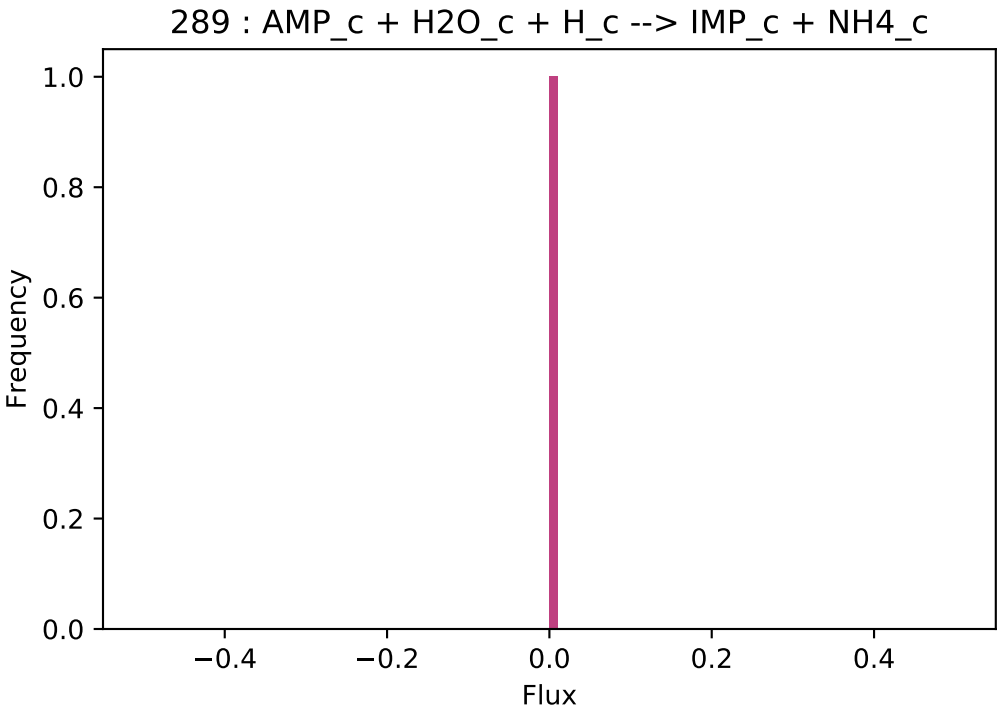

284 : AIR_h + CO2_h --> CAIR_h + H_h
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

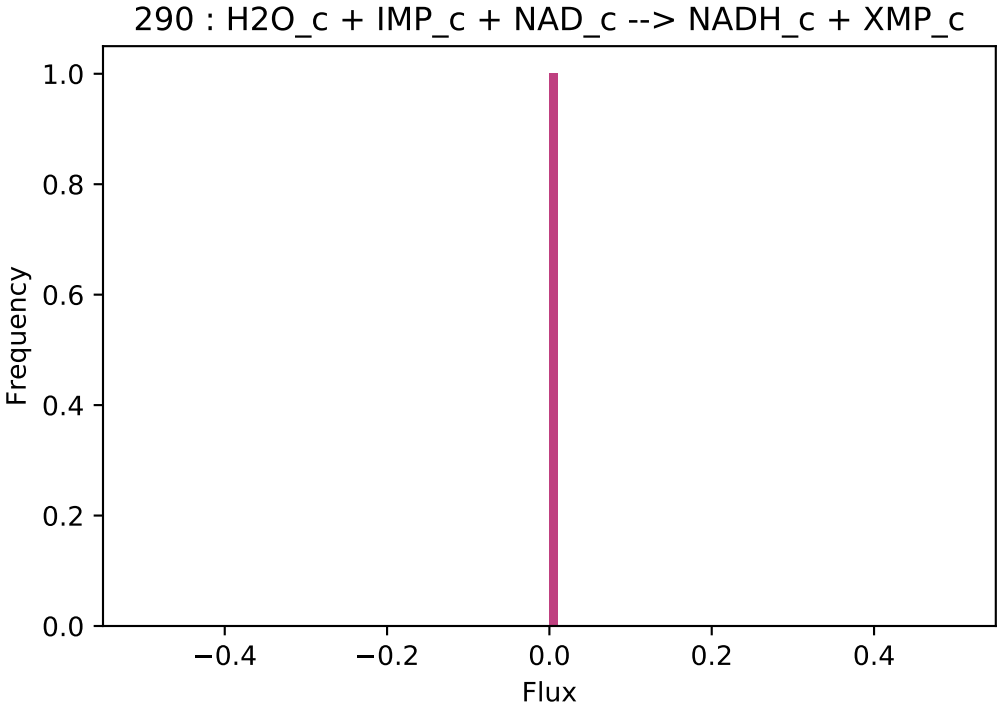

285 : ATP_h + Asp_h + CAIR_h --> ADP_h + H_h + Pi_h + SAICAR_h
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

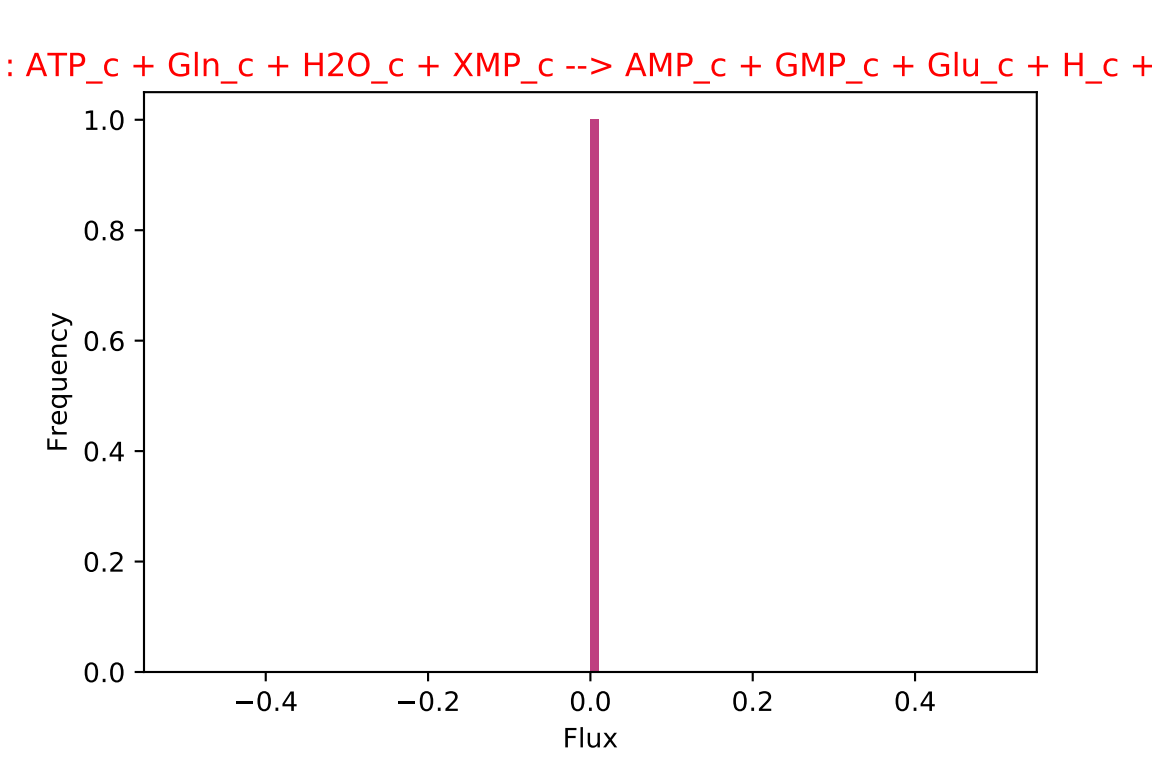

286 : H_h + SAICAR_h --> AICAR_h + Fum_h
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

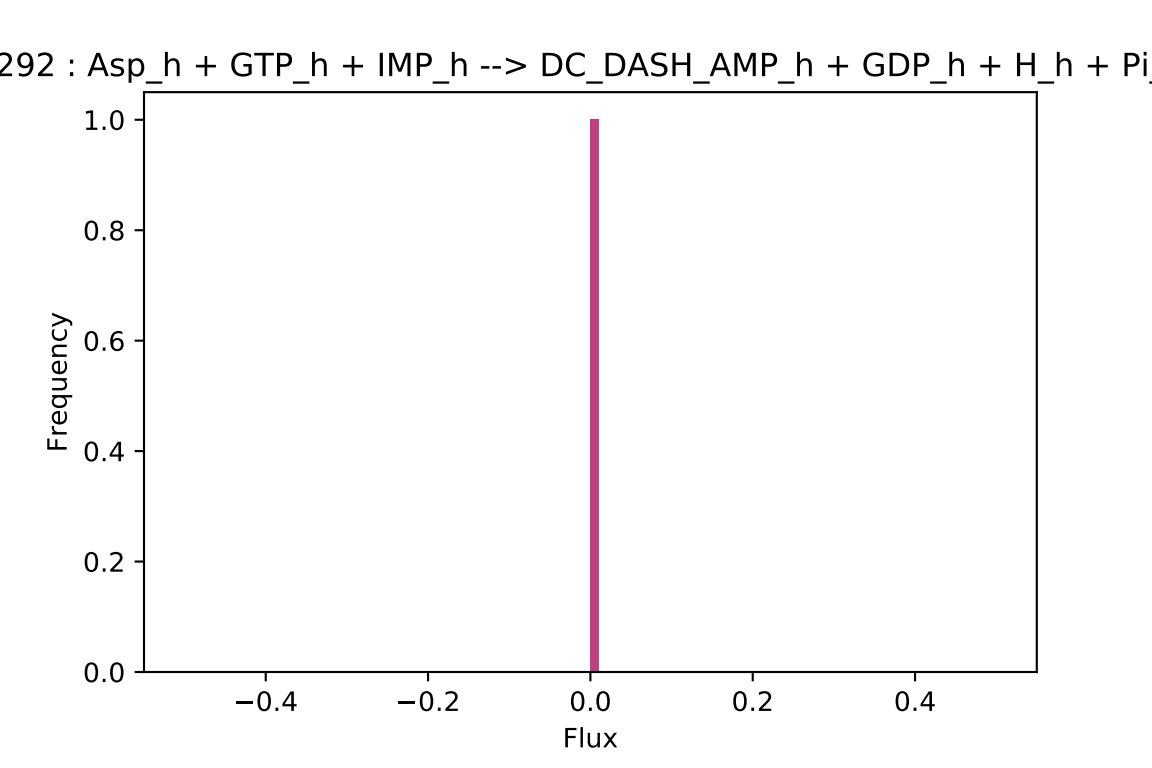

287 : AICAR_h + F_DASH_THF_h --> FAICAR_h + 2.0 H_h + THF_h
Frequency
Flux
0.0
0.2
0.4
0.6
0.8
1.0
−0.4
−0.2
0.0
0.2
0.4

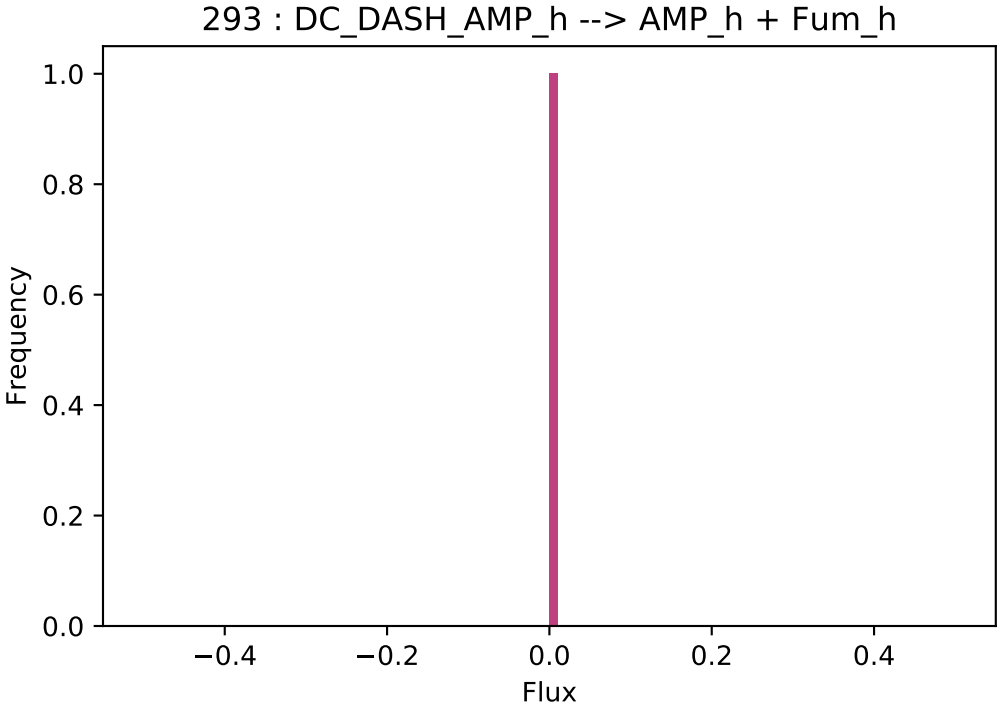

288 : FAICAR_h --> H2O_h + IMP_h
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

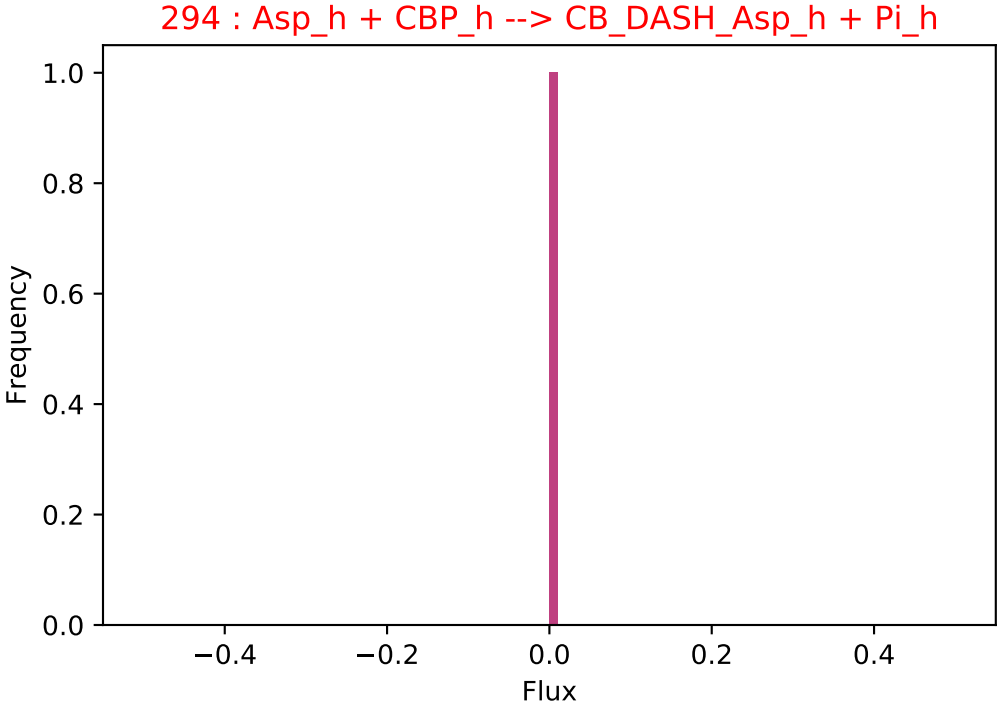

289 : AMP_c + H2O_c + H_c --> IMP_c + NH4_c
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

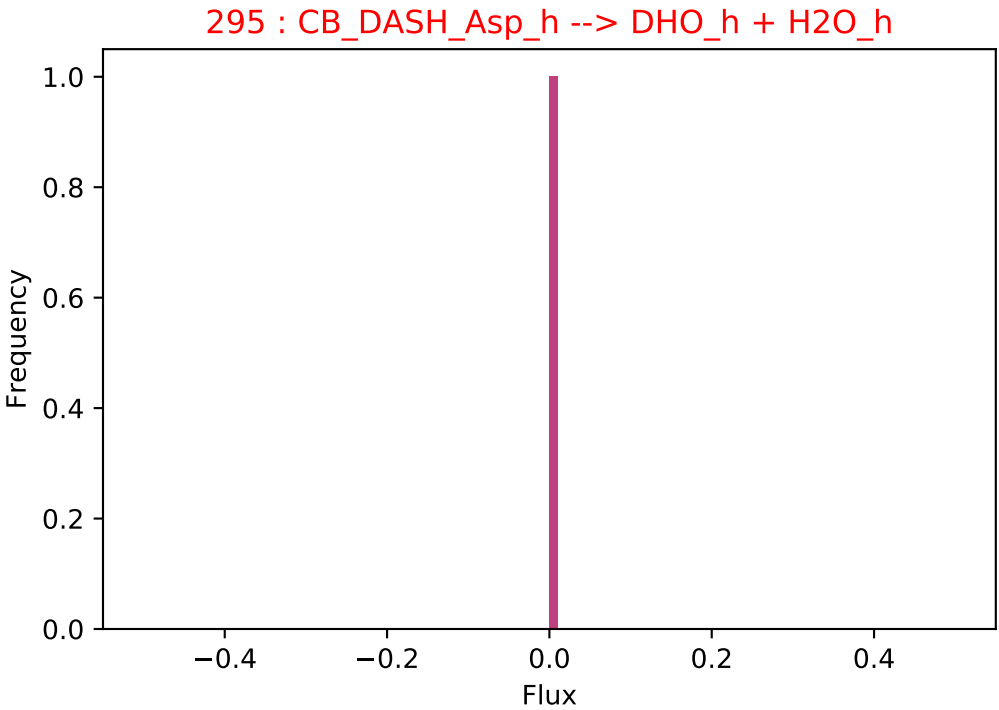

290 : H2O_c + IMP_c + NAD_c --> NADH_c + XMP_c
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

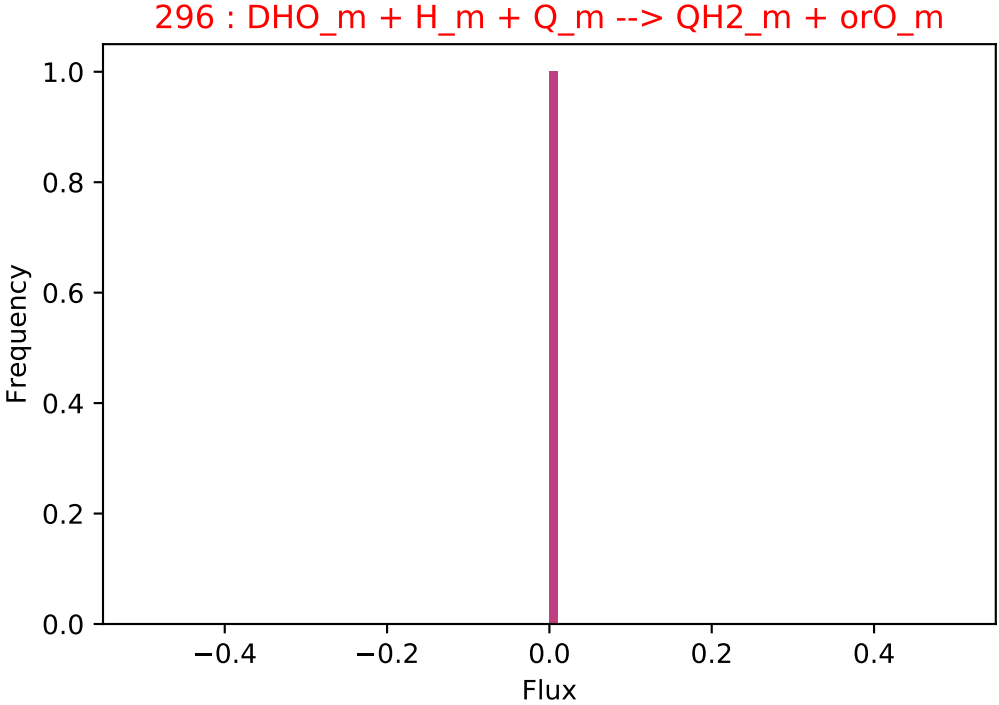

: ATP_c + Gln_c + H2O_c + XMP_c --> AMP_c + GMP_c + Glu_c + H_c +
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

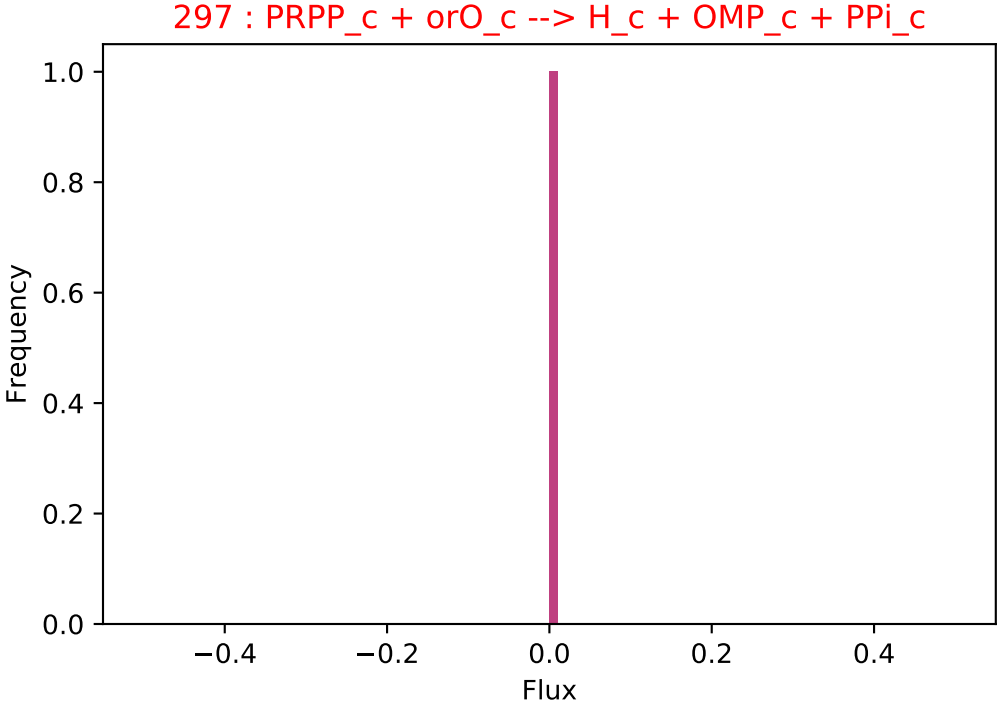

292 : Asp_h + GTP_h + IMP_h --> DC_DASH_AMP_h + GDP_h + H_h + Pi
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

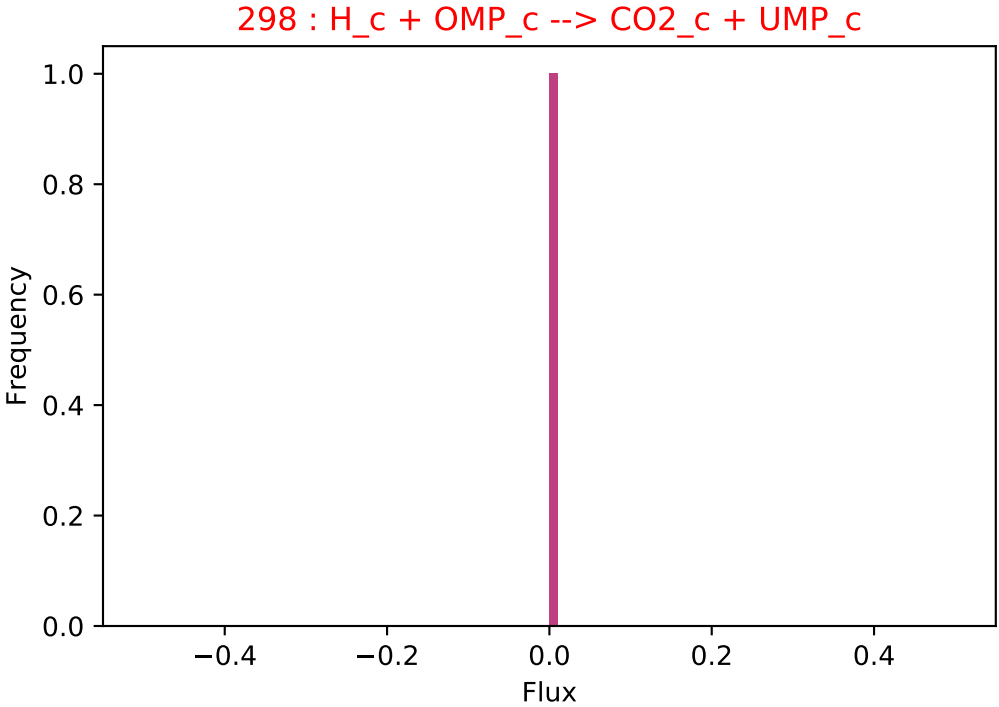

293 : DC_DASH_AMP_h --> AMP_h + Fum_h
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

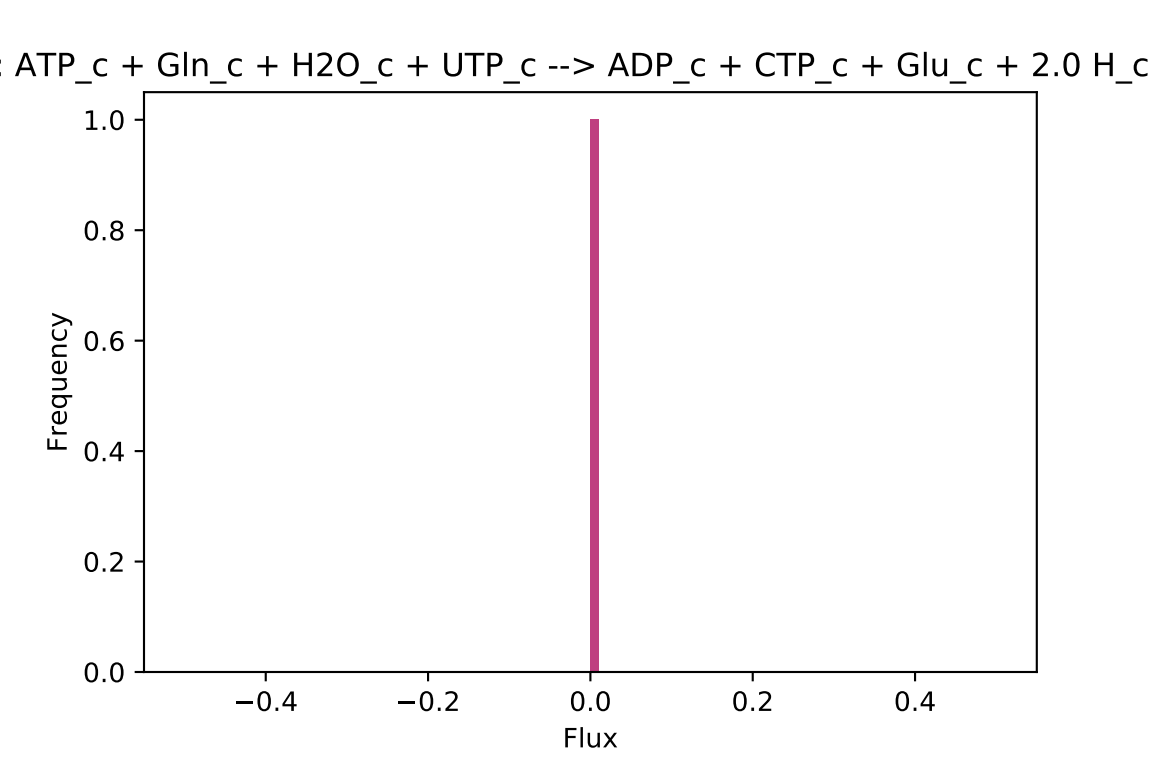

294 : Asp_h + CBP_h --> CB_DASH_Asp_h + Pi_h
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

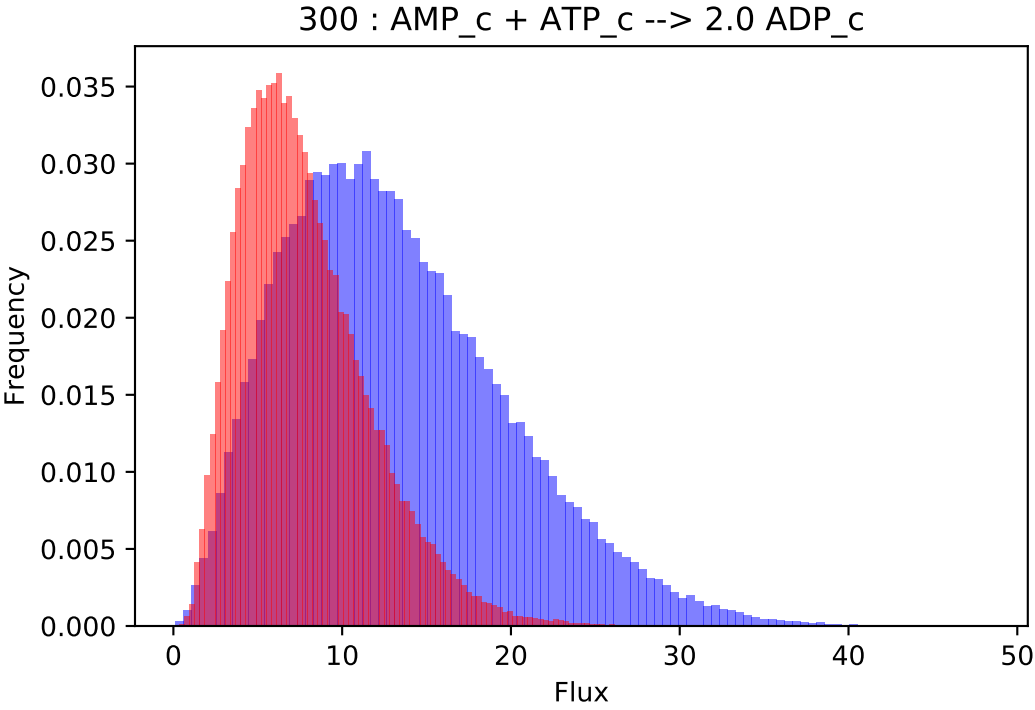

295 : CB_DASH_Asp_h --> DHO_h + H2O_h
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

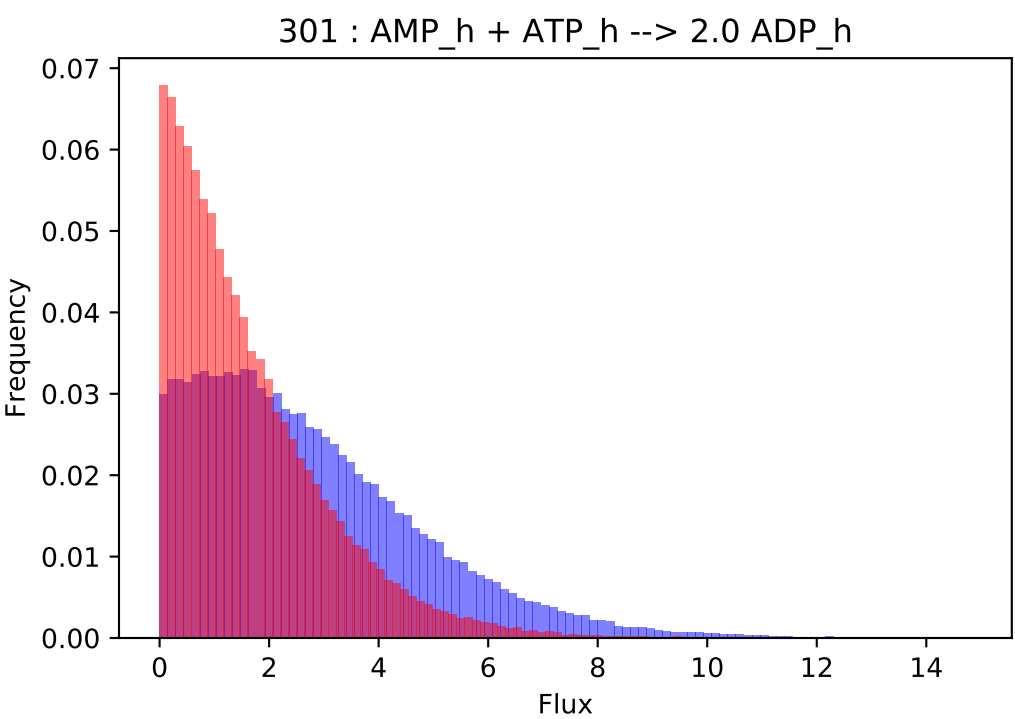

296 : DHO_m + H_m + Q_m --> QH2_m + orO_m
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

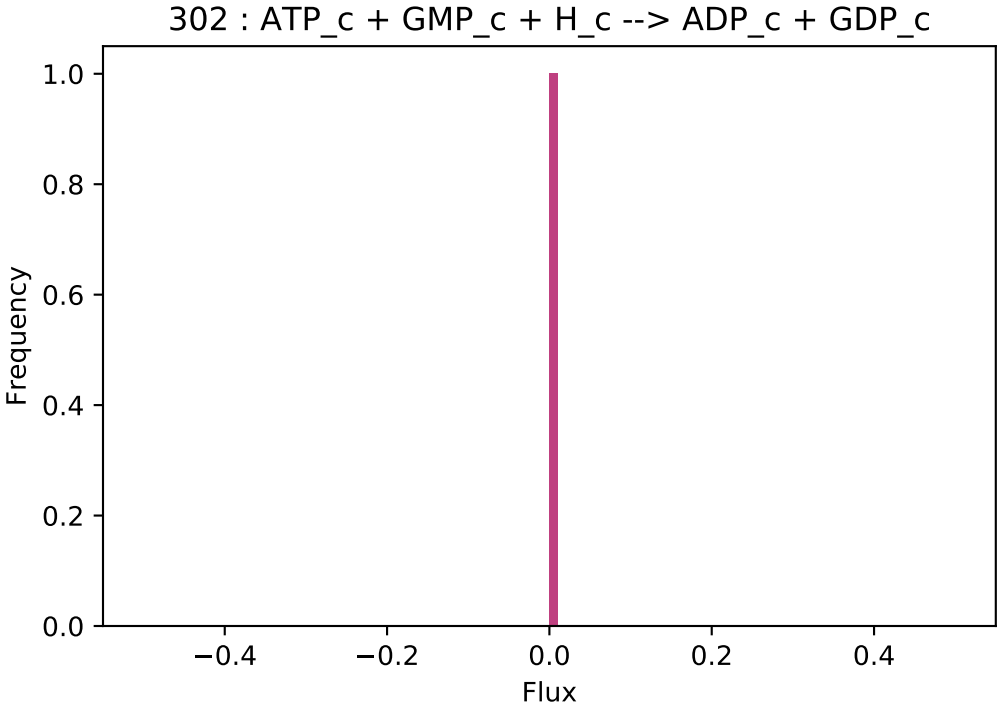

297 : PRPP_c + orO_c --> H_c + OMP_c + PPi_c
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

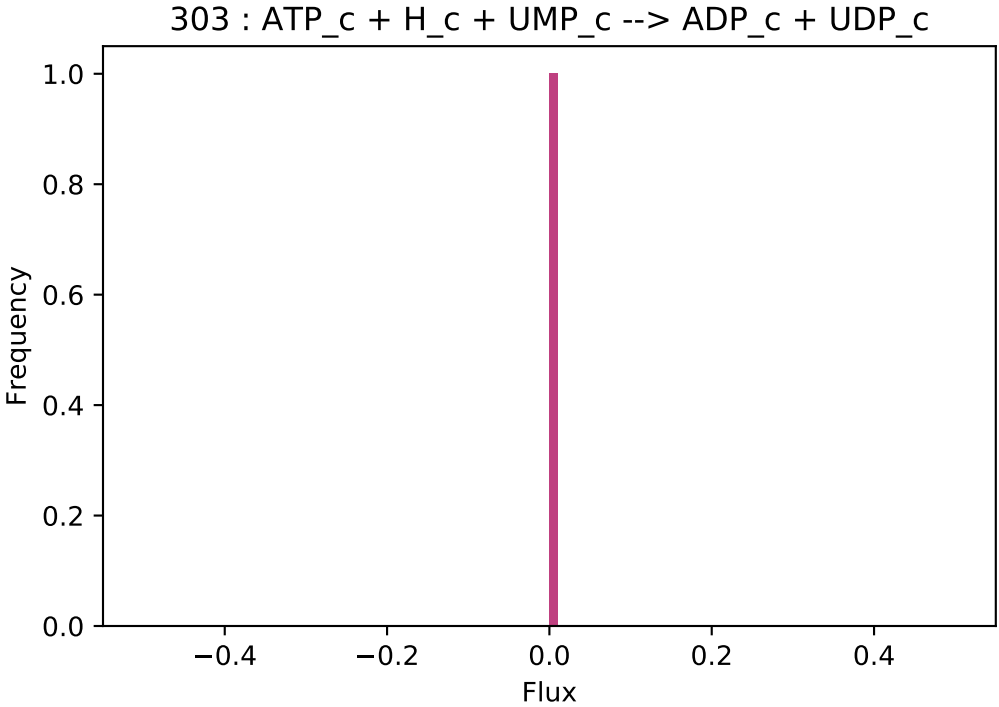

298 : H_c + OMP_c --> CO2_c + UMP_c
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

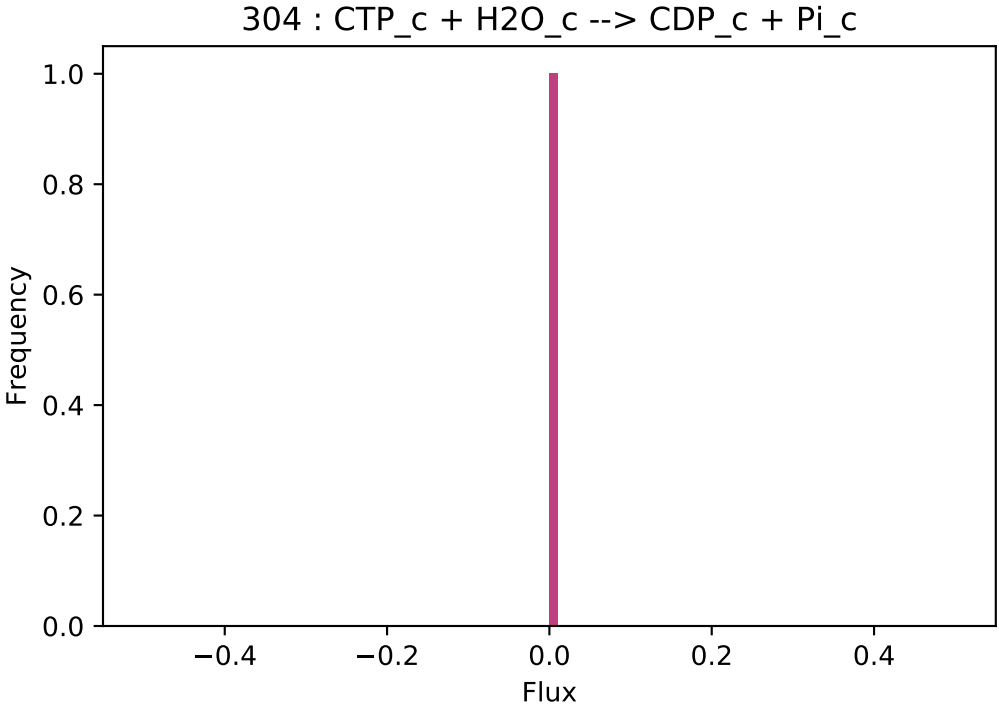

: ATP_c + Gln_c + H2O_c + UTP_c --> ADP_c + CTP_c + Glu_c + 2.0 H_c
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

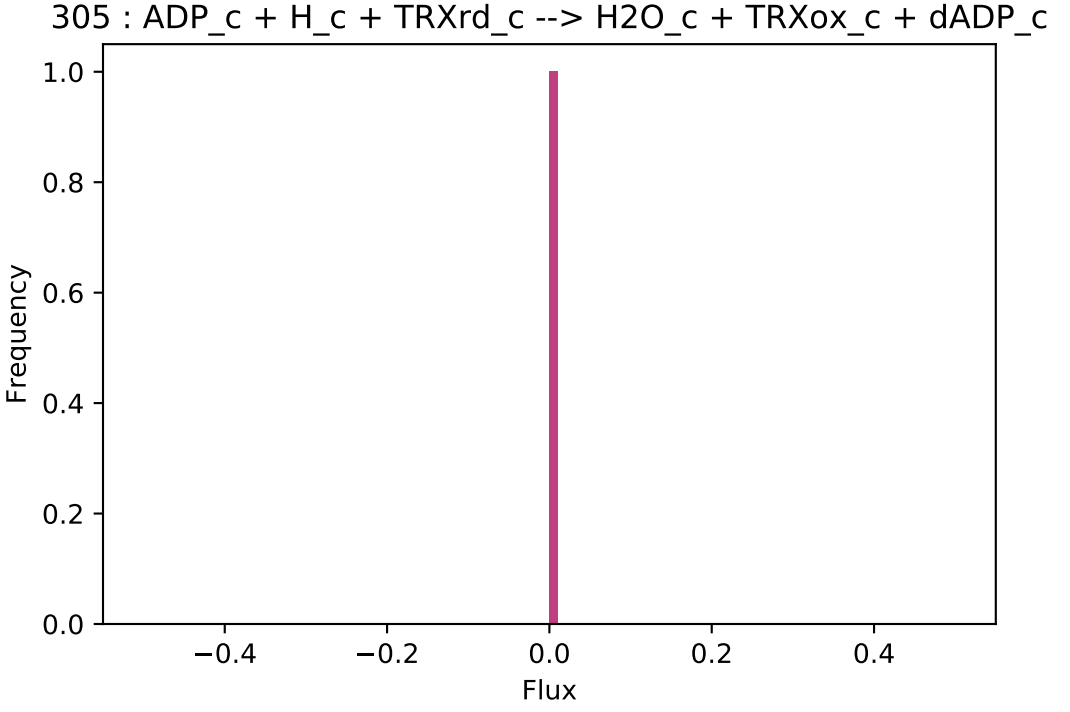

300 : AMP_c + ATP_c --> 2.0 ADP_c
Frequency
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0
10
20
30
40
50
Flux

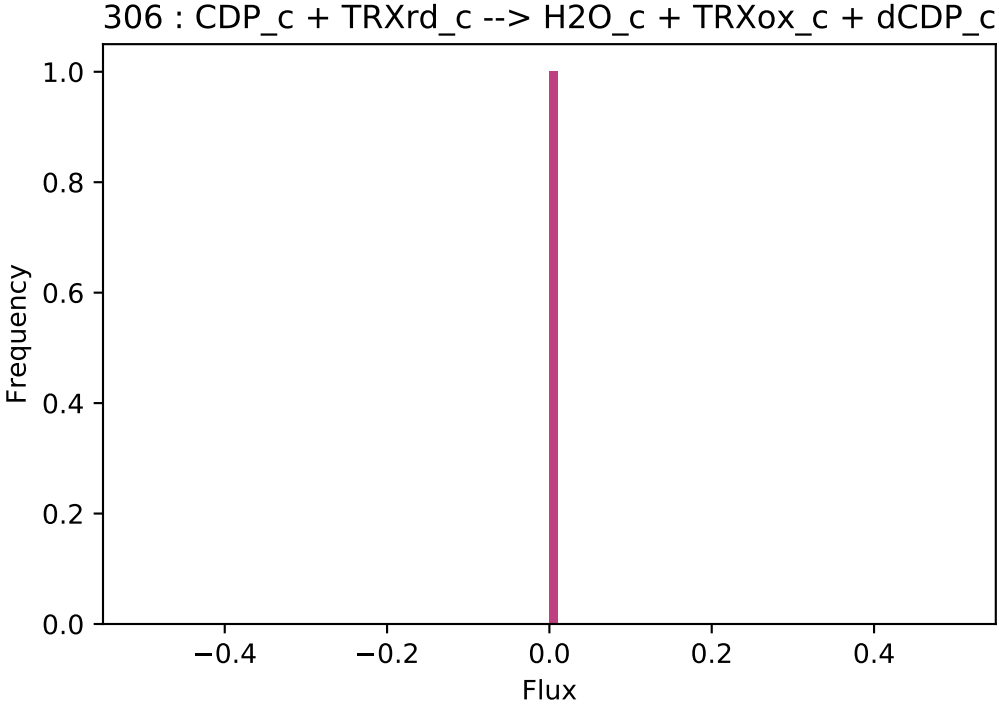

301 : AMP_h + ATP_h --> 2.0 ADP_h
Frequency
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
0
2
4
6
8
10
12
14
Flux

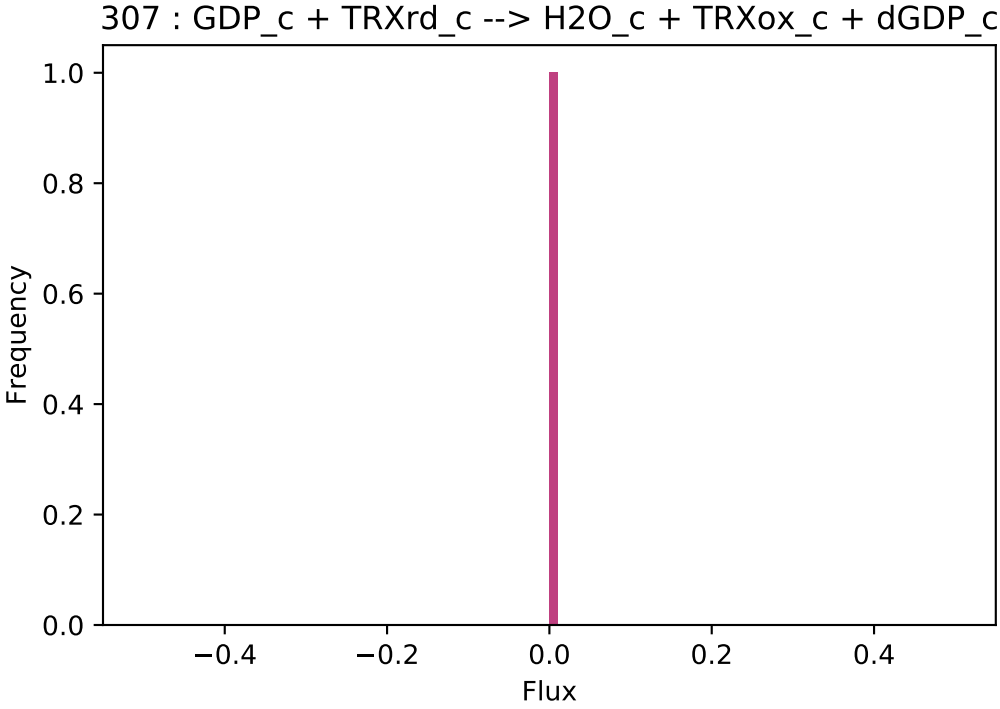

302 : ATP_c + GMP_c + H_c --> ADP_c + GDP_c
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

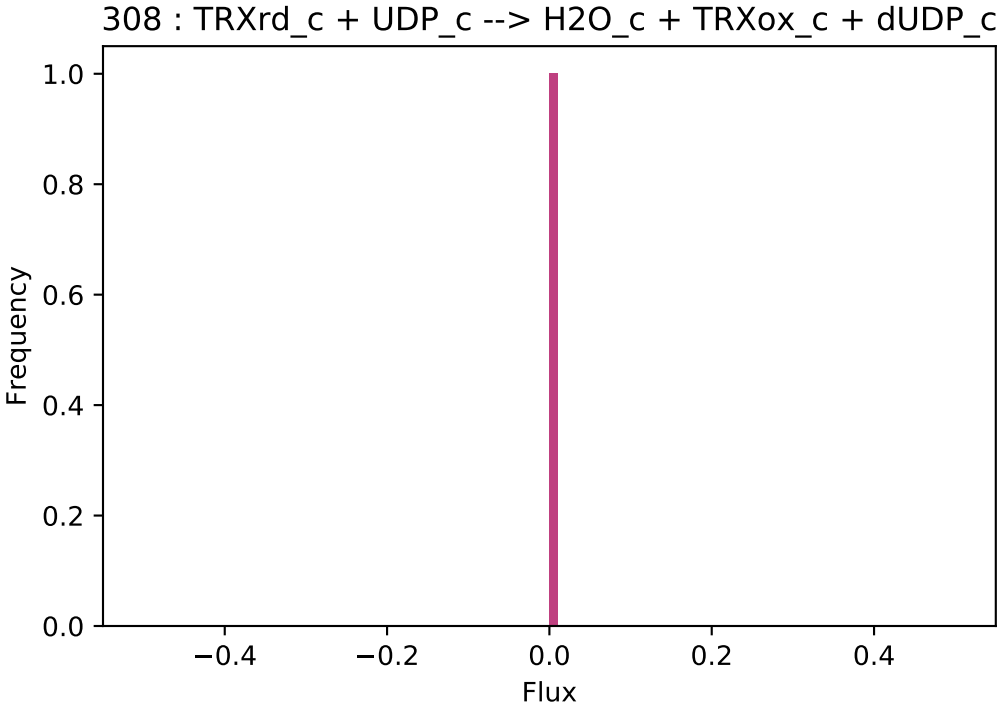

303 : ATP_c + H_c + UMP_c --> ADP_c + UDP_c
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

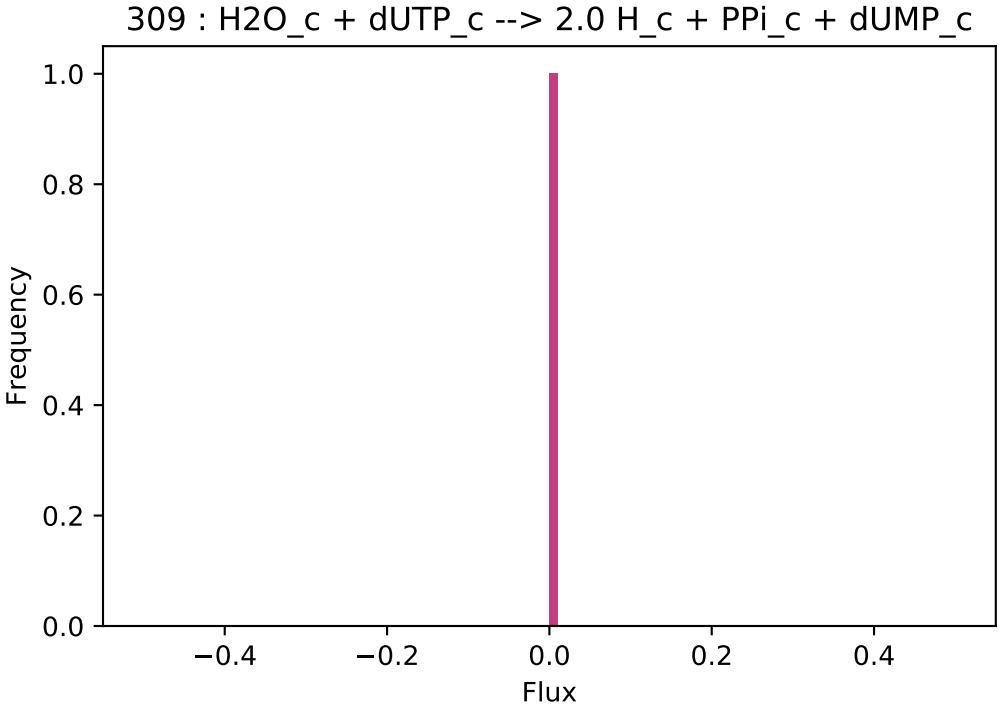

304 : CTP_c + H2O_c --> CDP_c + Pi_c
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

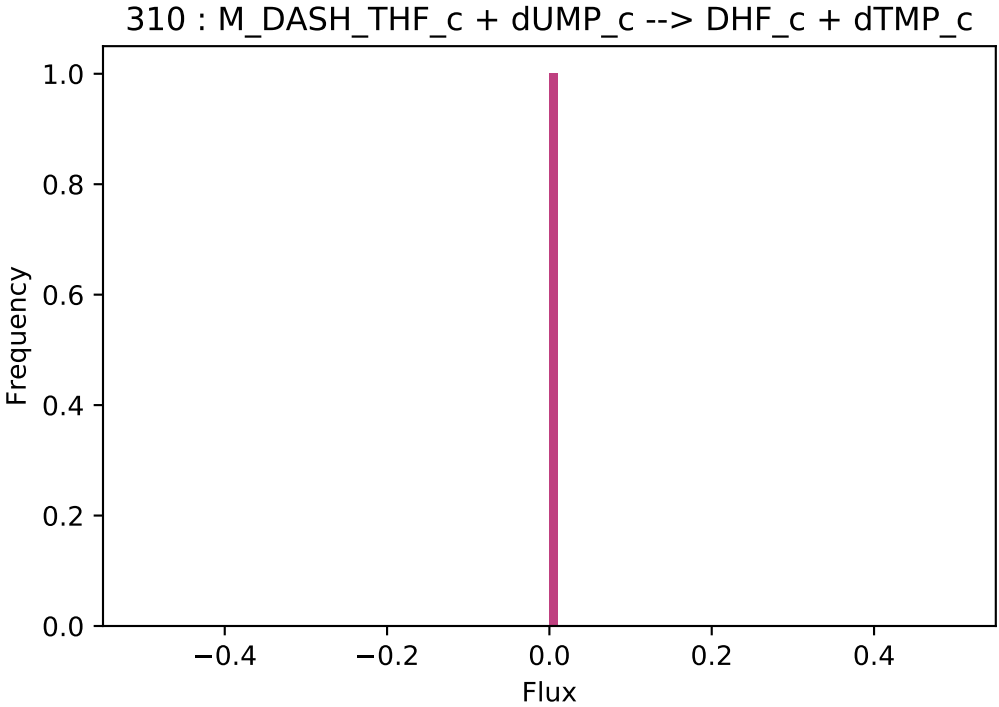

305 : ADP_c + H_c + TRXrd_c --> H2O_c + TRXox_c + dADP_c
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

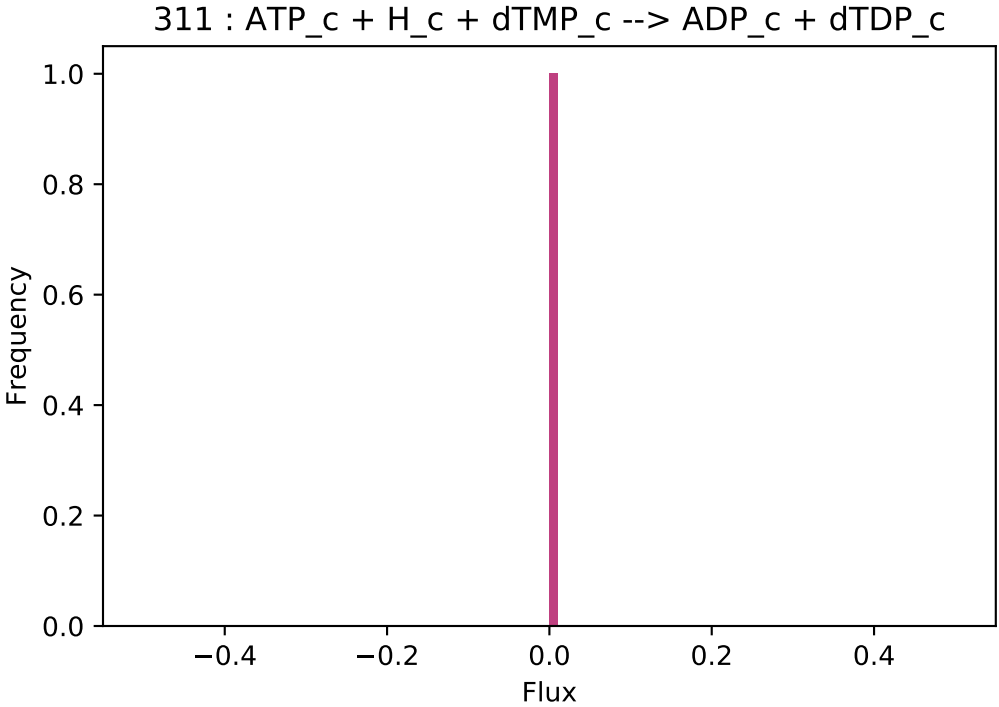

306 : CDP_c + TRXrd_c --> H2O_c + TRXox_c + dCDP_c
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

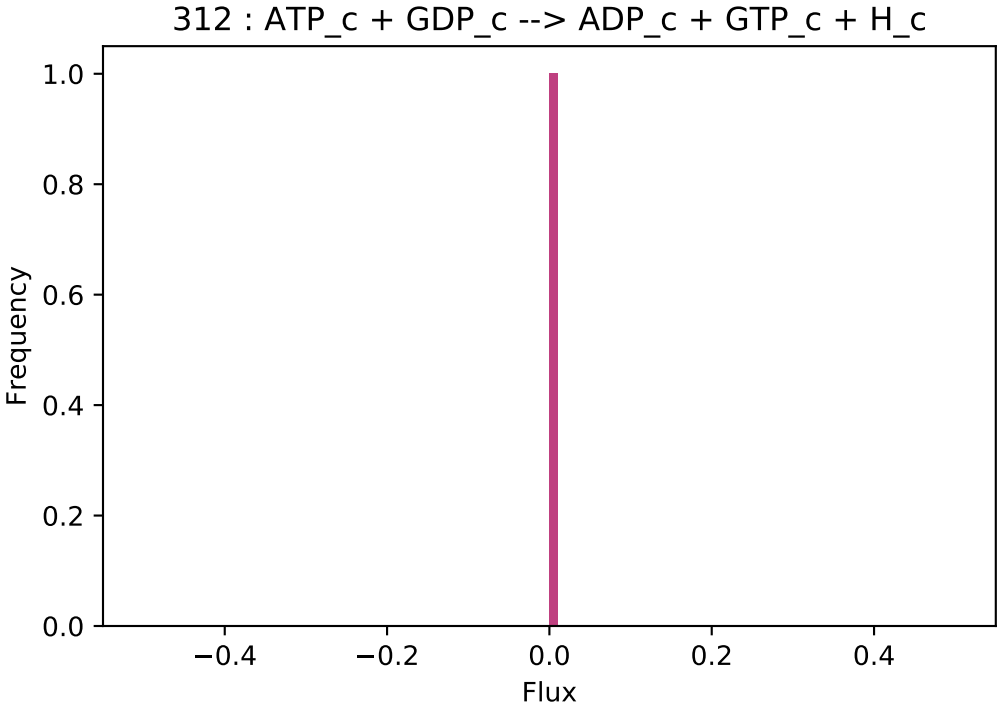

307 : GDP_c + TRXrd_c --> H2O_c + TRXox_c + dGDP_c
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

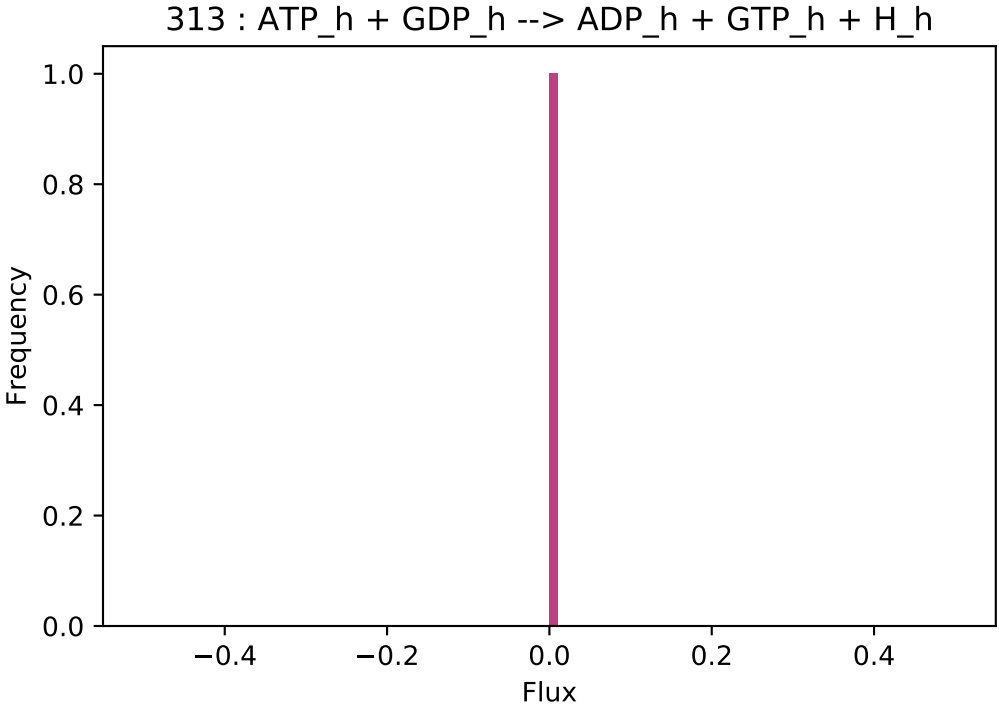

308 : TRXrd_c + UDP_c --> H2O_c + TRXox_c + dUDP_c
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

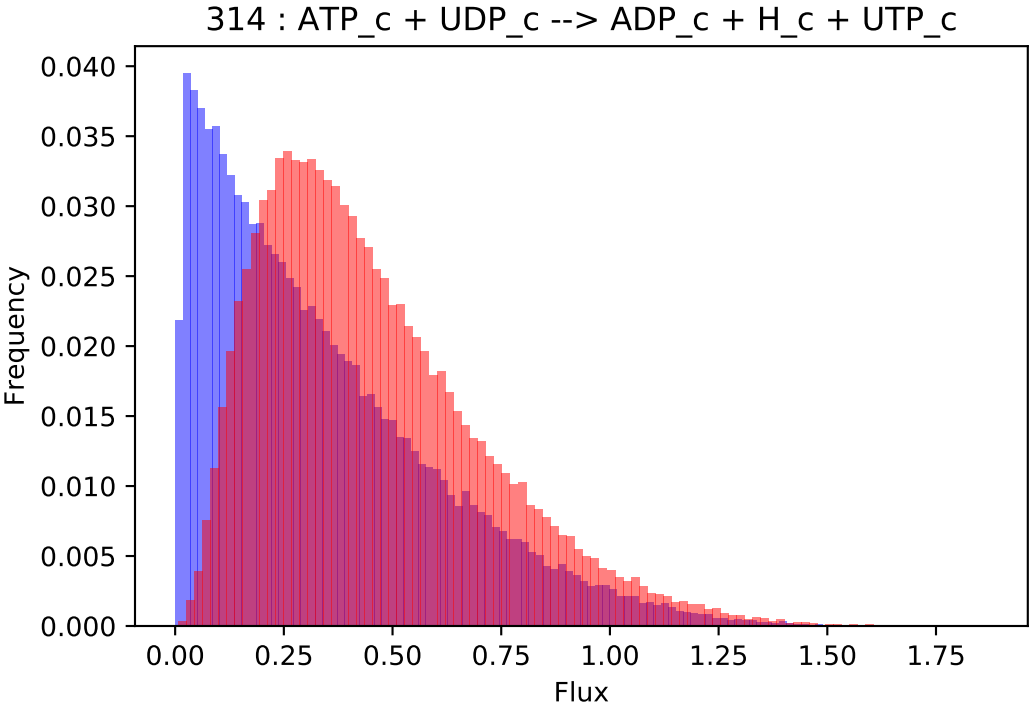

309 : H2O_c + dUTP_c --> 2.0 H_c + PPi_c + dUMP_c
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

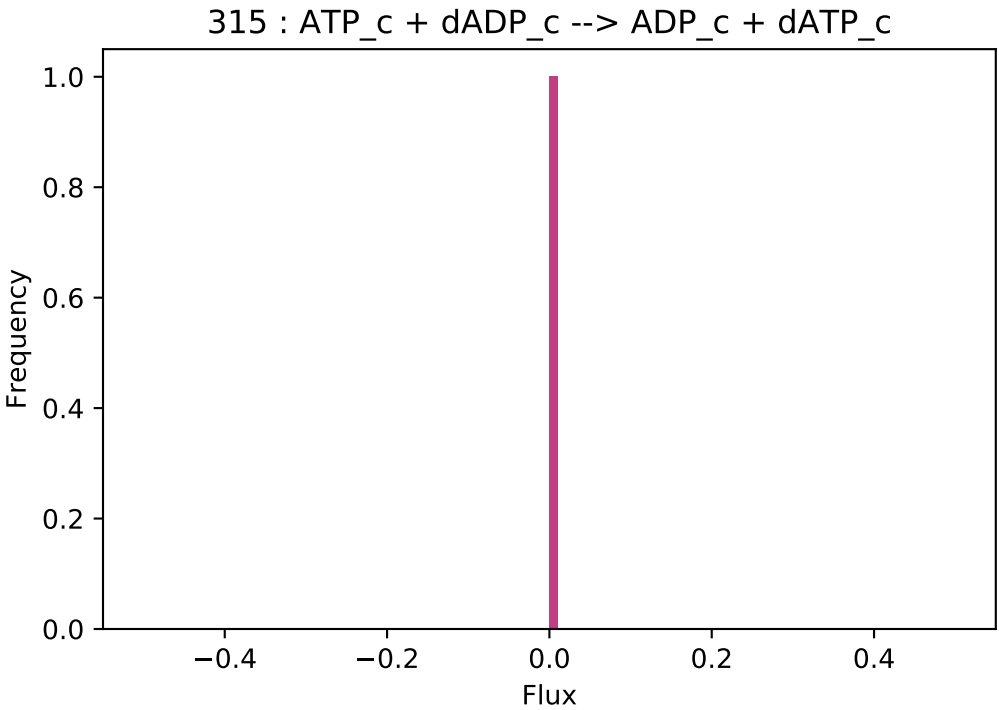

310 : M_DASH_THF_c + dUMP_c --> DHF_c + dTMP_c
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

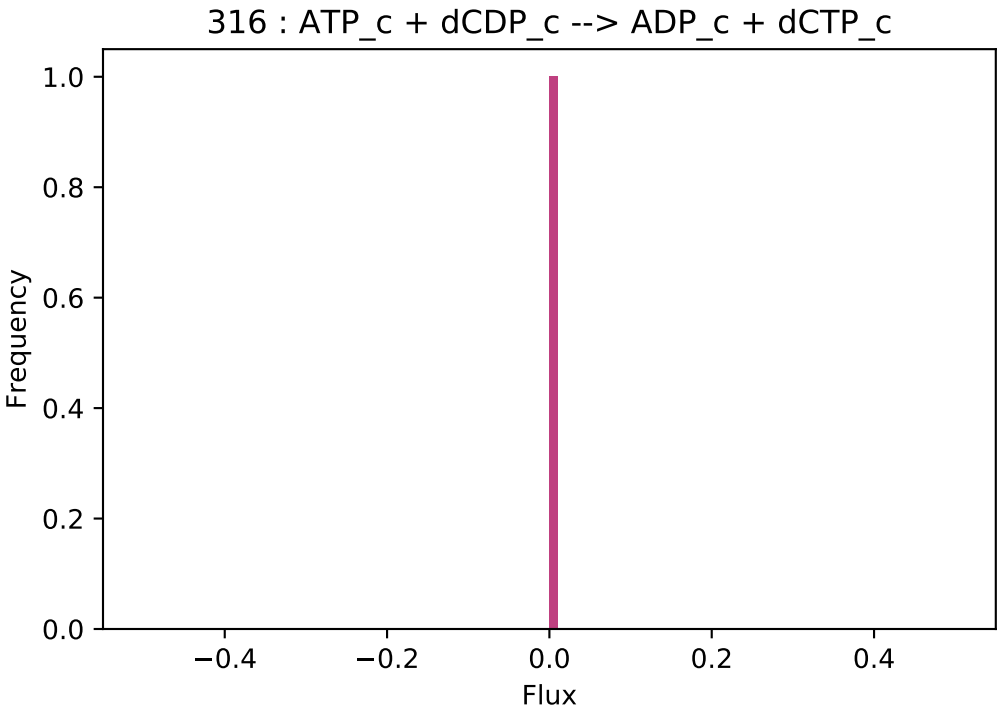

311 : ATP_c + H_c + dTMP_c --> ADP_c + dTDP_c
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

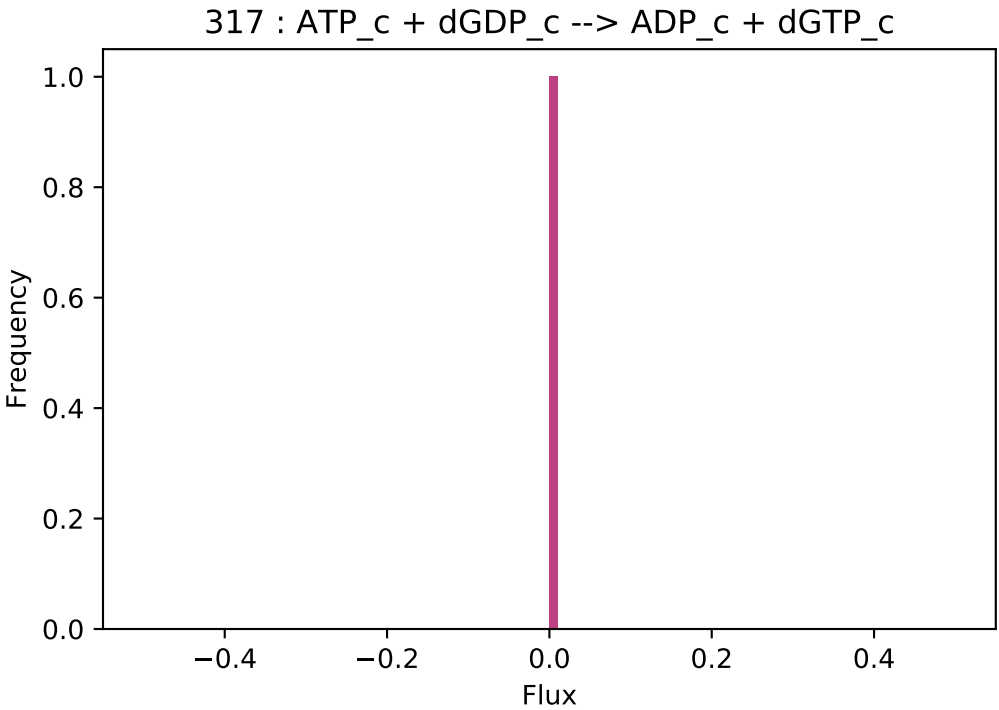

312 : ATP_c + GDP_c --> ADP_c + GTP_c + H_c
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

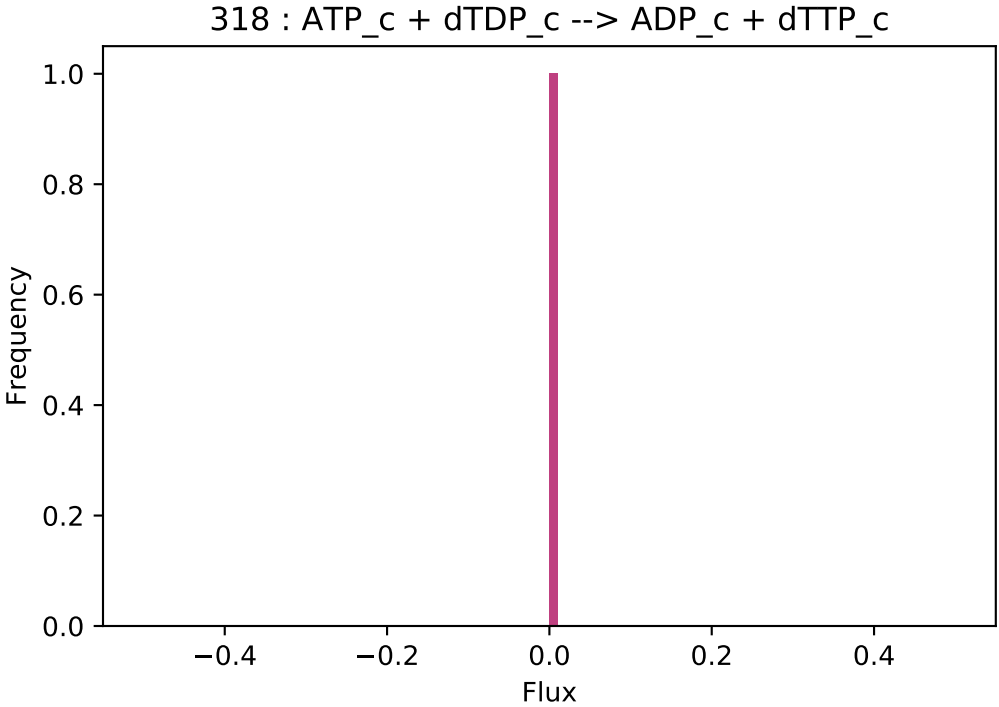

313 : ATP_h + GDP_h --> ADP_h + GTP_h + H_h
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

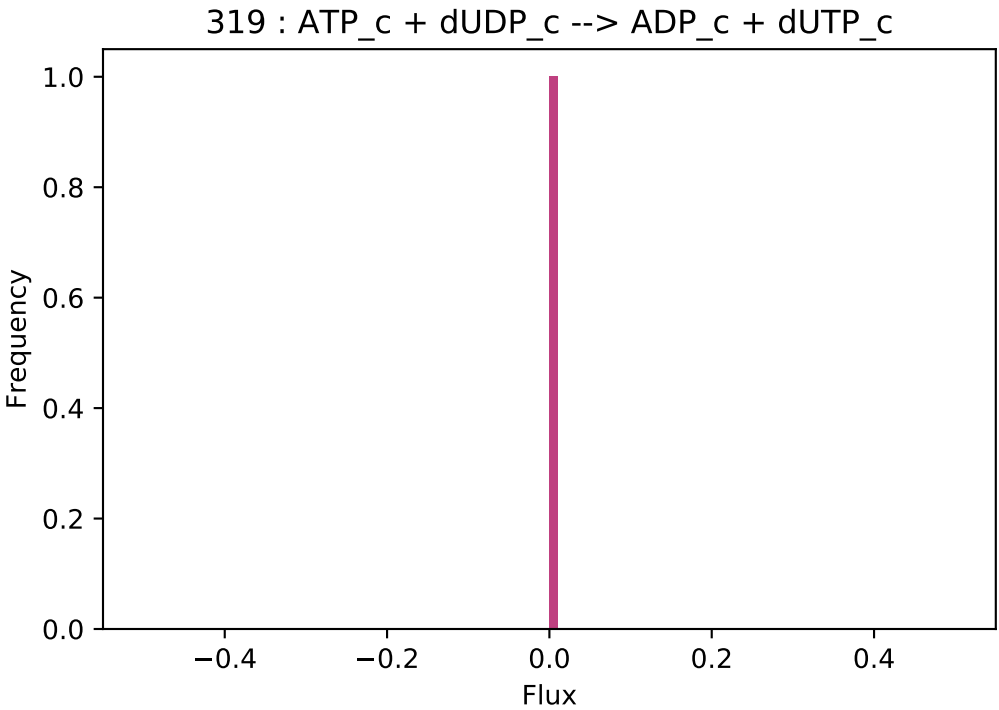

314 : ATP_c + UDP_c --> ADP_c + H_c + UTP_c
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
Flux

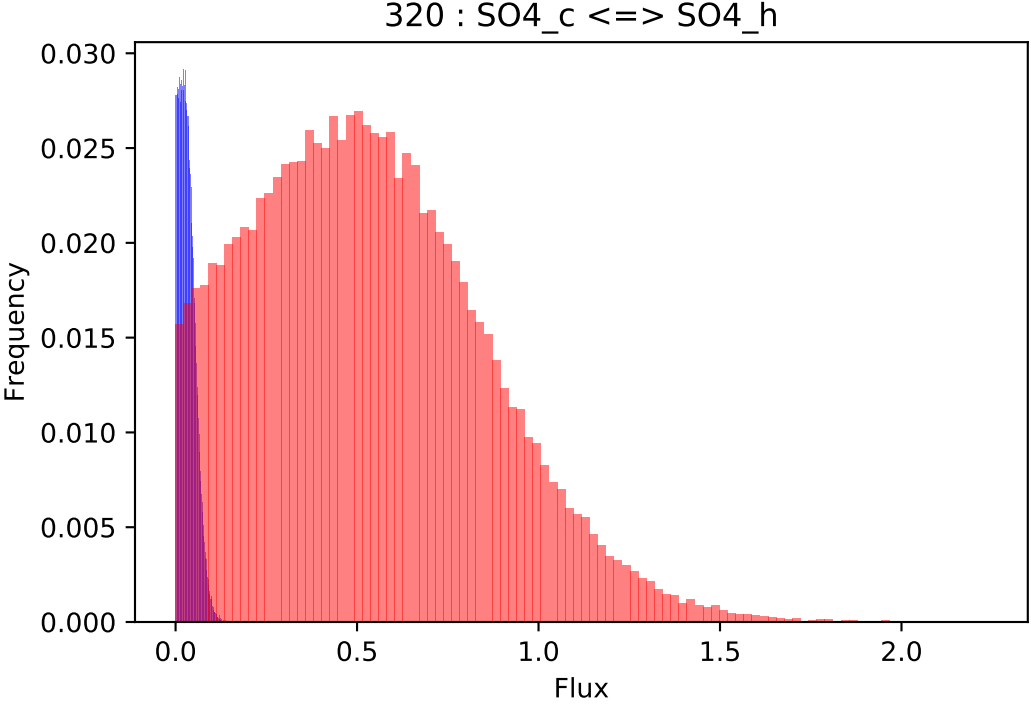

315 : ATP_c + dADP_c --> ADP_c + dATP_c
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

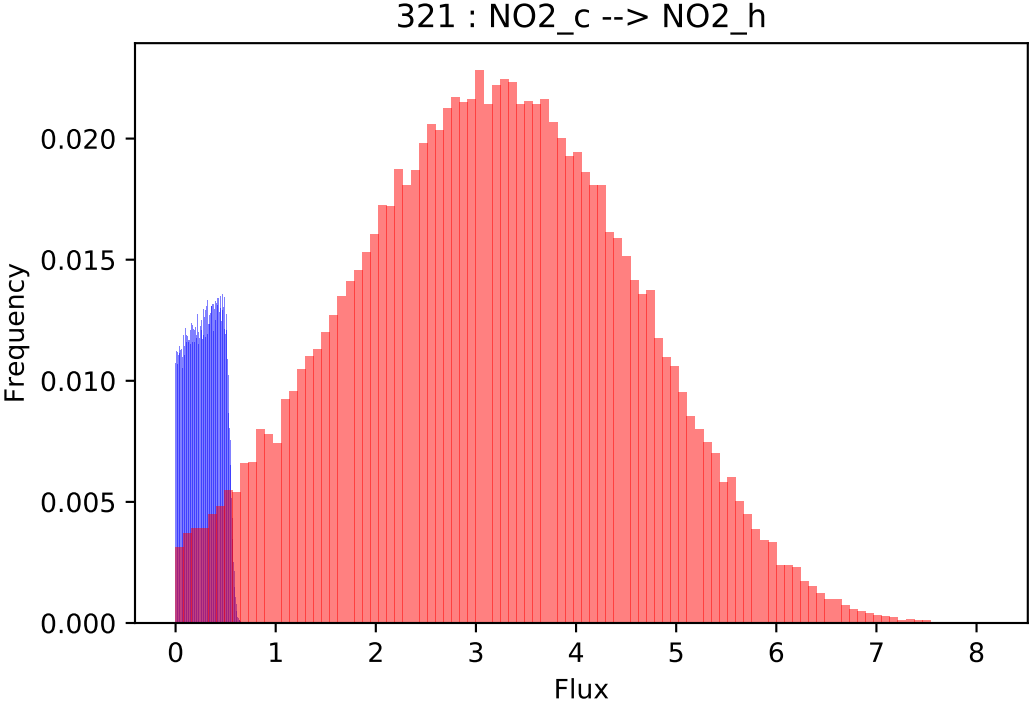

316 : ATP_c + dCDP_c --> ADP_c + dCTP_c
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

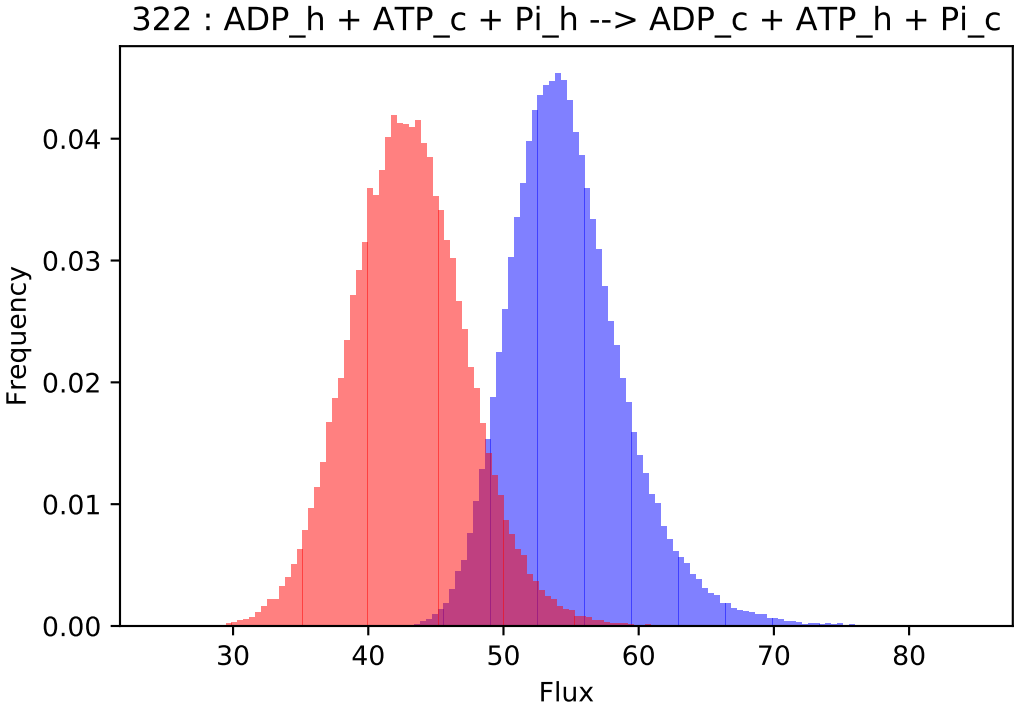

317 : ATP_c + dGDP_c --> ADP_c + dGTP_c
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

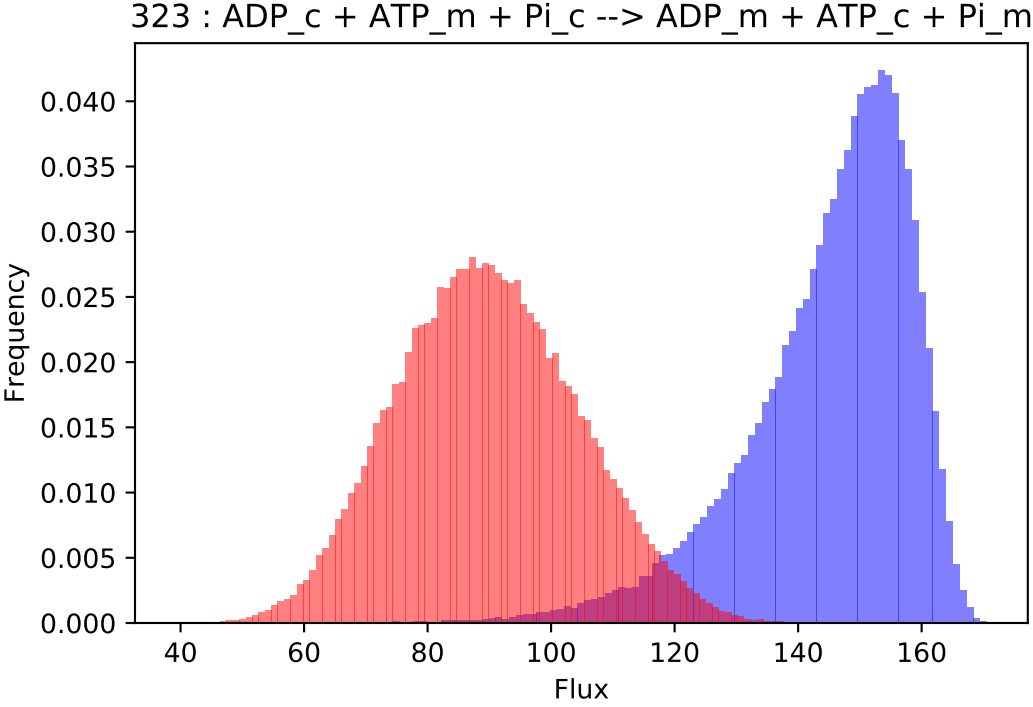

318 : ATP_c + dTDP_c --> ADP_c + dTTP_c
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

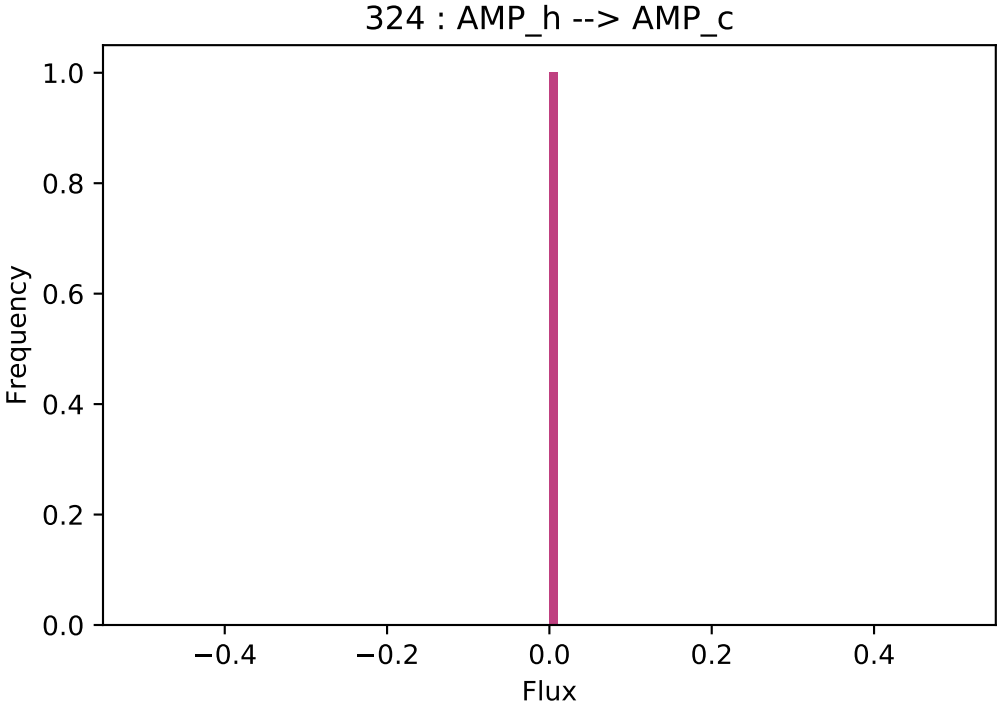

319 : ATP_c + dUDP_c --> ADP_c + dUTP_c
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

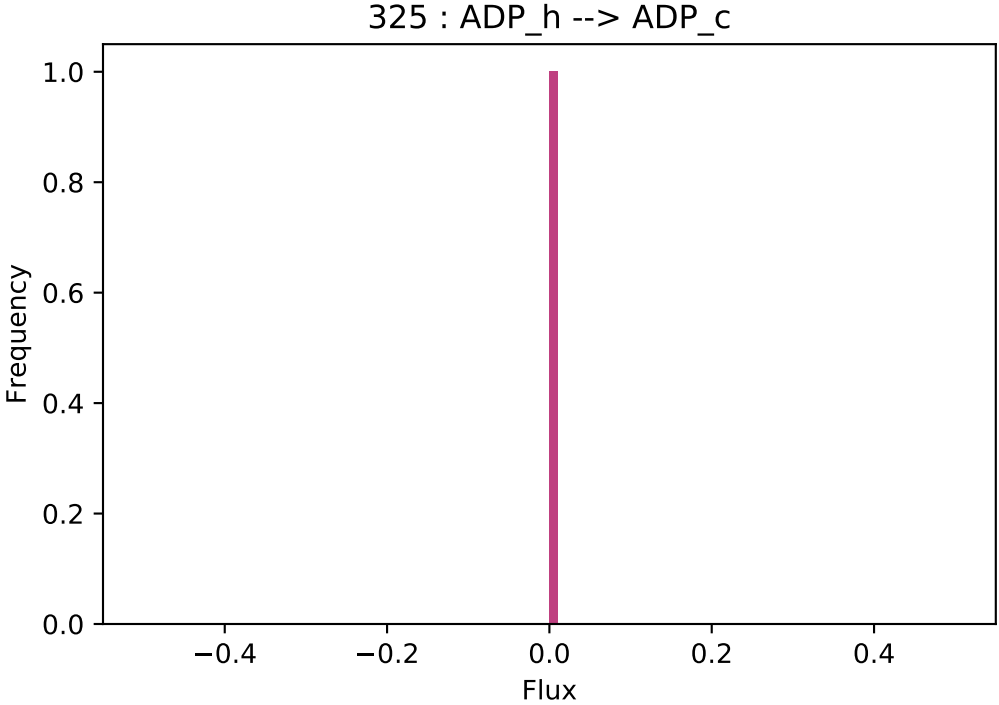

320 : SO4_c <=> SO4_h
0.030
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
0.0
0.5
1.0
1.5
2.0
Flux

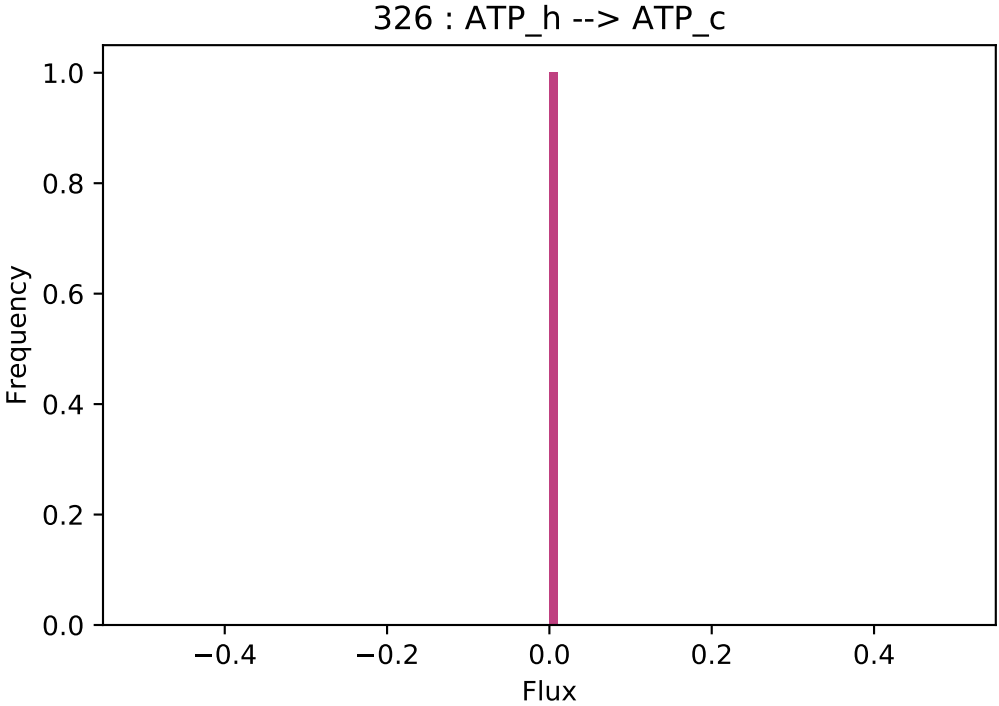

321 : NO2_c --> NO2_h
Frequency
0.020
0.015
0.010
0.005
0.000
0
1
2
3
4
5
6
7
8
Flux

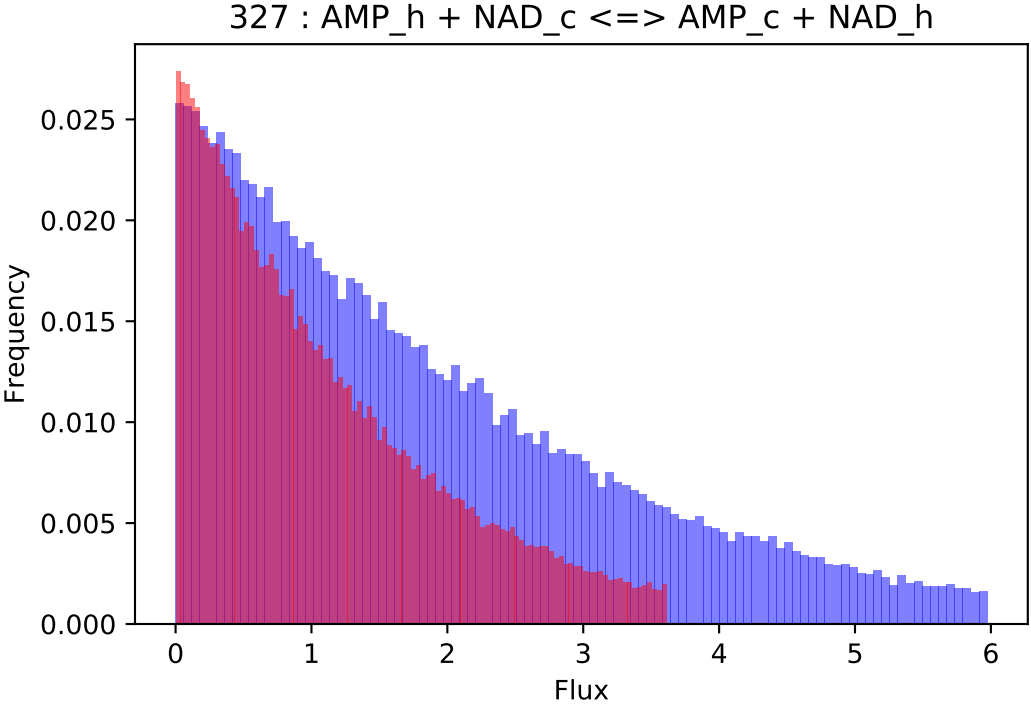

322 : ADP_h + ATP_c + Pi_h --> ADP_c + ATP_h + Pi_c
Frequency
0.00
0.01
0.02
0.03
0.04
30
40
50
60
70
80
Flux

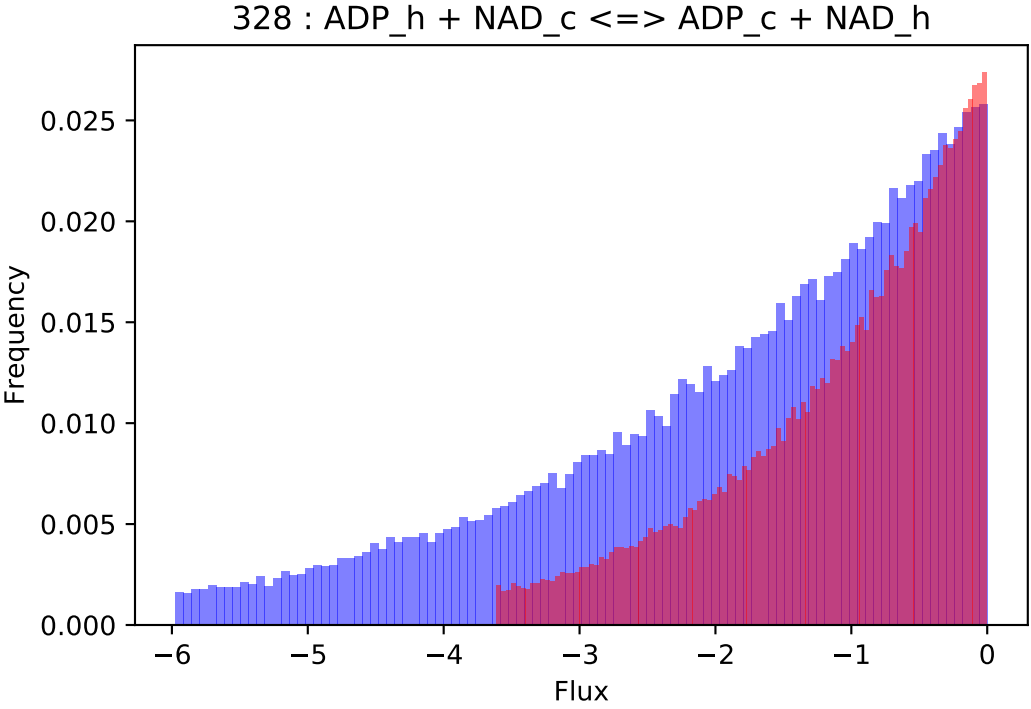

323 : ADP_c + ATP_m + Pi_c --> ADP_m + ATP_c + Pi_m
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
40
60
80
100
120
140
160
Flux

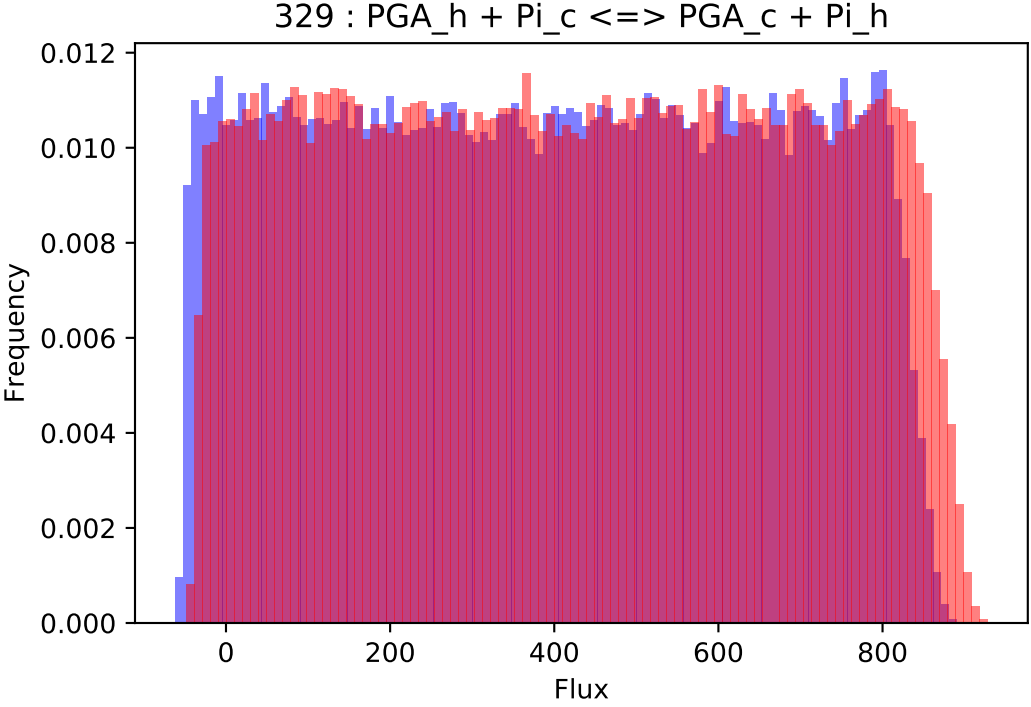

324 : AMP_h --> AMP_c
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

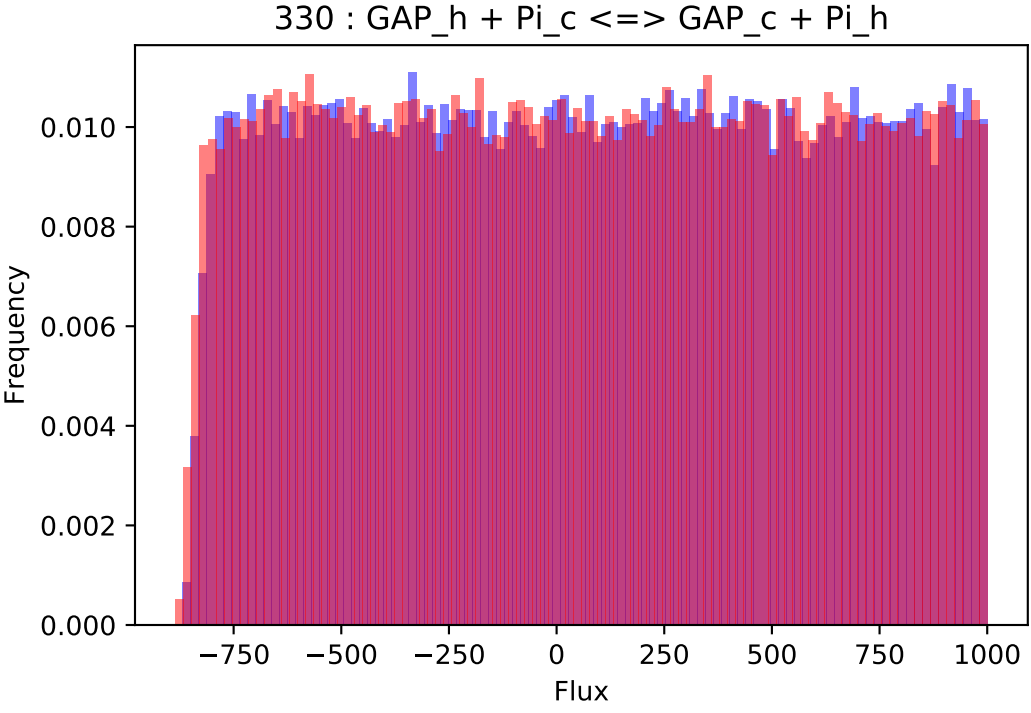

325 : ADP_h --> ADP_c
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

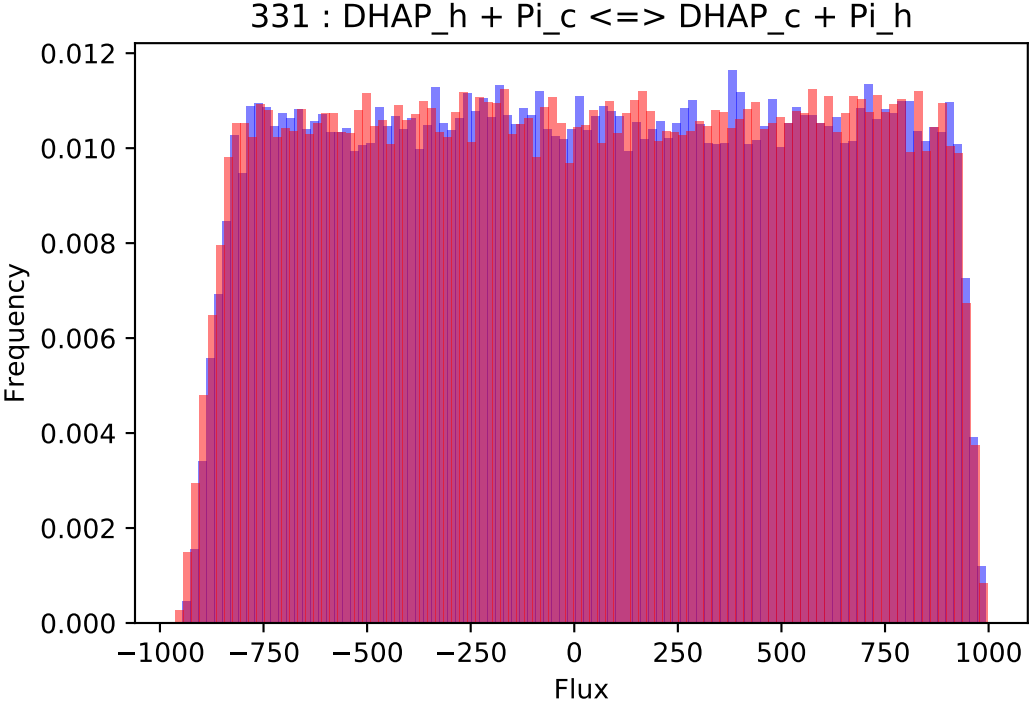

326 : ATP_h --> ATP_c
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

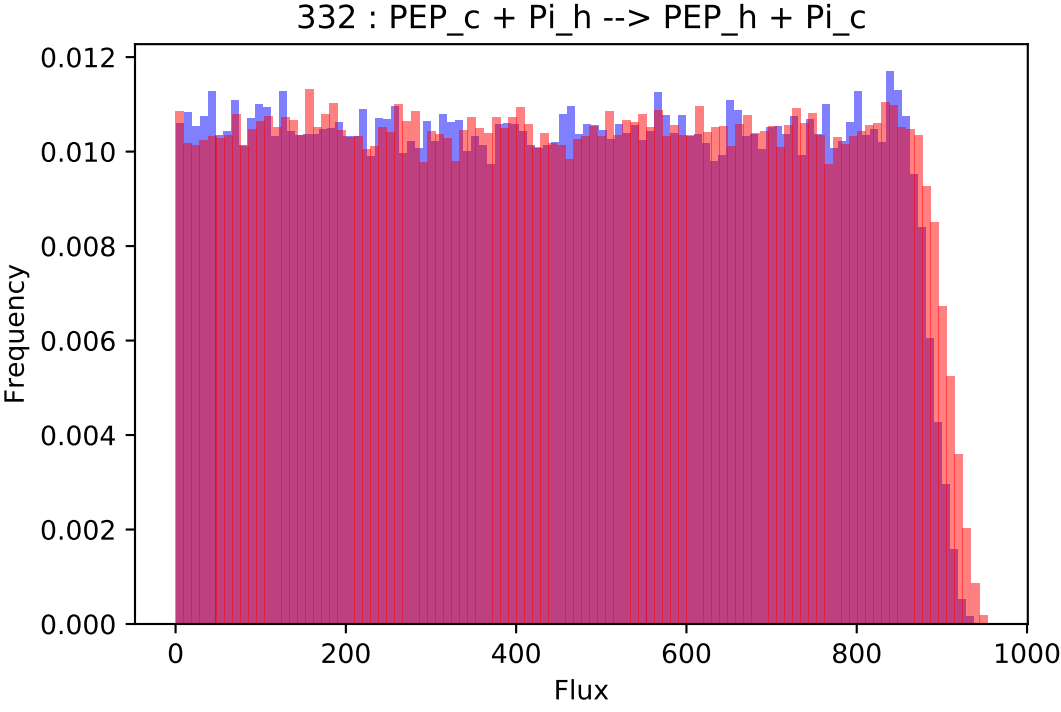

327 : AMP_h + NAD_c <=> AMP_c + NAD_h
Frequency
0.025
0.020
0.015
0.010
0.005
0.000
0
1
2
3
4
5
6
Flux

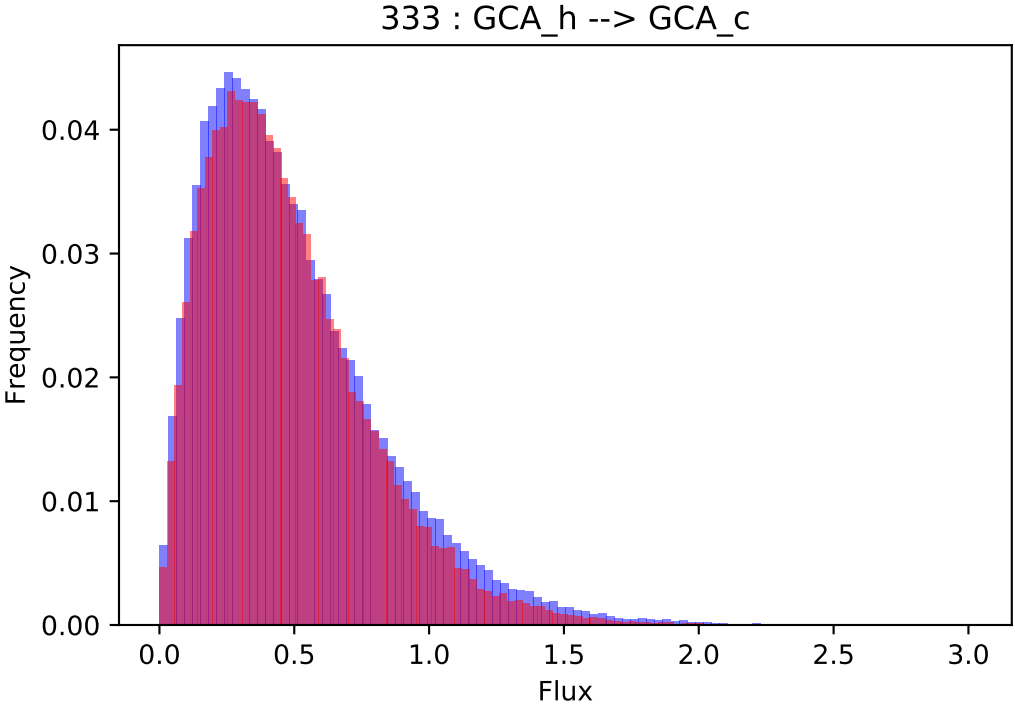

328 : ADP_h + NAD_c <=> ADP_c + NAD_h
Frequency
0.025
0.020
0.015
0.010
0.005
0.000
−6
−5
−4
−3
−2
−1
0
Flux

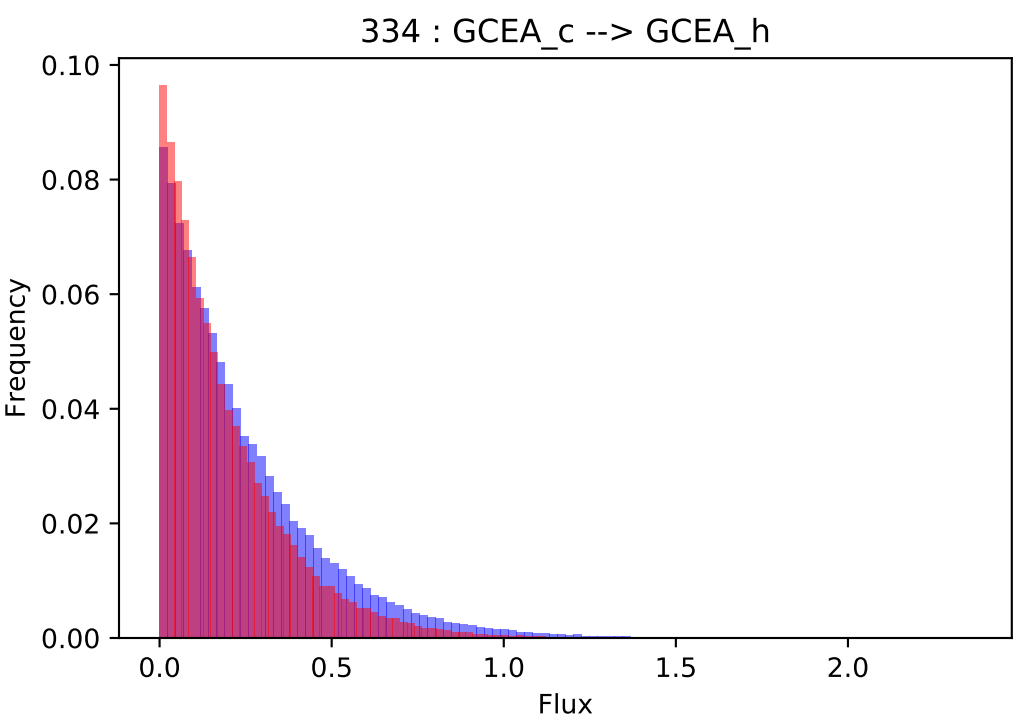

329 : PGA_h + Pi_c <=> PGA_c + Pi_h
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Frequency
0
200
400
600
800
Flux

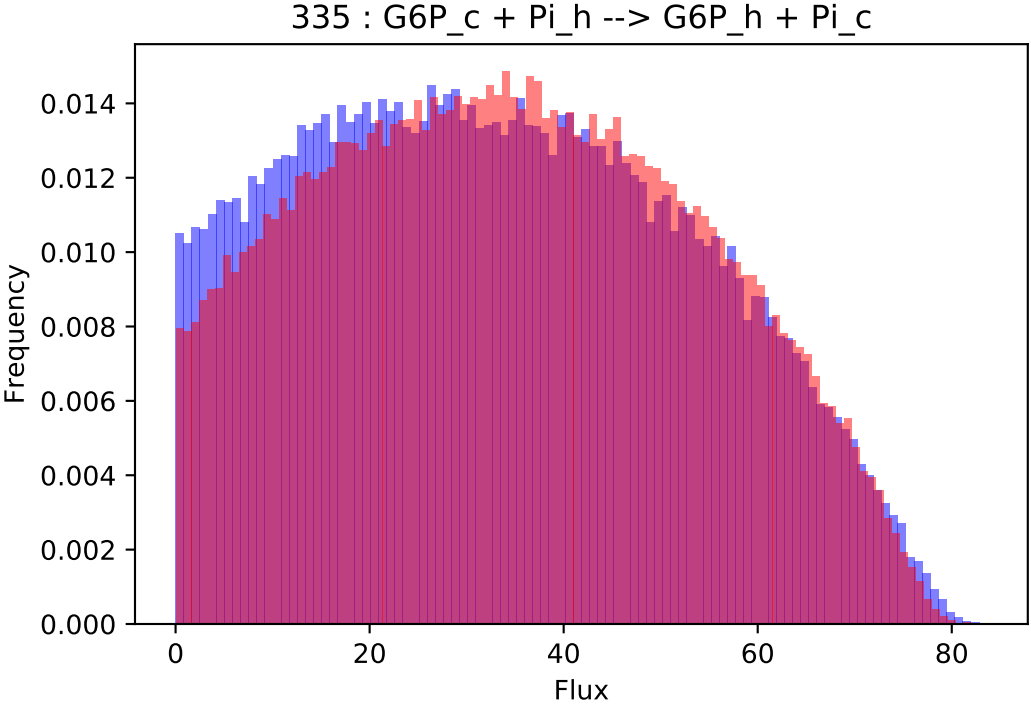

330 : GAP_h + Pi_c <=> GAP_c + Pi_h
Frequency
0.010
0.008
0.006
0.004
0.002
0.000
−750
−500
−250
0
250
500
750
1000
Flux

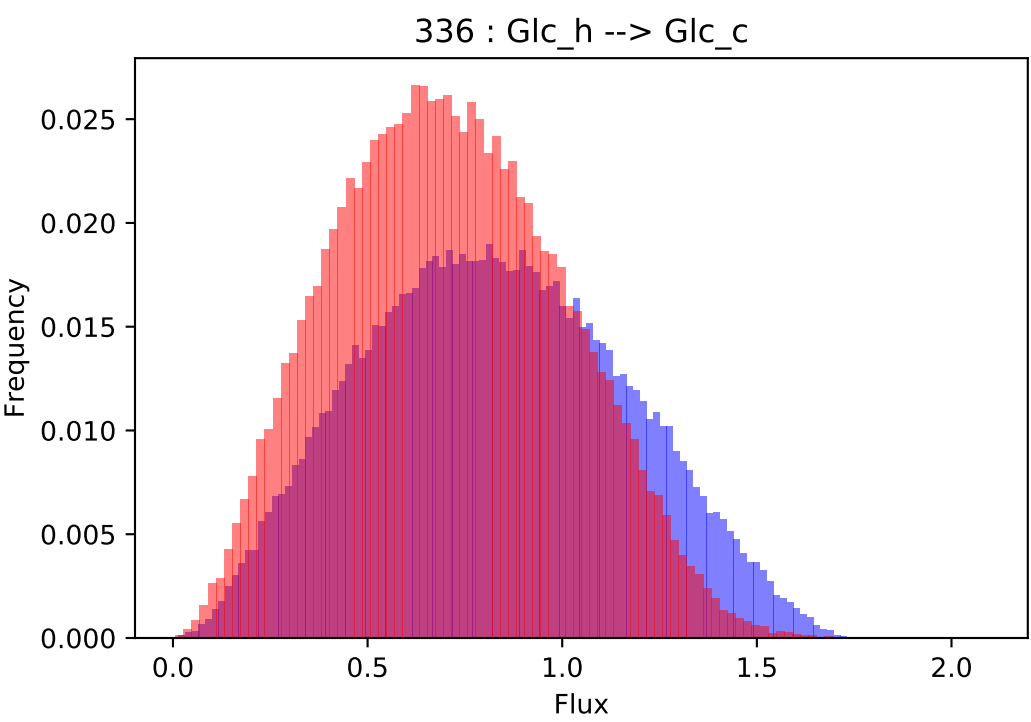

331 : DHAP_h + Pi_c <=> DHAP_c + Pi_h
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Frequency
−1000
−750
−500
−250
0
250
500
750
1000
Flux

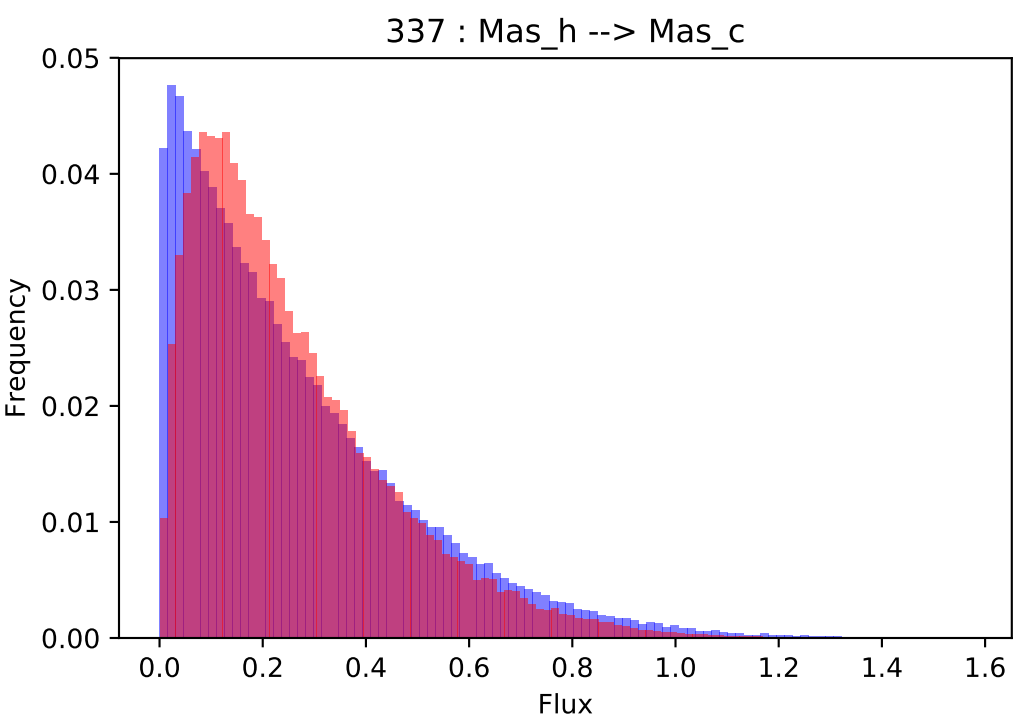

332 : PEP_c + Pi_h --> PEP_h + Pi_c
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Frequency
0
200
400
600
800
1000
Flux

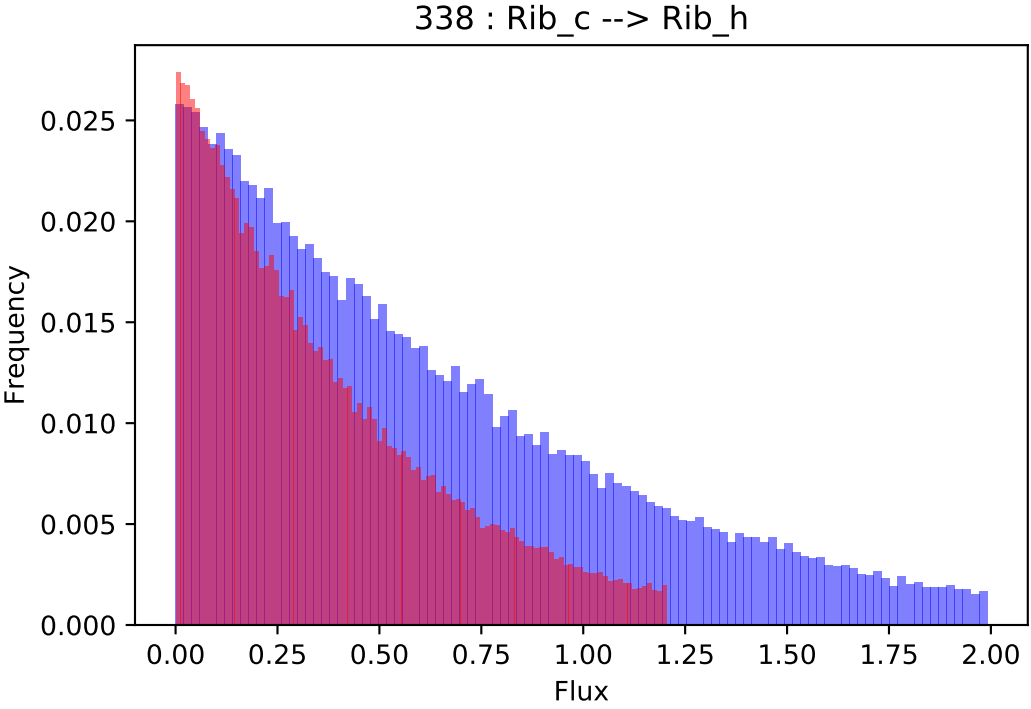

333 : GCA_h --> GCA_c
Frequency
0.00
0.01
0.02
0.03
0.04
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Flux

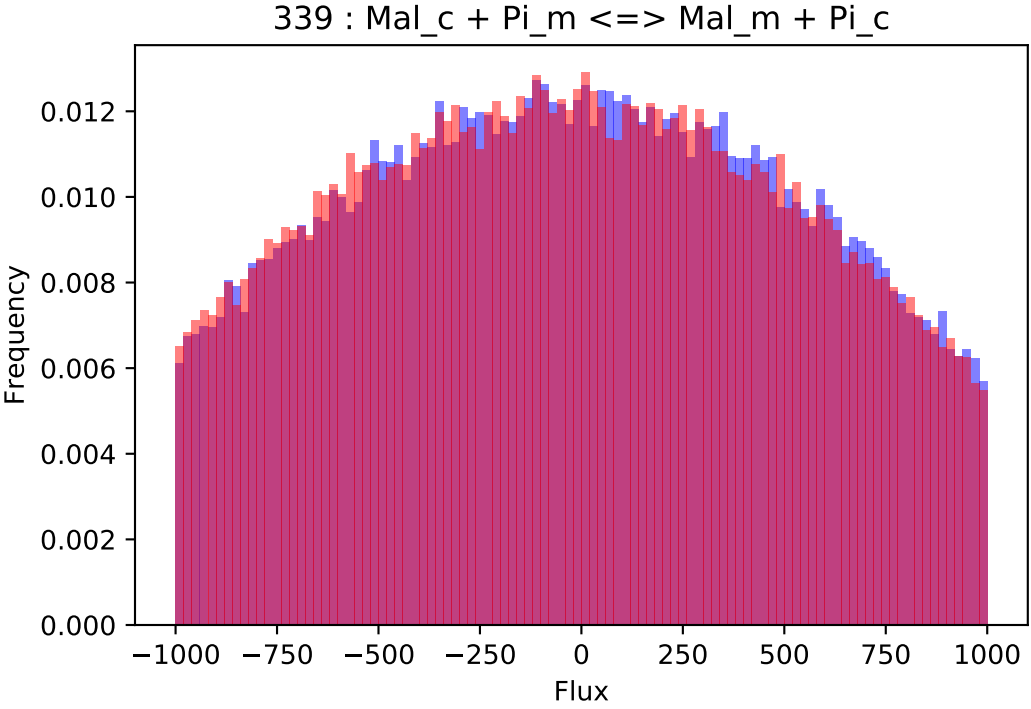

334 : GCEA_c --> GCEA_h
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.5
1.0
1.5
2.0
Flux

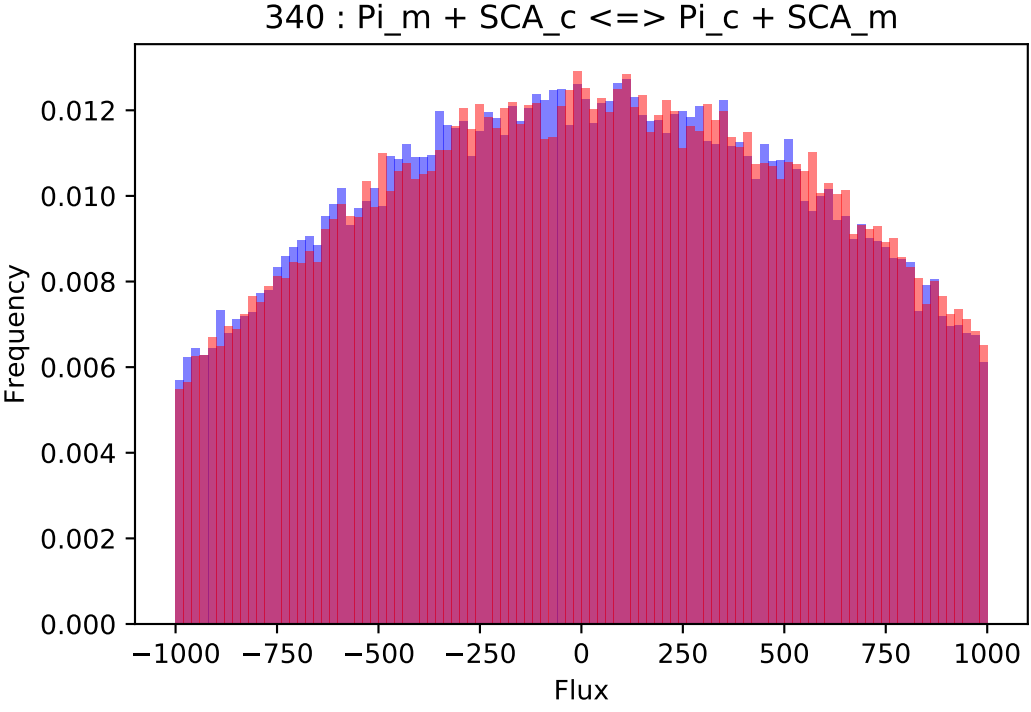

335 : G6P_c + Pi_h --> G6P_h + Pi_c
Frequency
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
0
20
40
60
80
Flux

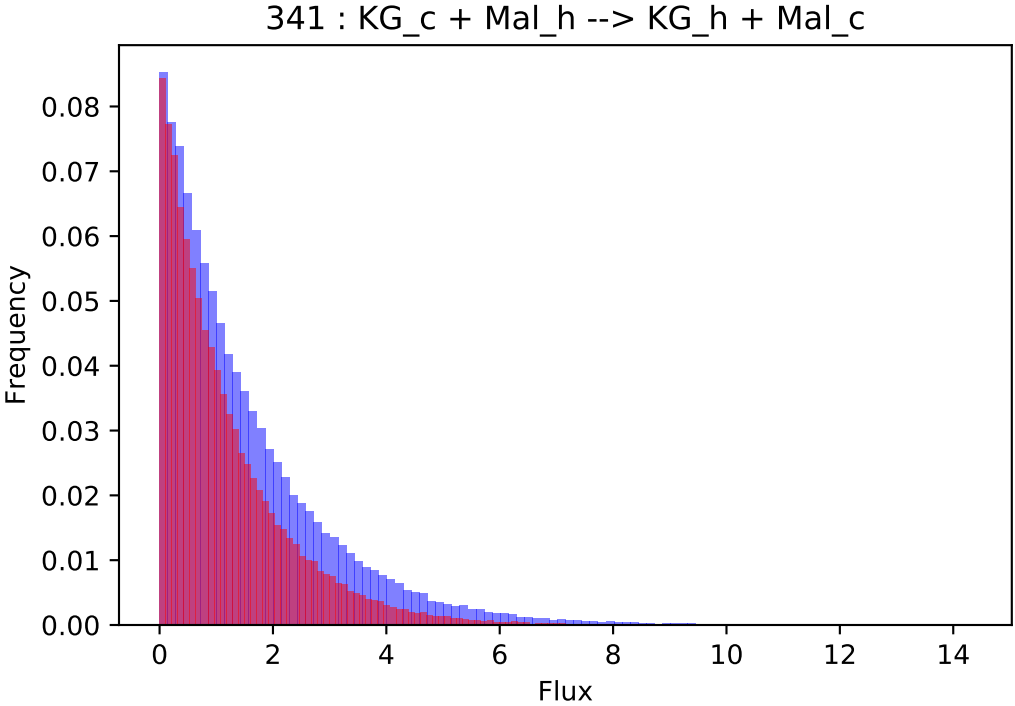

336 : Glc_h --> Glc_c
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
0.0
0.5
1.0
1.5
2.0
Flux

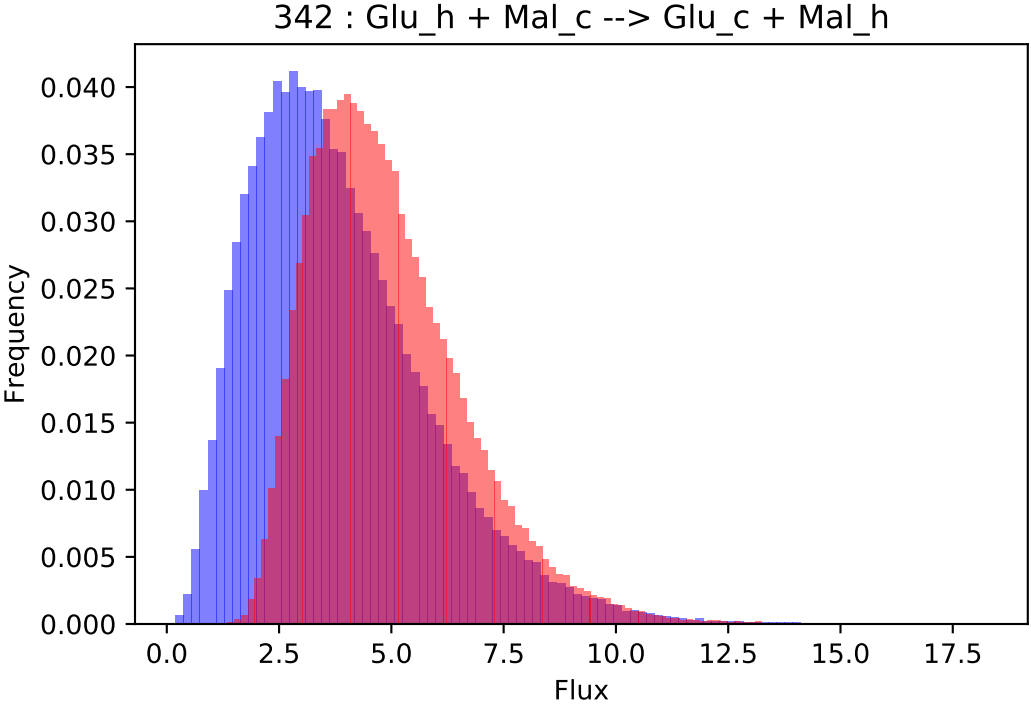

337 : Mas_h --> Mas_c
Frequency
Flux
0.00
0.01
0.02
0.03
0.04
0.05
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6

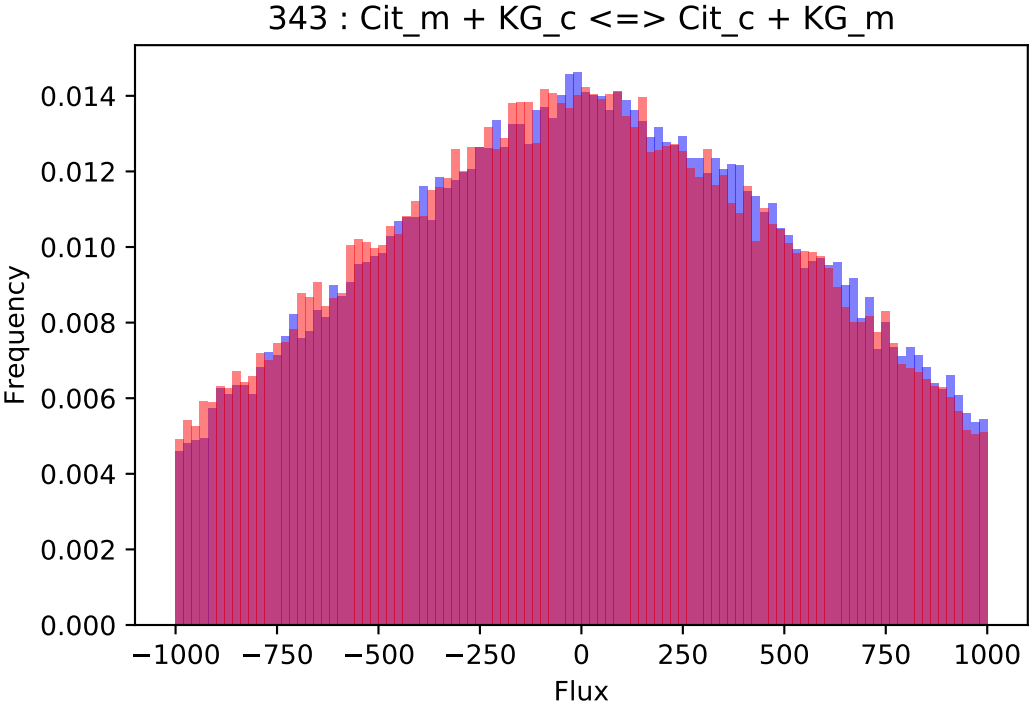

338 : Rib_c --> Rib_h
Frequency
0.025
0.020
0.015
0.010
0.005
0.000
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
Flux

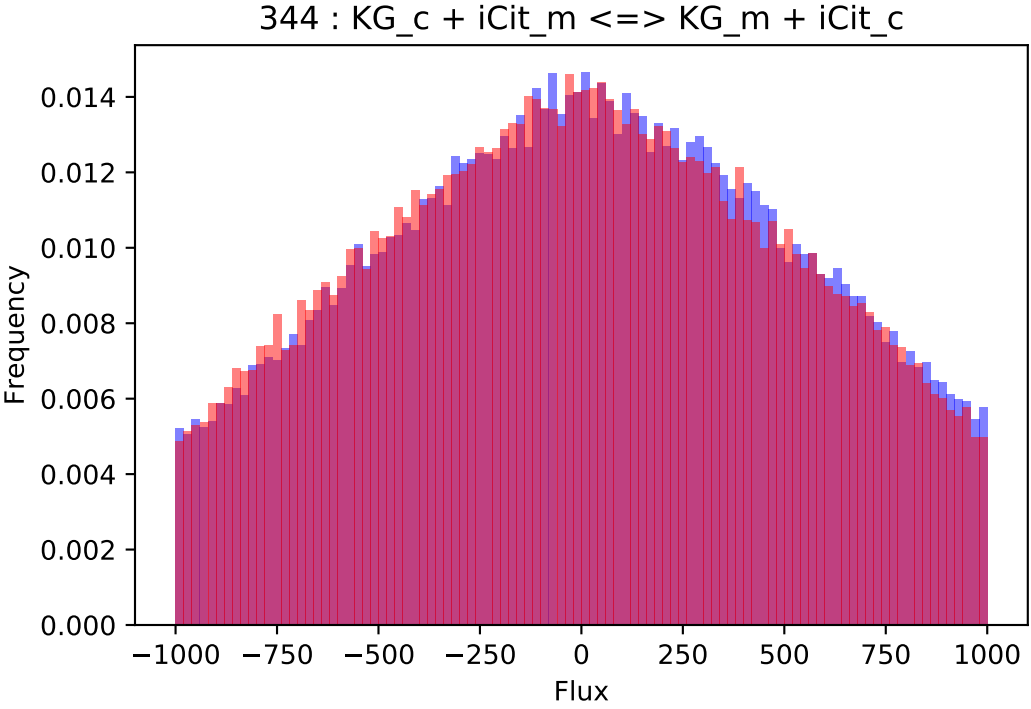

339 : Mal_c + Pi_m <=> Mal_m + Pi_c
Frequency
0.012
0.010
0.008
0.006
0.004
0.002
0.000
−1000
−750
−500
−250
0
250
500
750
1000
Flux

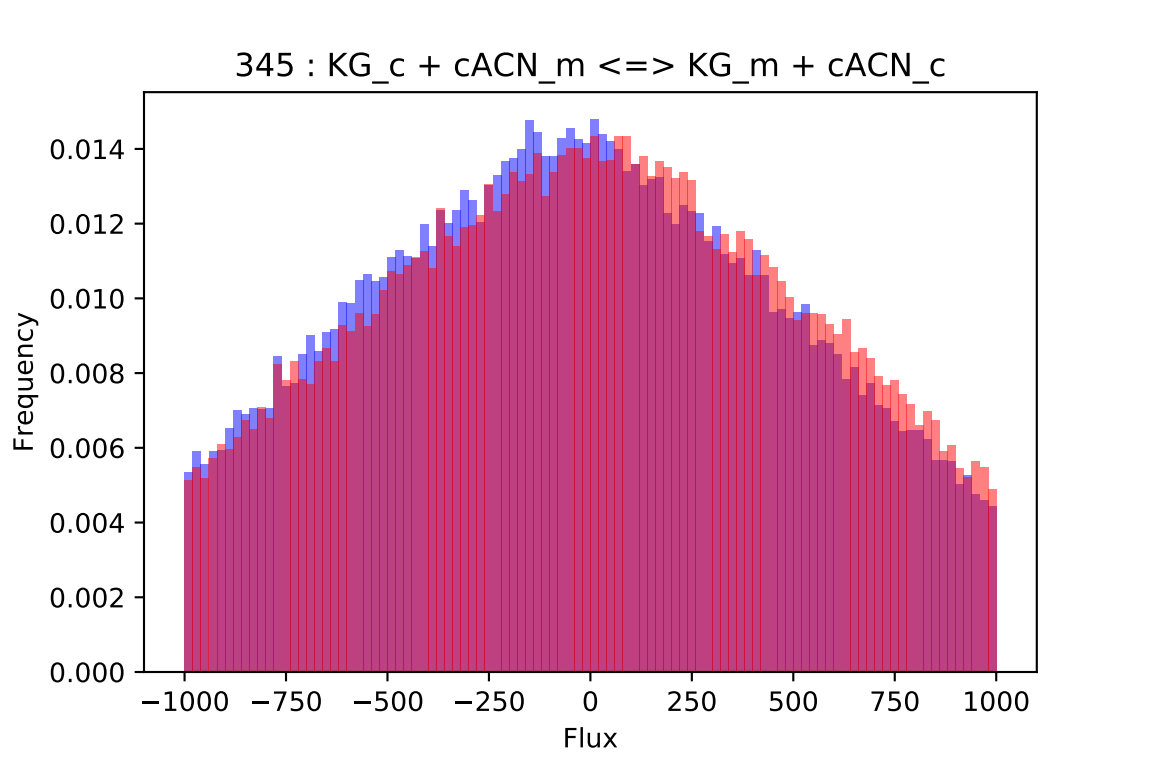

340 : Pi_m + SCA_c <=> Pi_c + SCA_m
Frequency
0.012
0.010
0.008
0.006
0.004
0.002
0.000
−1000
−750
−500
−250
0
250
500
750
1000
Flux

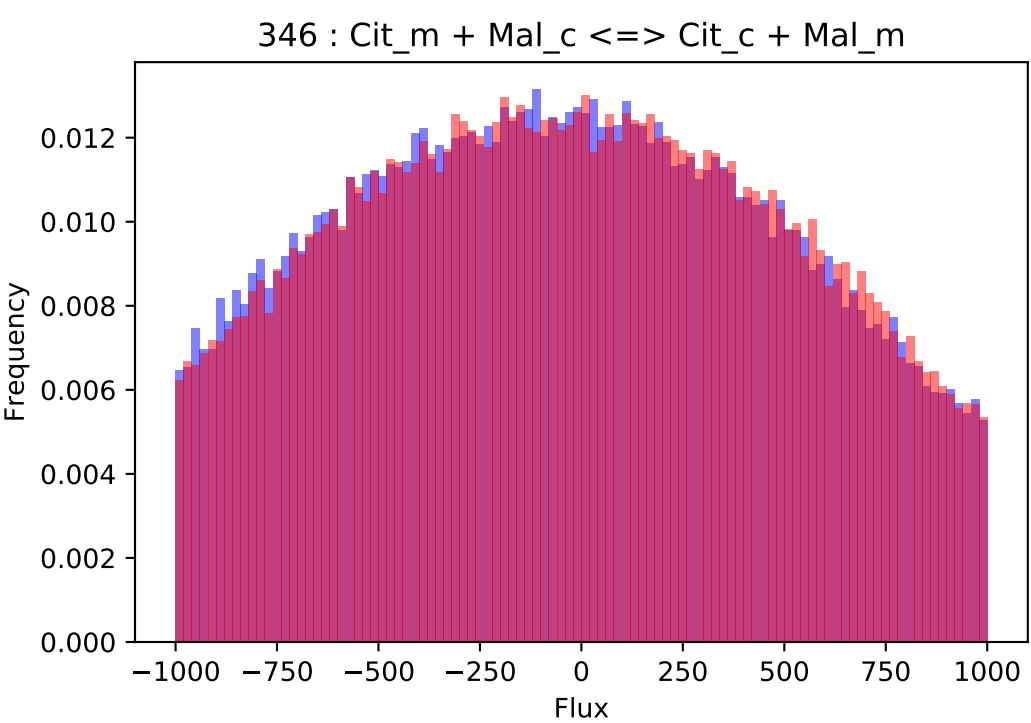

341 : KG_c + Mal_h --> KG_h + Mal_c
Frequency
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0
2
4
6
8
10
12
14
Flux

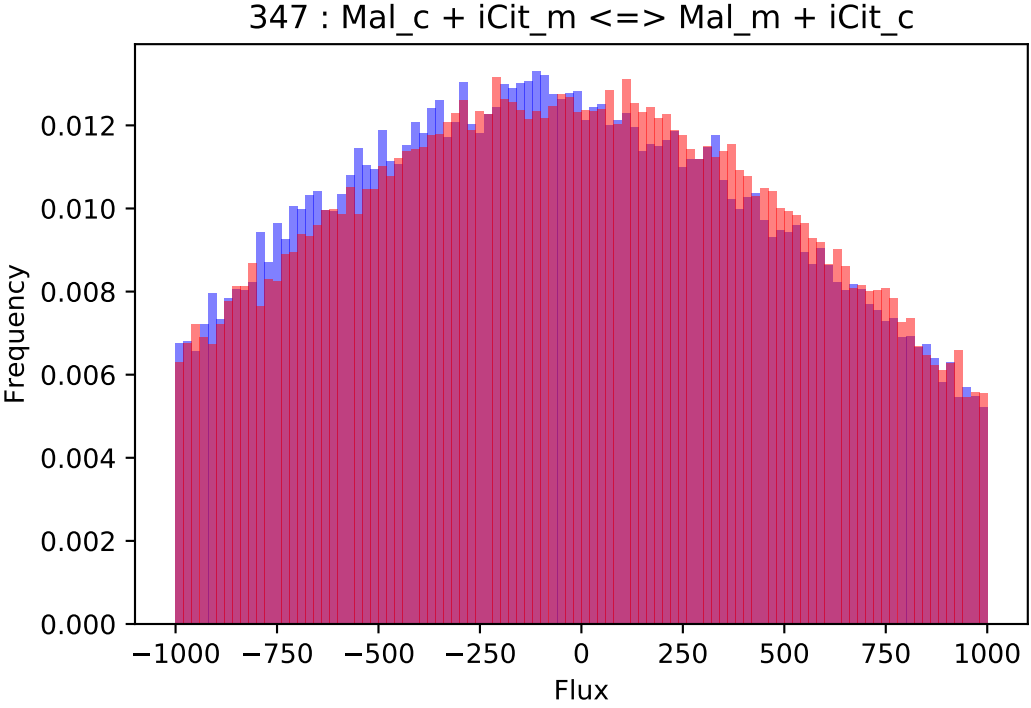

342 : Glu_h + Mal_c --> Glu_c + Mal_h
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
Flux

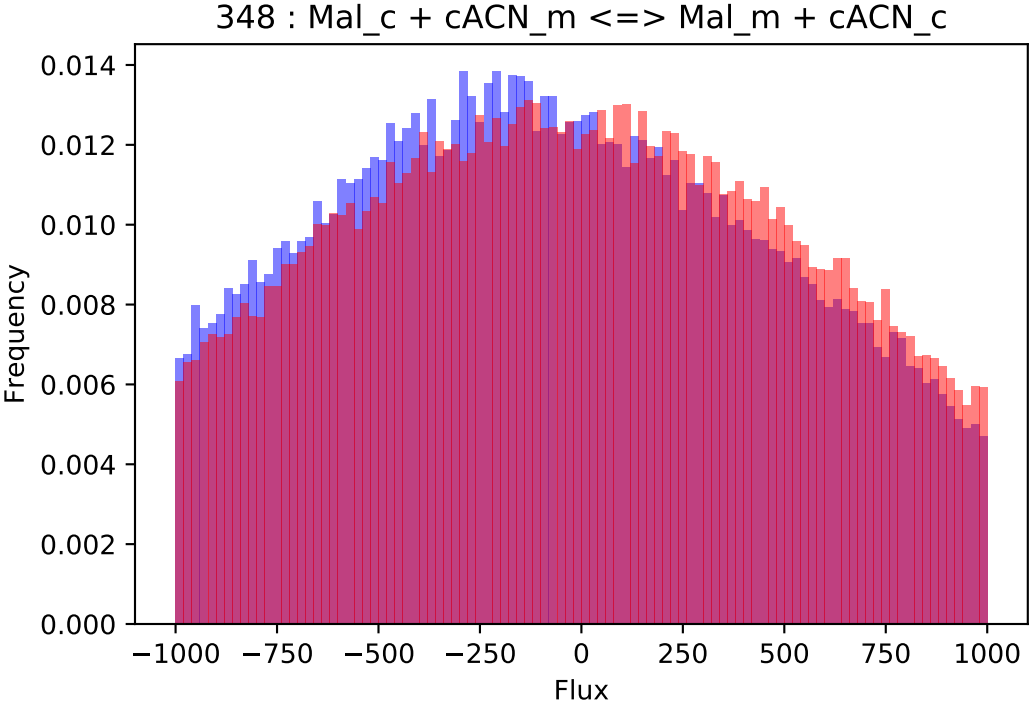

343 : Cit_m + KG_c <=> Cit_c + KG_m
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Frequency
−1000
−750
−500
−250
0
250
500
750
1000
Flux

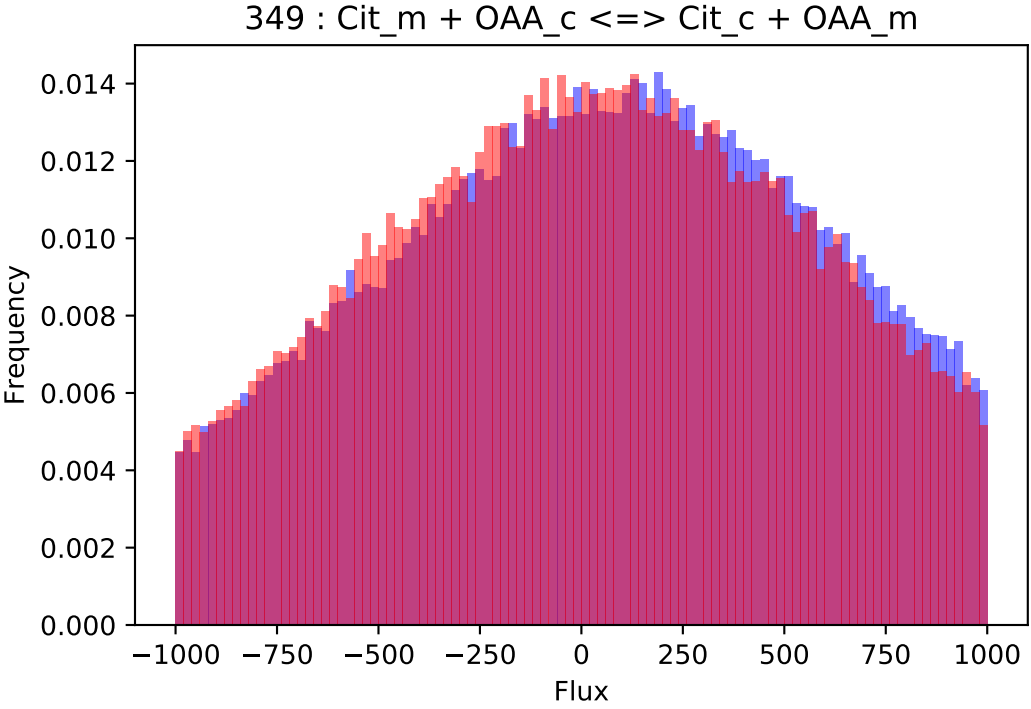

344 : KG_c + iCit_m <=> KG_m + iCit_c
Frequency
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
−1000
−750
−500
−250
0
250
500
750
1000
Flux

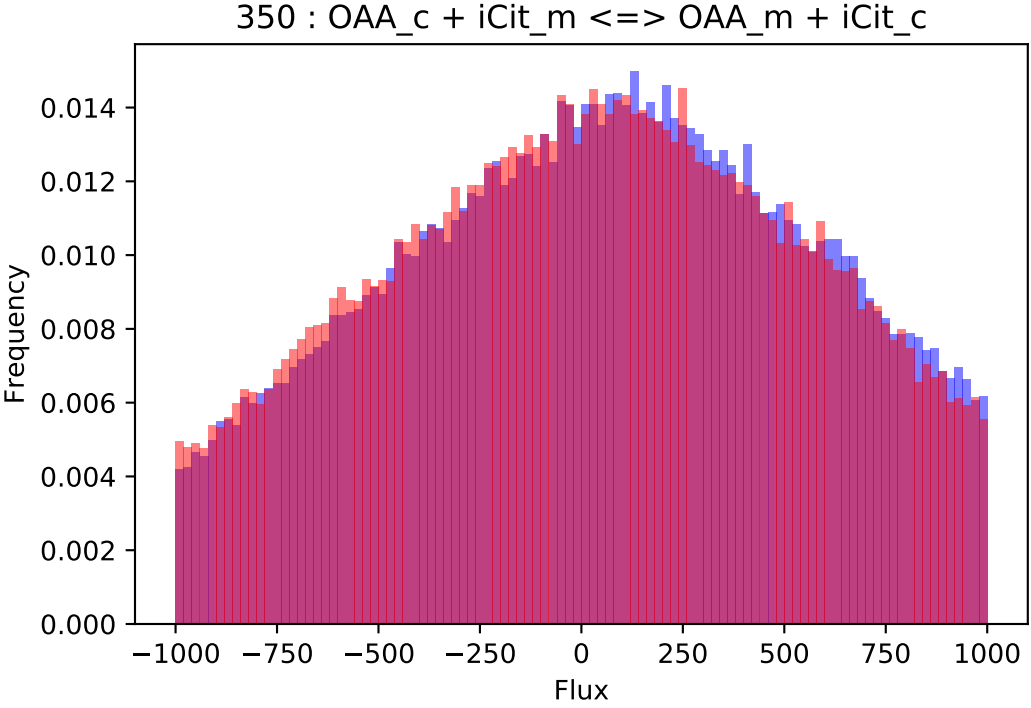

345 : KG_c + cACN_m <=> KG_m + cACN_c
Frequency
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
−1000
−750
−500
−250
0
250
500
750
1000
Flux

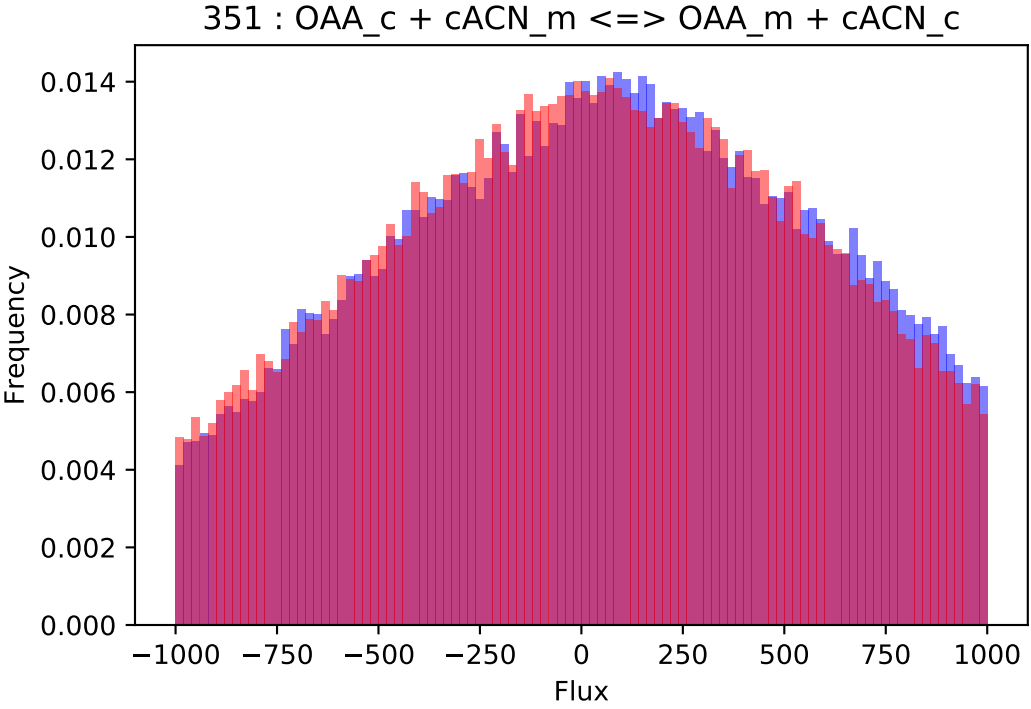

346 : Cit_m + Mal_c <=> Cit_c + Mal_m
Frequency
0.000
0.002
0.004
0.006
0.008
0.010
0.012
−1000
−750
−500
−250
0
250
500
750
1000
Flux

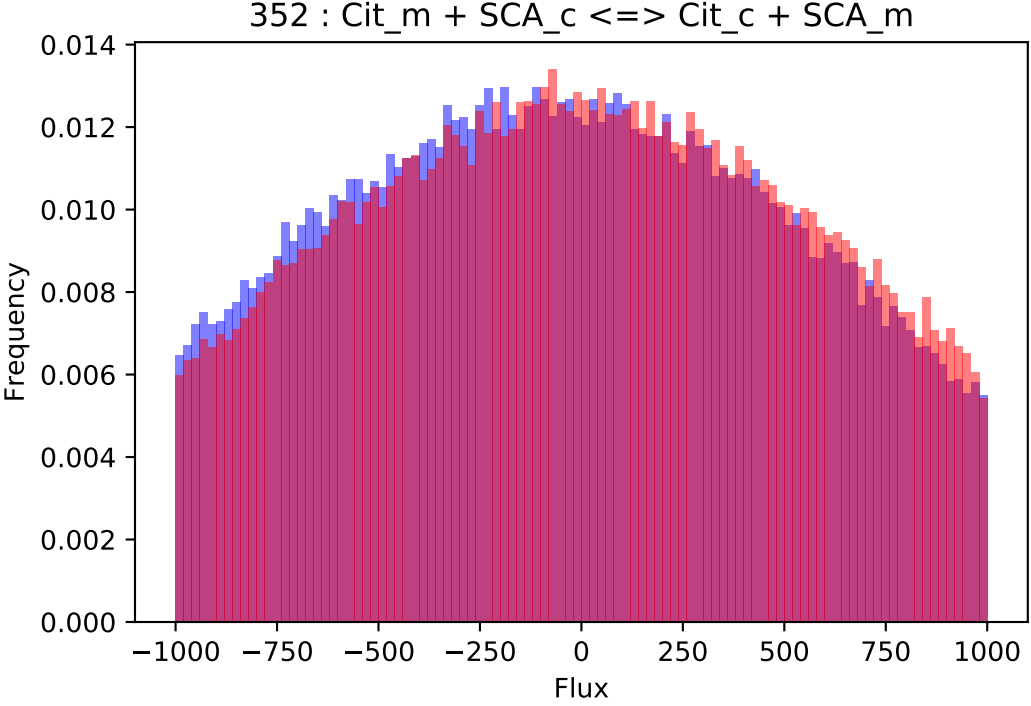

347 : Mal_c + iCit_m <=> Mal_m + iCit_c
Frequency
0.012
0.010
0.008
0.006
0.004
0.002
0.000
−1000
−750
−500
−250
0
250
500
750
1000
Flux

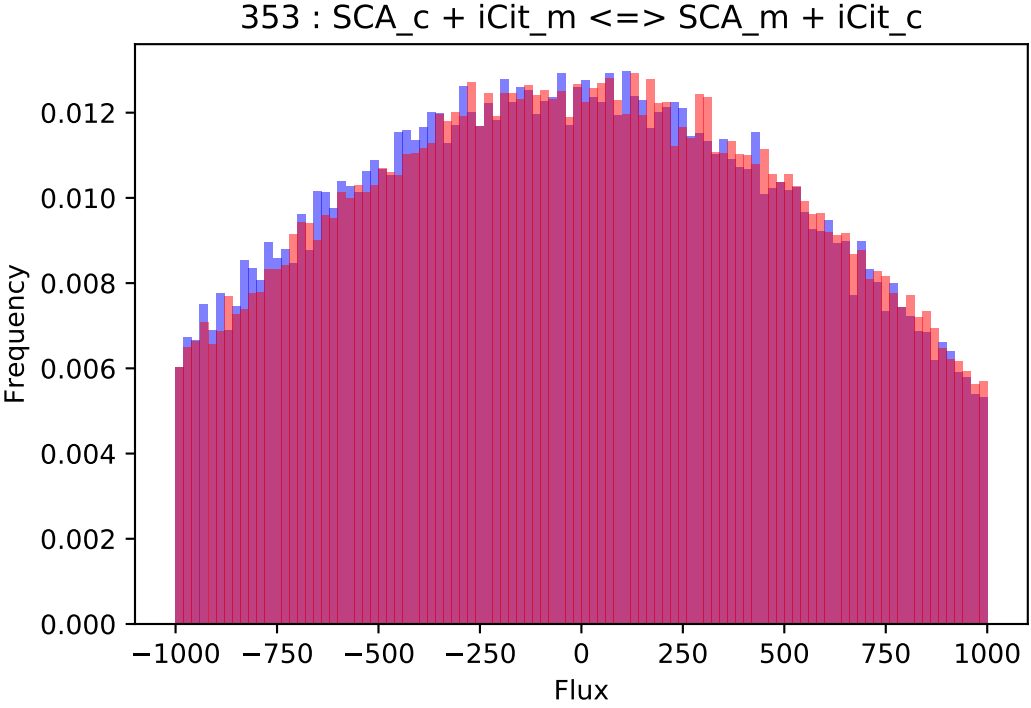

348 : Mal_c + cACN_m <=> Mal_m + cACN_c
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Frequency
−1000
−750
−500
−250
0
250
500
750
1000
Flux

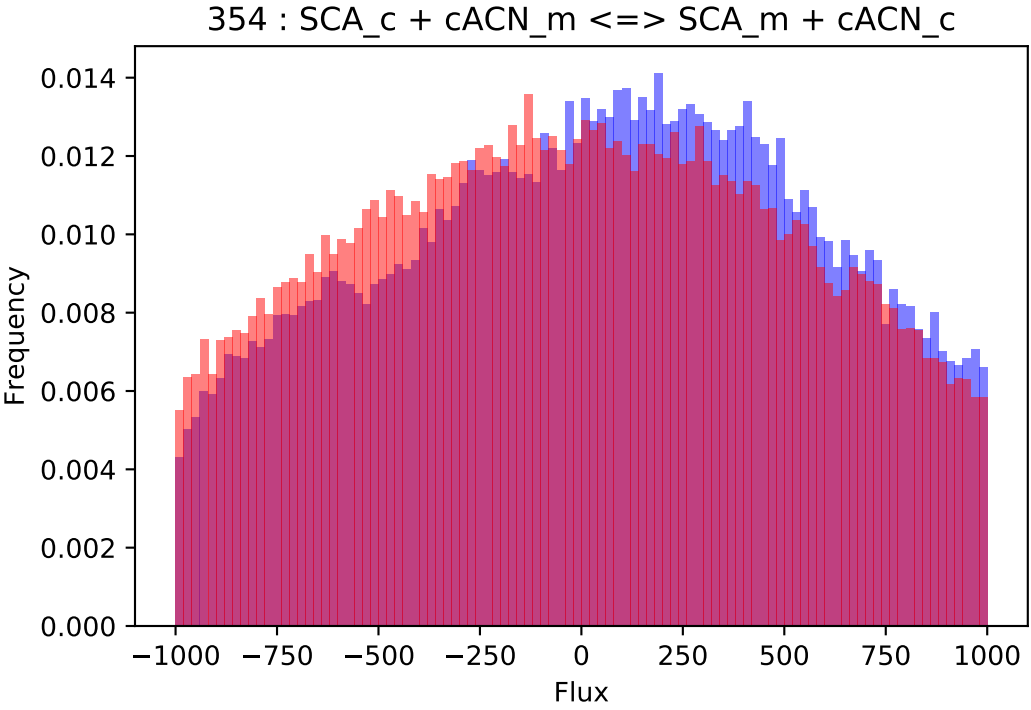

349 : Cit_m + OAA_c <=> Cit_c + OAA_m
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Frequency
−1000
−750
−500
−250
0
250
500
750
1000
Flux

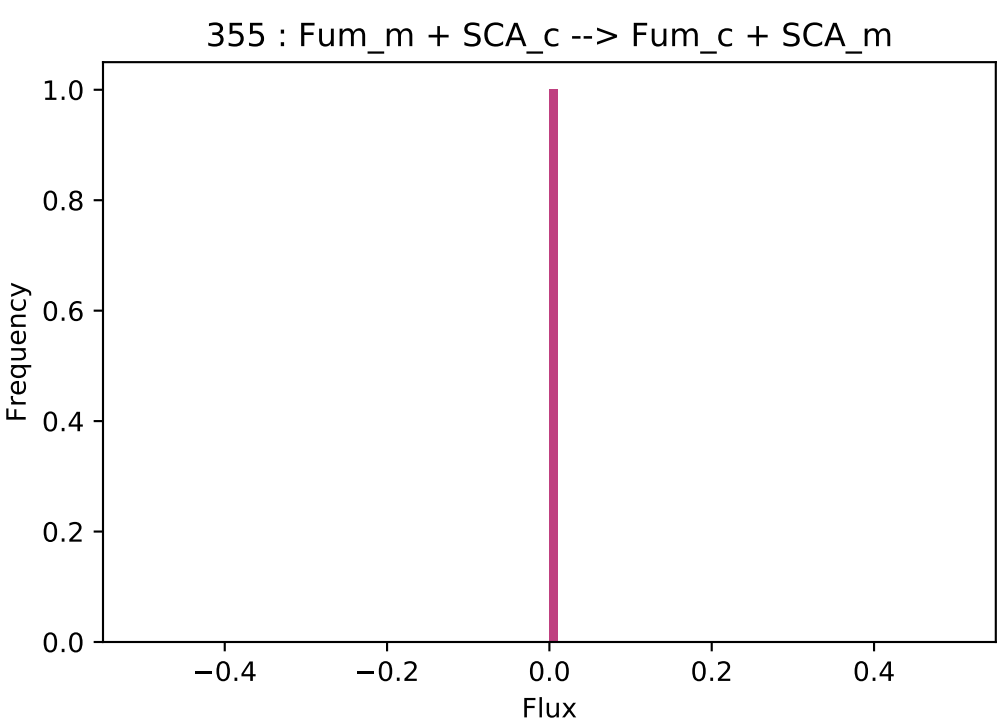

350 : OAA_c + iCit_m <=> OAA_m + iCit_c
Frequency
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
−1000
−750
−500
−250
0
250
500
750
1000
Flux

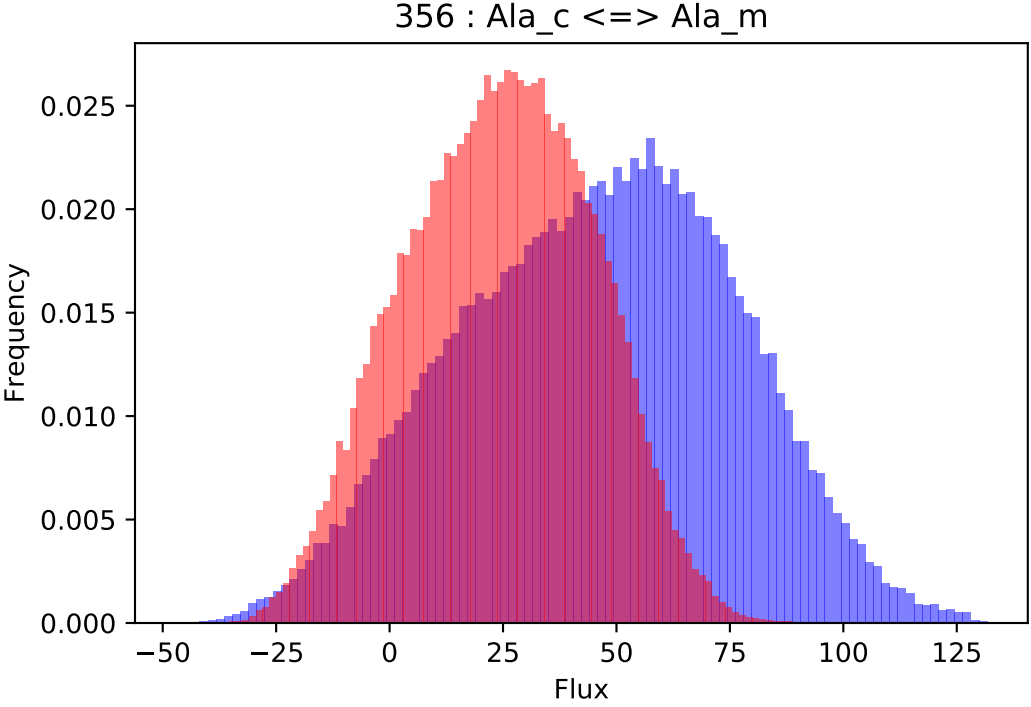

351 : OAA_c + cACN_m <=> OAA_m + cACN_c
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Frequency
−1000
−750
−500
−250
0
250
500
750
1000
Flux

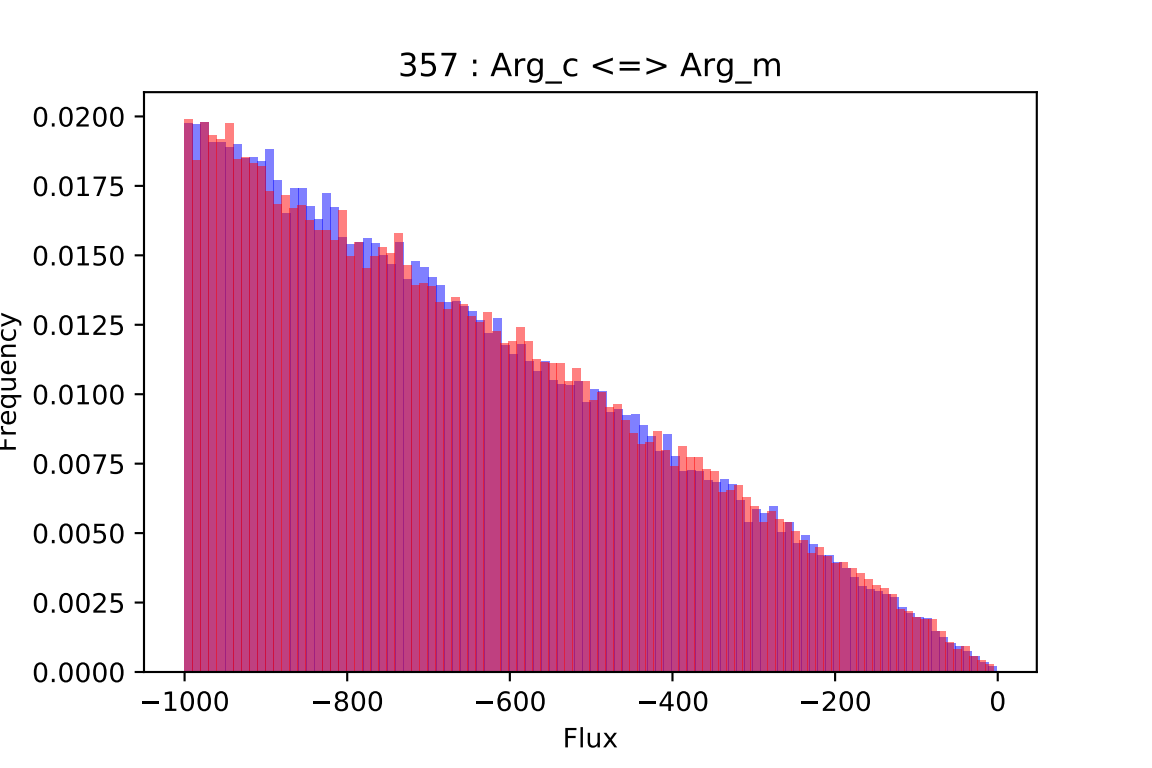

352 : Cit_m + SCA_c <=> Cit_c + SCA_m
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Frequency
−1000
−750
−500
−250
0
250
500
750
1000
Flux

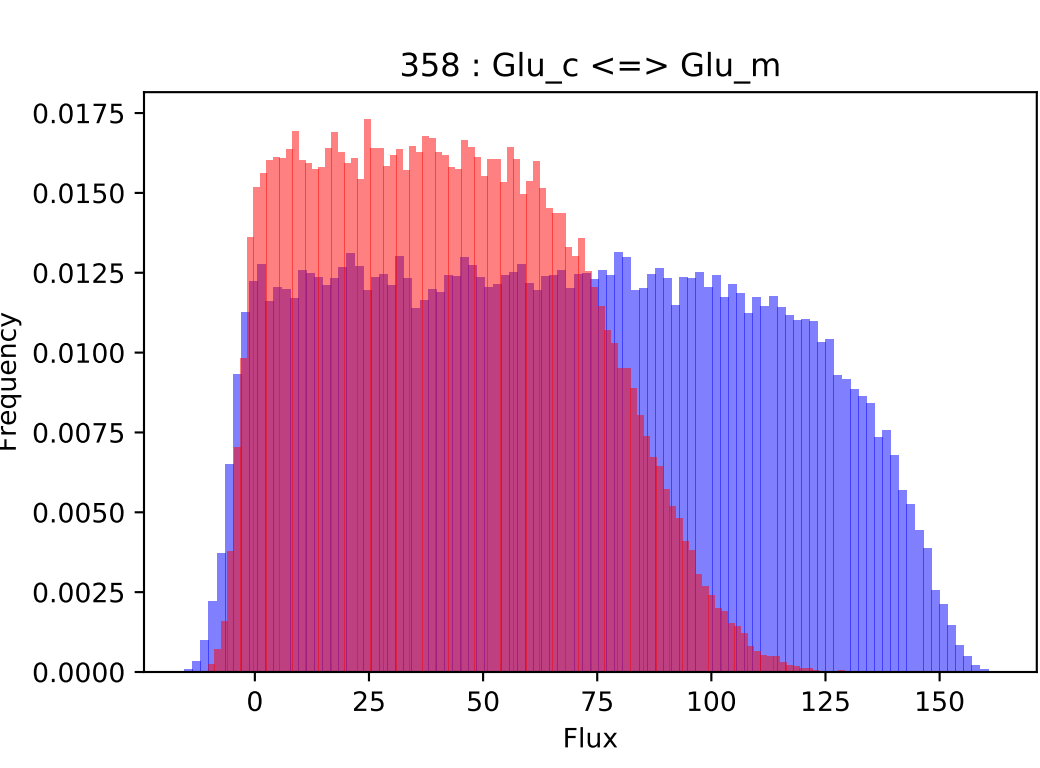

353 : SCA_c + iCit_m <=> SCA_m + iCit_c
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Frequency
−1000
−750
−500
−250
0
250
500
750
1000
Flux

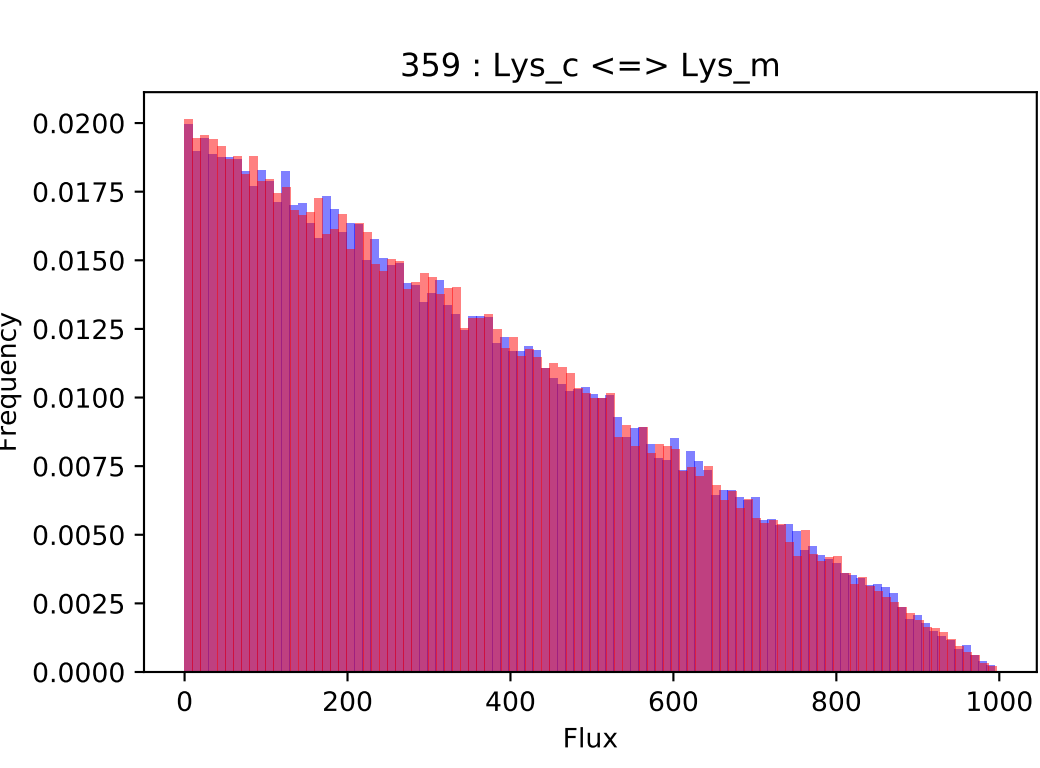

354 : SCA_c + cACN_m <=> SCA_m + cACN_c
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Frequency
−1000
−750
−500
−250
0
250
500
750
1000
Flux

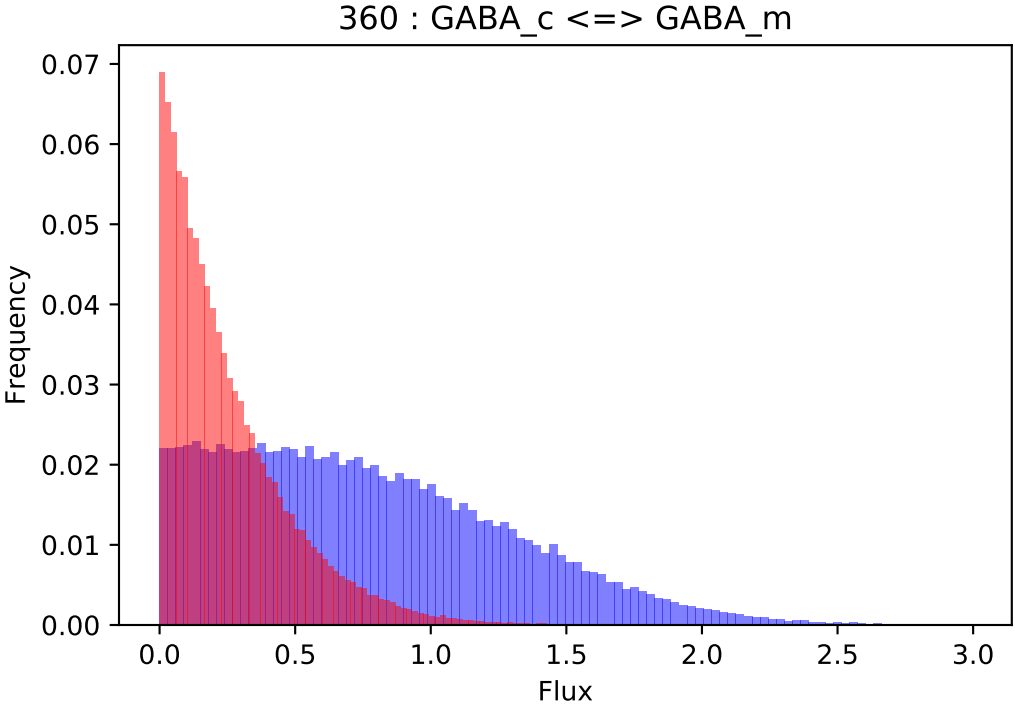

355 : Fum_m + SCA_c --> Fum_c + SCA_m
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

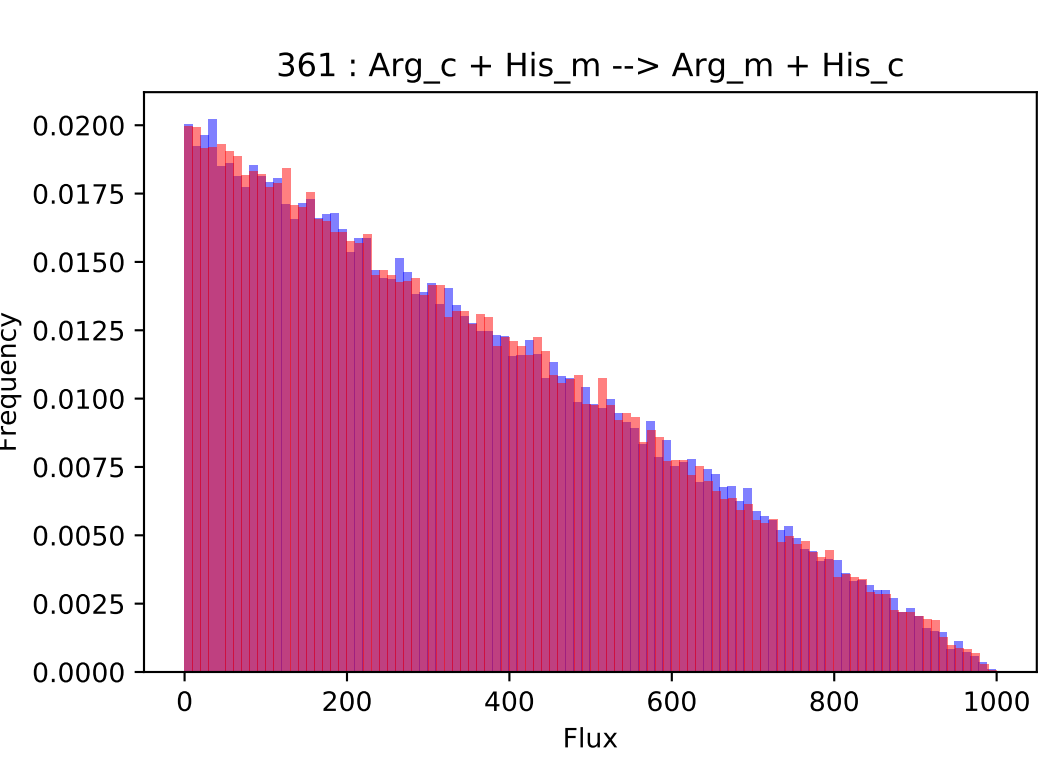

356 : Ala_c <=> Ala_m
Frequency
0.025
0.020
0.015
0.010
0.005
0.000
−50
−25
0
25
50
75
100
125
Flux

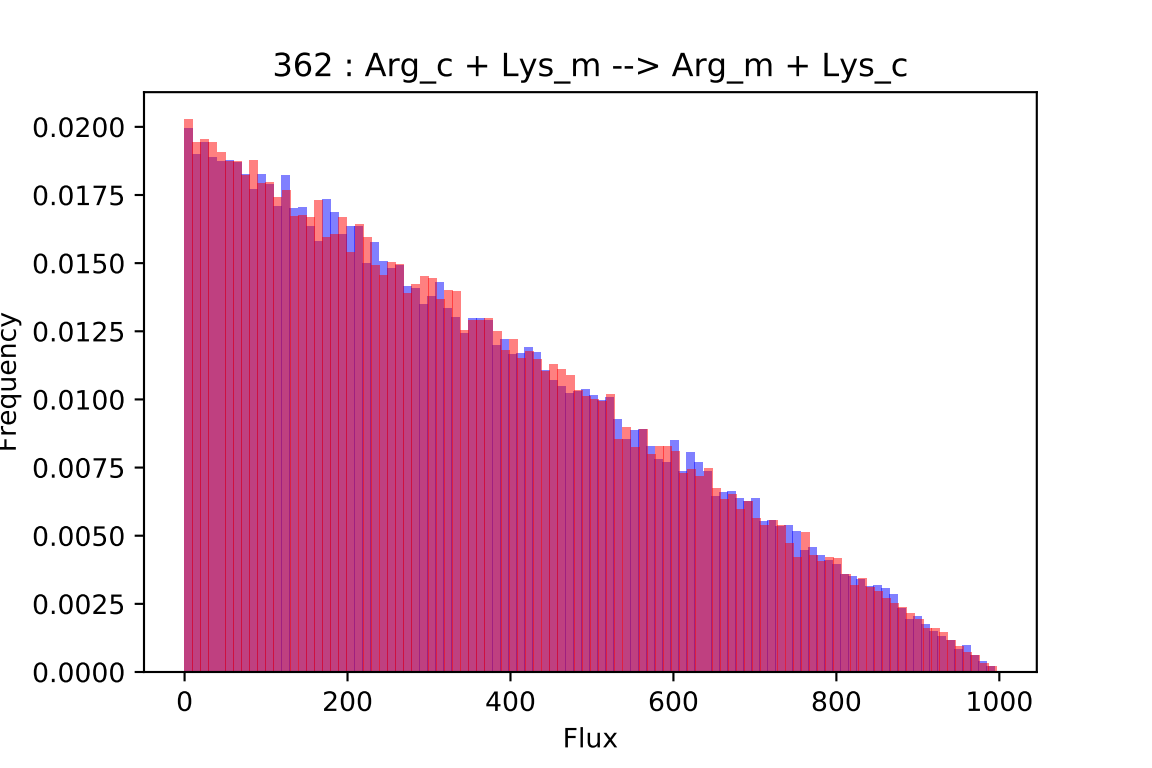

357 : Arg_c <=> Arg_m
0.0200
0.0175
0.0150
0.0125
0.0100
0.0075
0.0050
0.0025
0.0000
Frequency
−1000
−800
−600
−400
−200
0
Flux

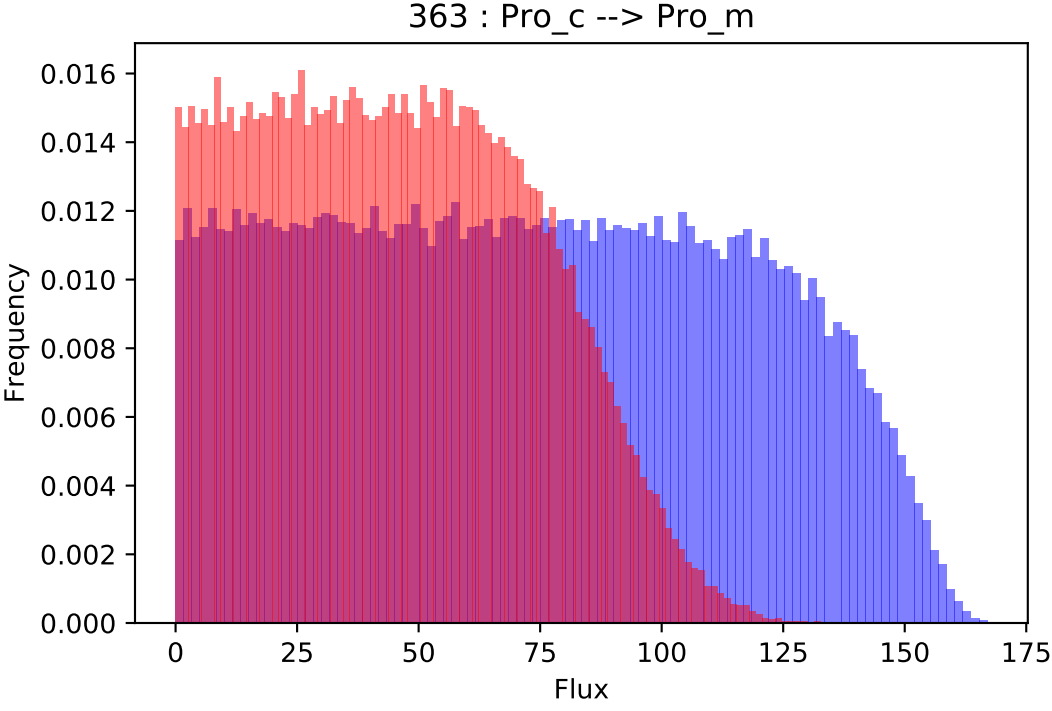

358 : Glu_c <=> Glu_m
Frequency
0.0175
0.0150
0.0125
0.0100
0.0075
0.0050
0.0025
0.0000
0
25
50
75
100
125
150
Flux

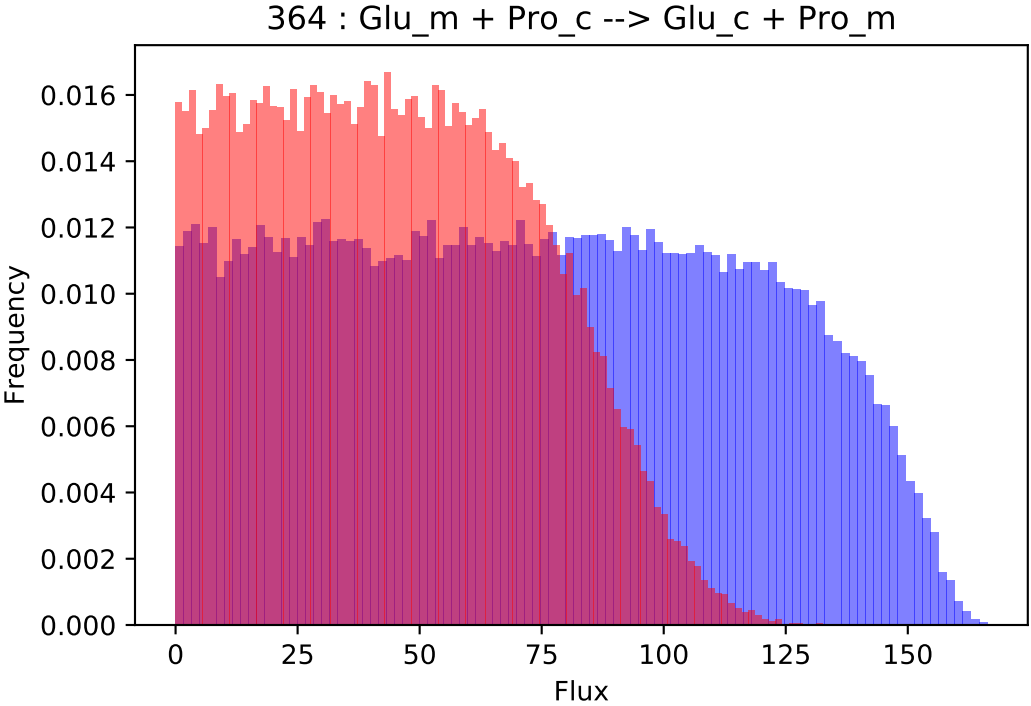

359 : Lys_c <=> Lys_m
Frequency
0.0200
0.0175
0.0150
0.0125
0.0100
0.0075
0.0050
0.0025
0.0000
0
200
400
600
800
1000
Flux

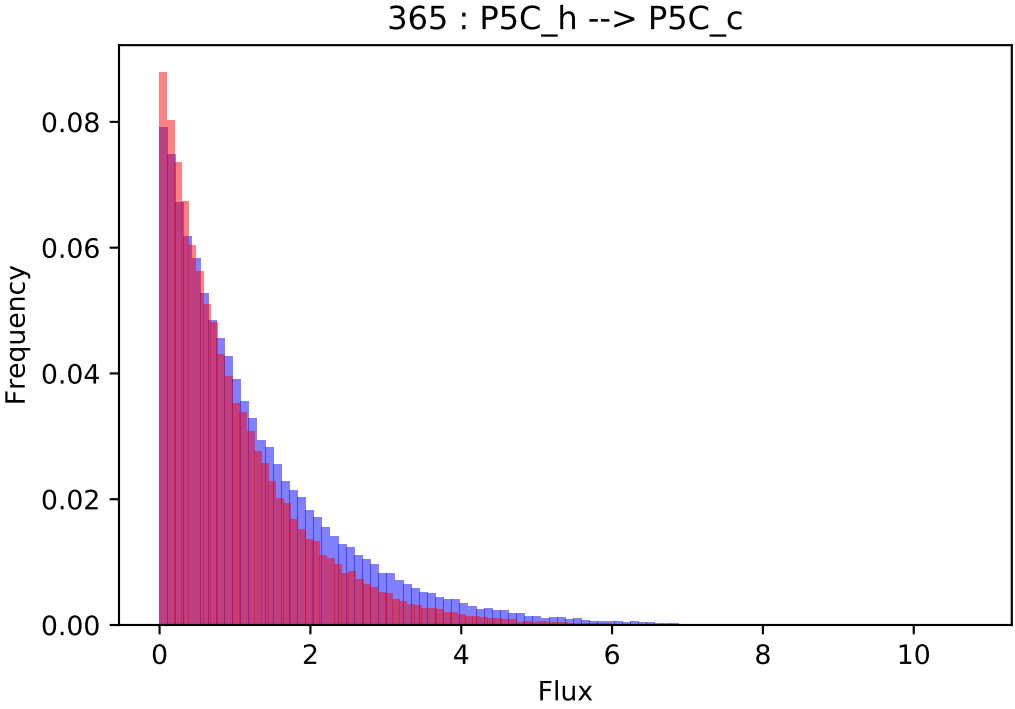

360 : GABA_c <=> GABA_m
Frequency
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Flux

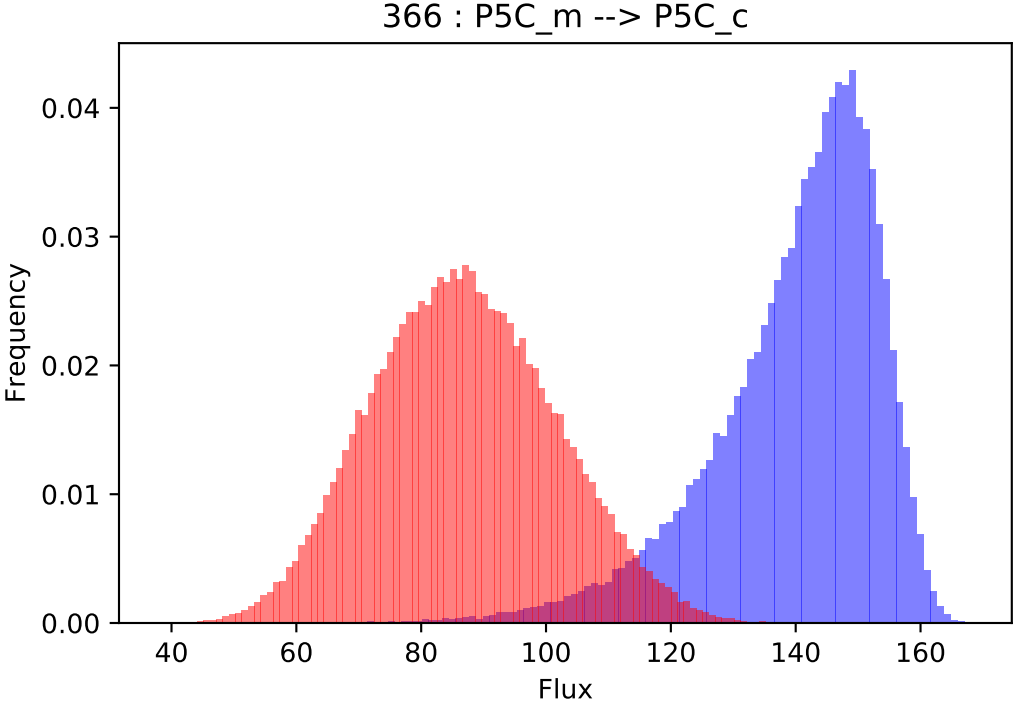

361 : Arg_c + His_m --> Arg_m + His_c
Frequency
0.0200
0.0175
0.0150
0.0125
0.0100
0.0075
0.0050
0.0025
0.0000
0
200
400
600
800
1000
Flux

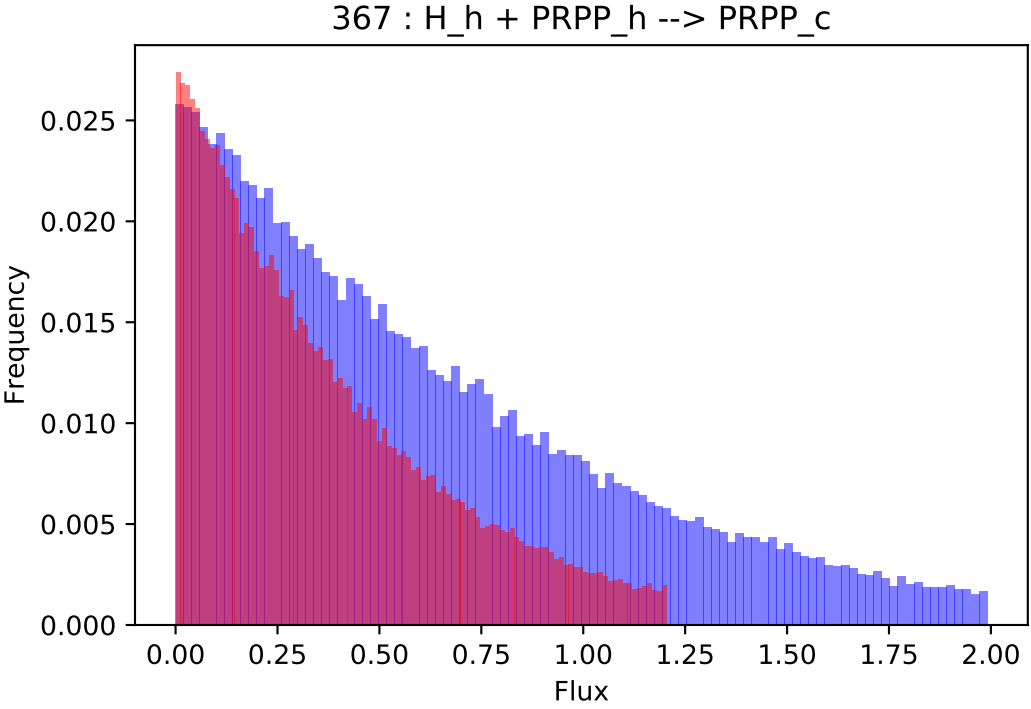

362 : Arg_c + Lys_m --> Arg_m + Lys_c
Frequency
0.0200
0.0175
0.0150
0.0125
0.0100
0.0075
0.0050
0.0025
0.0000
0
200
400
600
800
1000
Flux

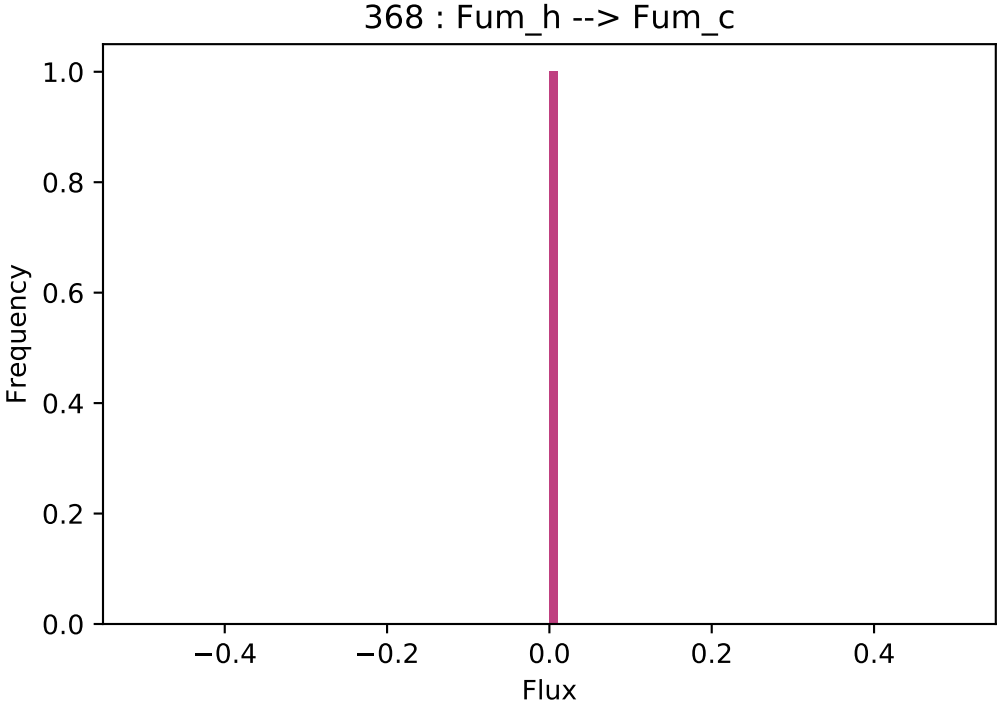

363 : Pro_c --> Pro_m
Frequency
0.016
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
0
25
50
75
100
125
150
175
Flux

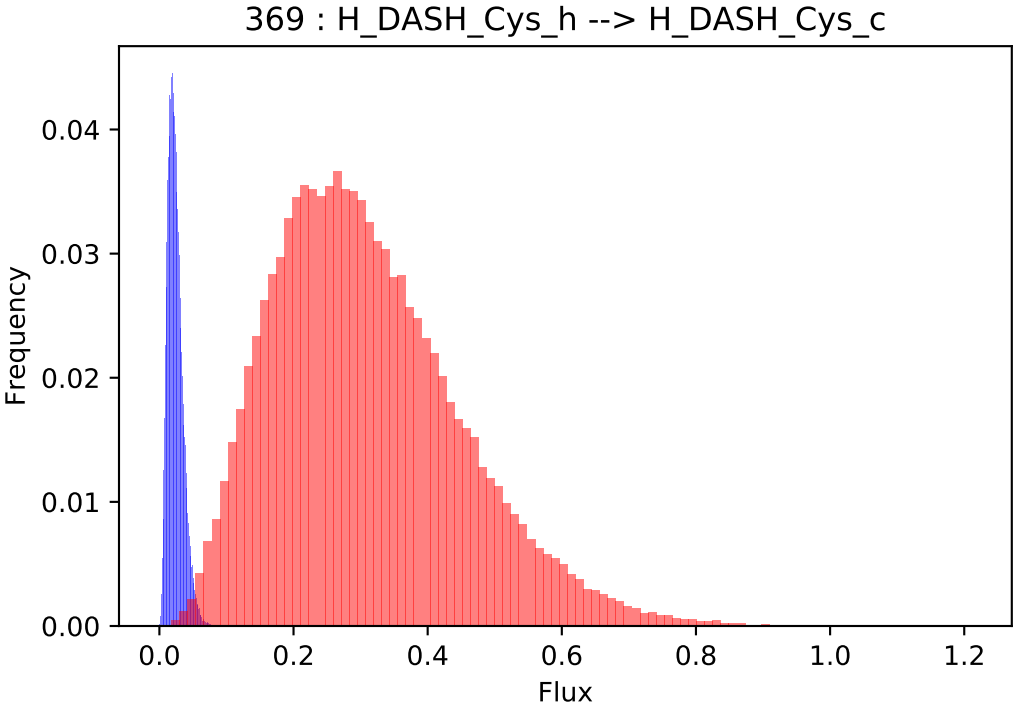

364 : Glu_m + Pro_c --> Glu_c + Pro_m
Frequency
0.016
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
0
25
50
75
100
125
150
Flux

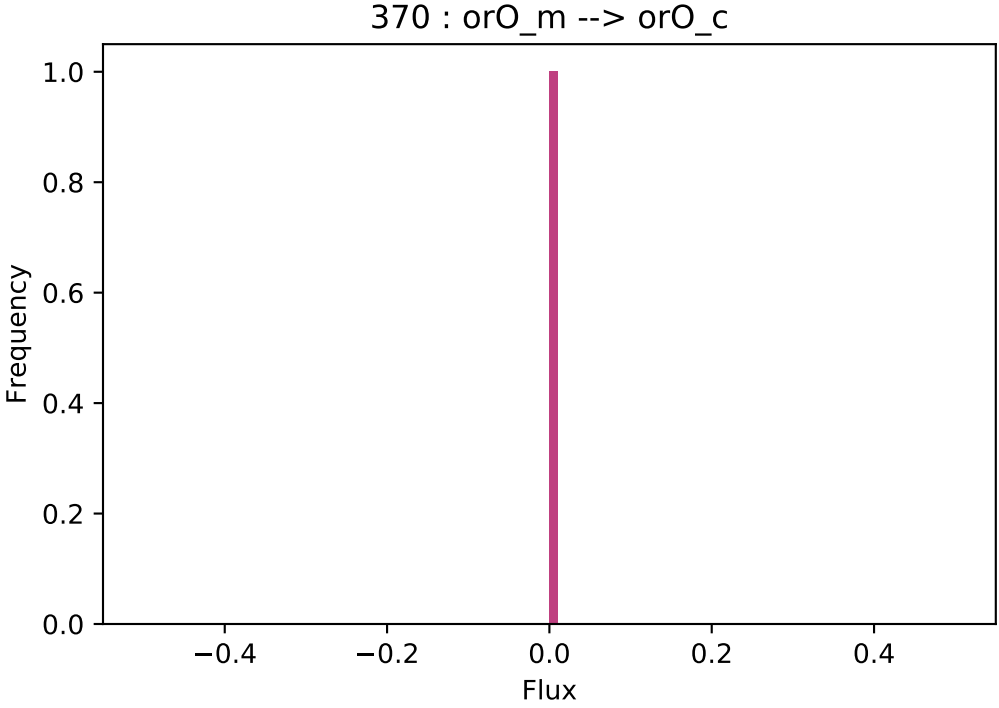

365 : P5C_h --> P5C_c
Frequency
0.00
0.02
0.04
0.06
0.08
0
2
4
6
8
10
Flux

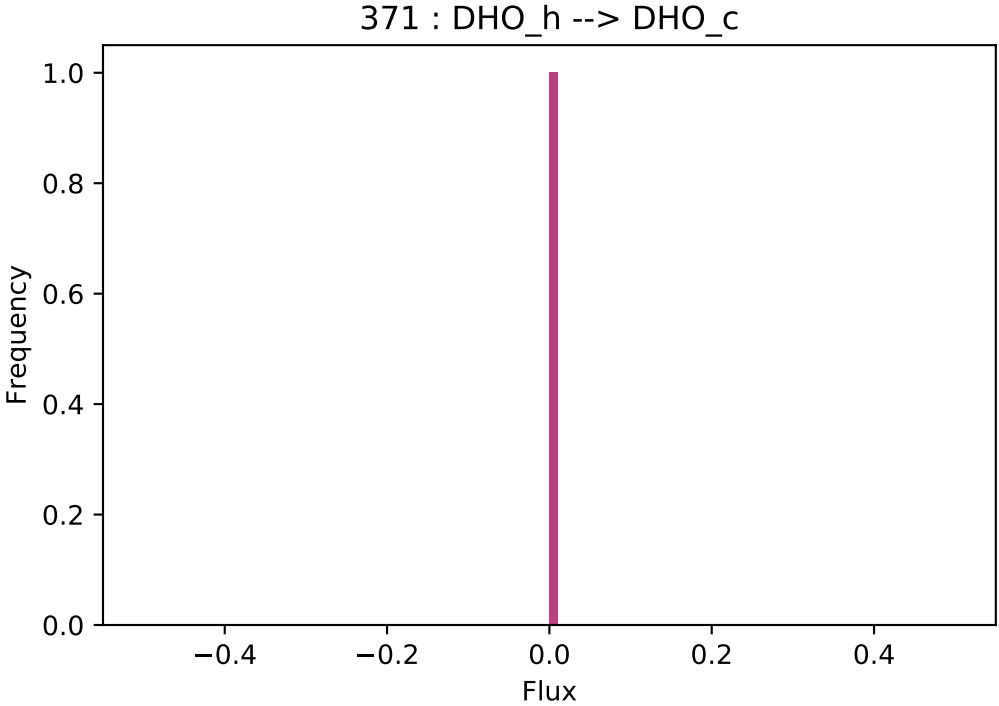

366 : P5C_m --> P5C_c
Frequency
0.00
0.01
0.02
0.03
0.04
40
60
80
100
120
140
160
Flux

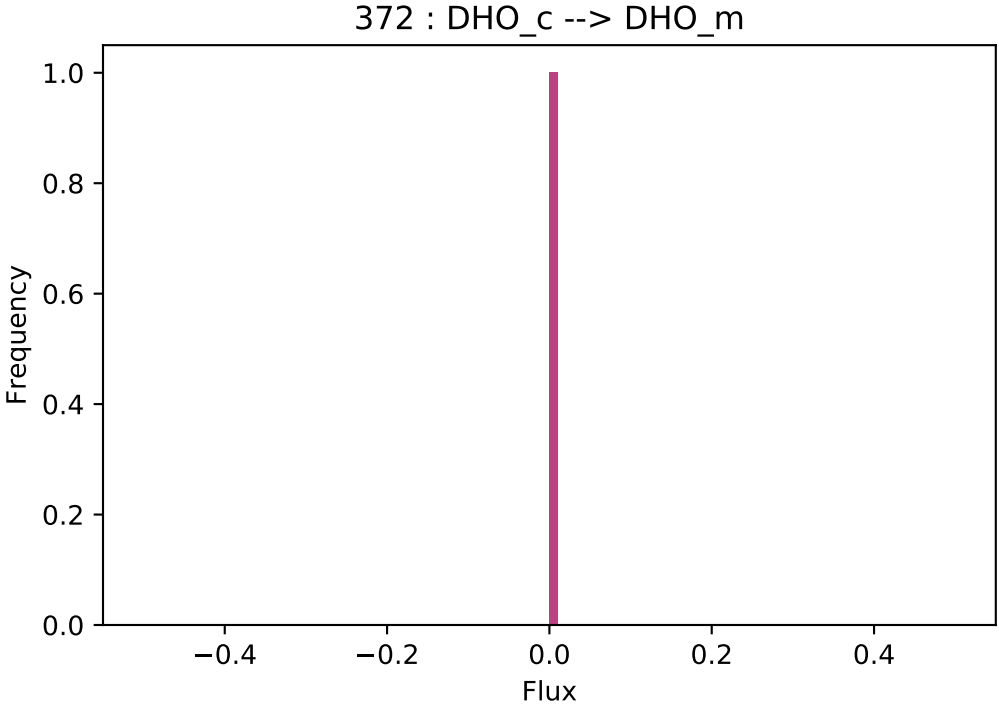

367 : H_h + PRPP_h --> PRPP_c
Frequency
0.025
0.020
0.015
0.010
0.005
0.000
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
Flux

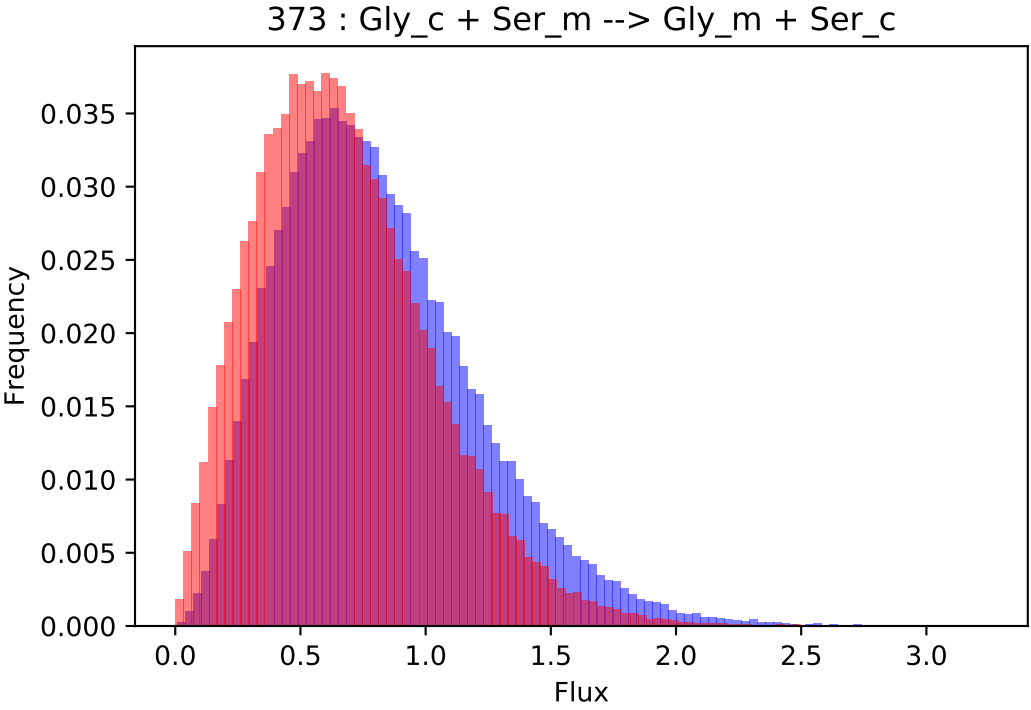

368 : Fum_h --> Fum_c
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

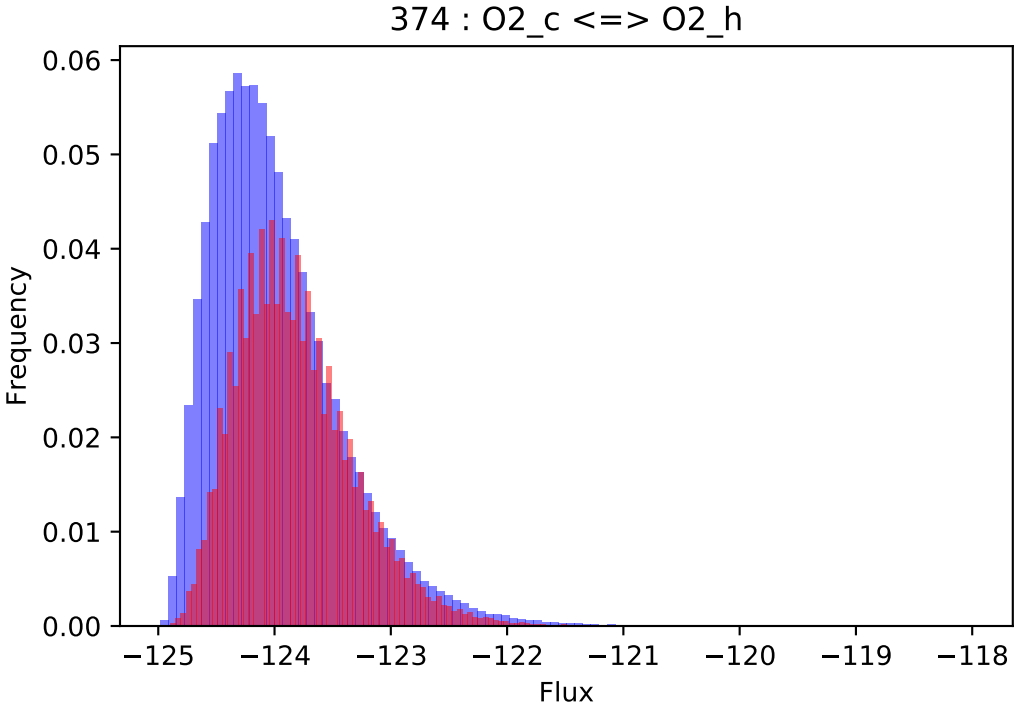

369 : H_DASH_Cys_h --> H_DASH_Cys_c
Frequency
0.00
0.01
0.02
0.03
0.04
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

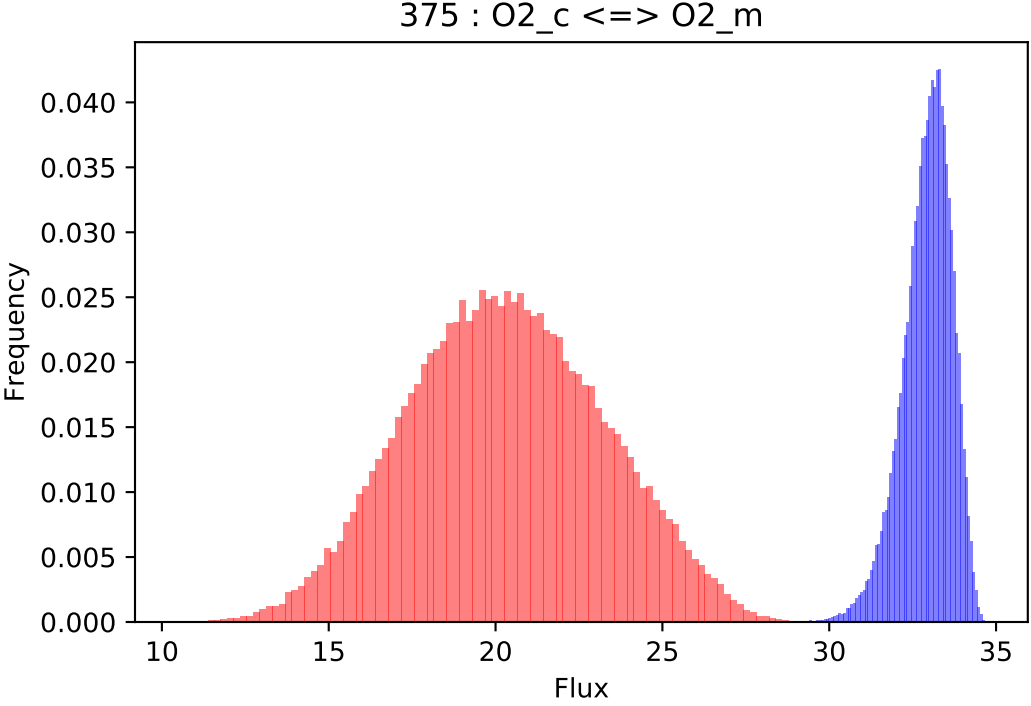

370 : orO_m --> orO_c
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

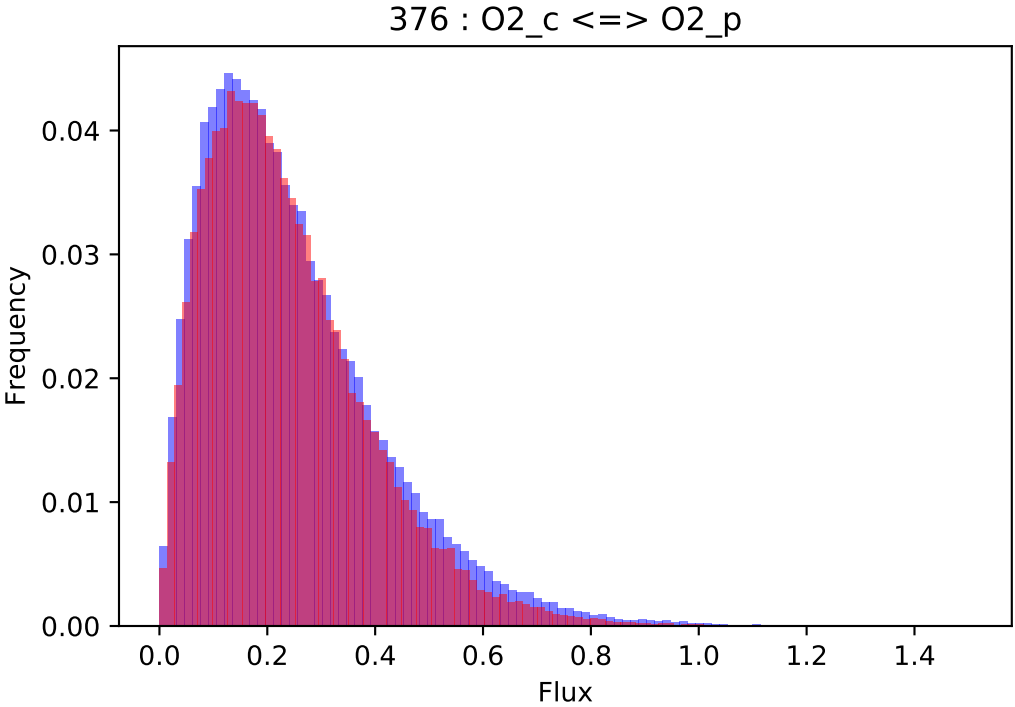

371 : DHO_h --> DHO_c
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

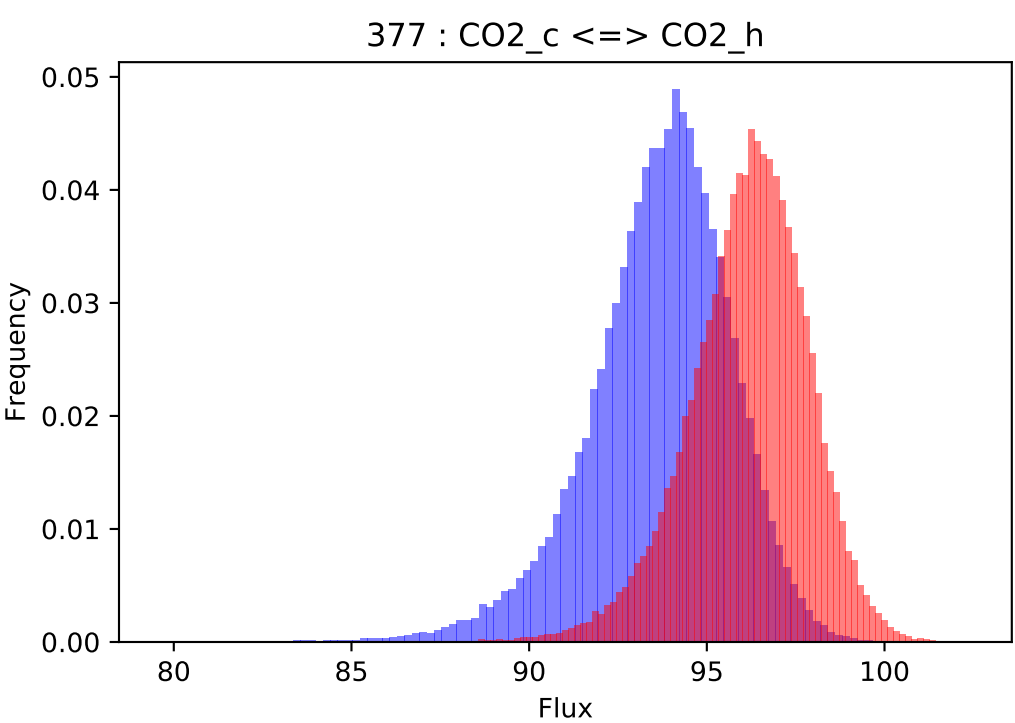

372 : DHO_c --> DHO_m
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

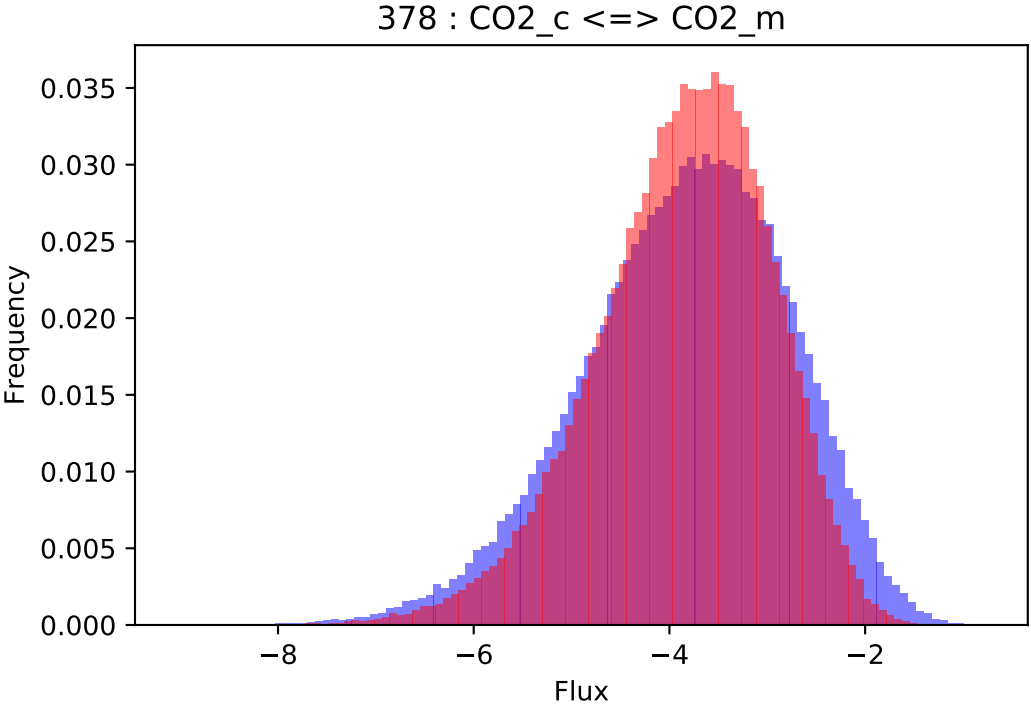

373 : Gly_c + Ser_m --> Gly_m + Ser_c
Frequency
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Flux

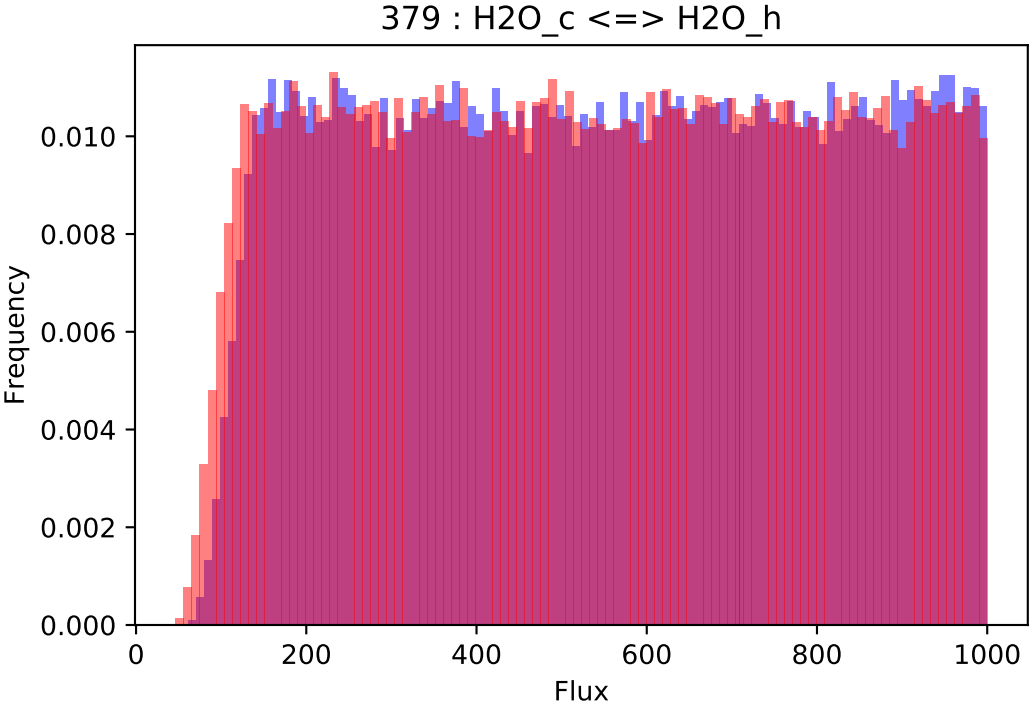

374 : O2_c <=> O2_h
0.06
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−125
−124
−123
−122
−121
−120
−119
−118
Flux

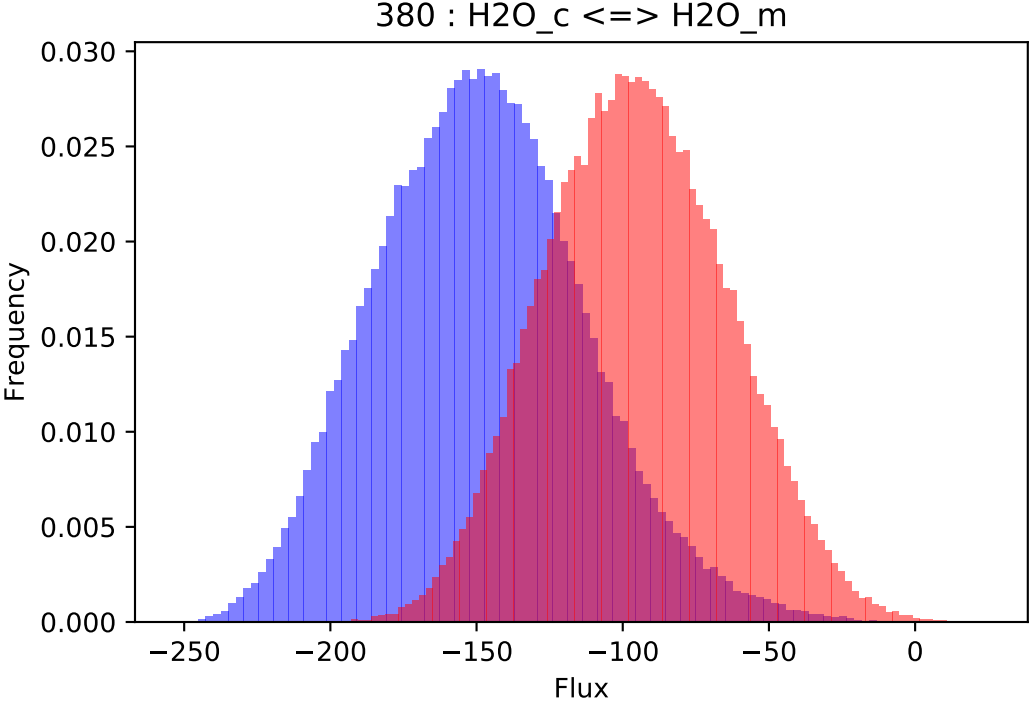

375 : O2_c <=> O2_m
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
10
15
20
25
30
35
Flux

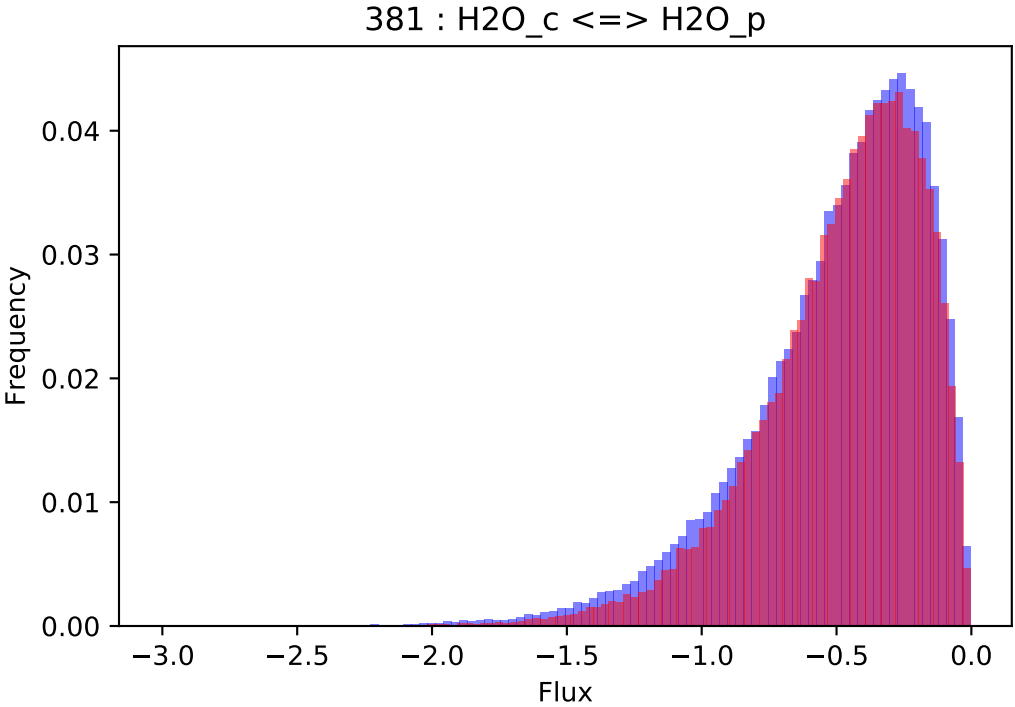

376 : O2_c <=> O2_p
Frequency
0.00
0.01
0.02
0.03
0.04
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
Flux

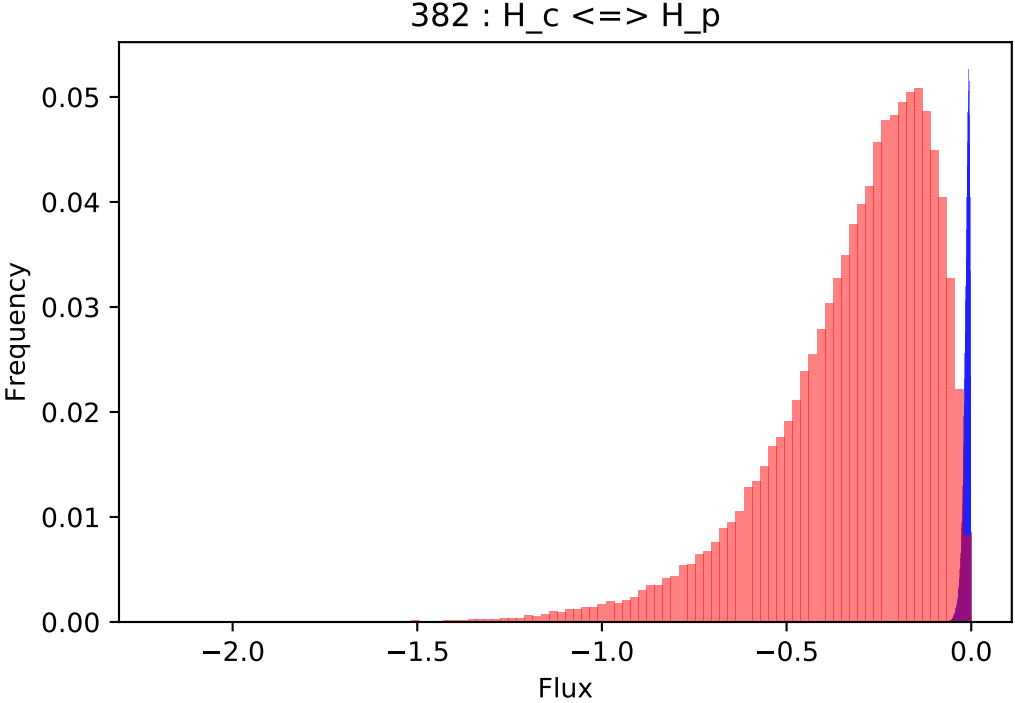

377 : CO2_c <=> CO2_h
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
80
85
90
95
100
Flux

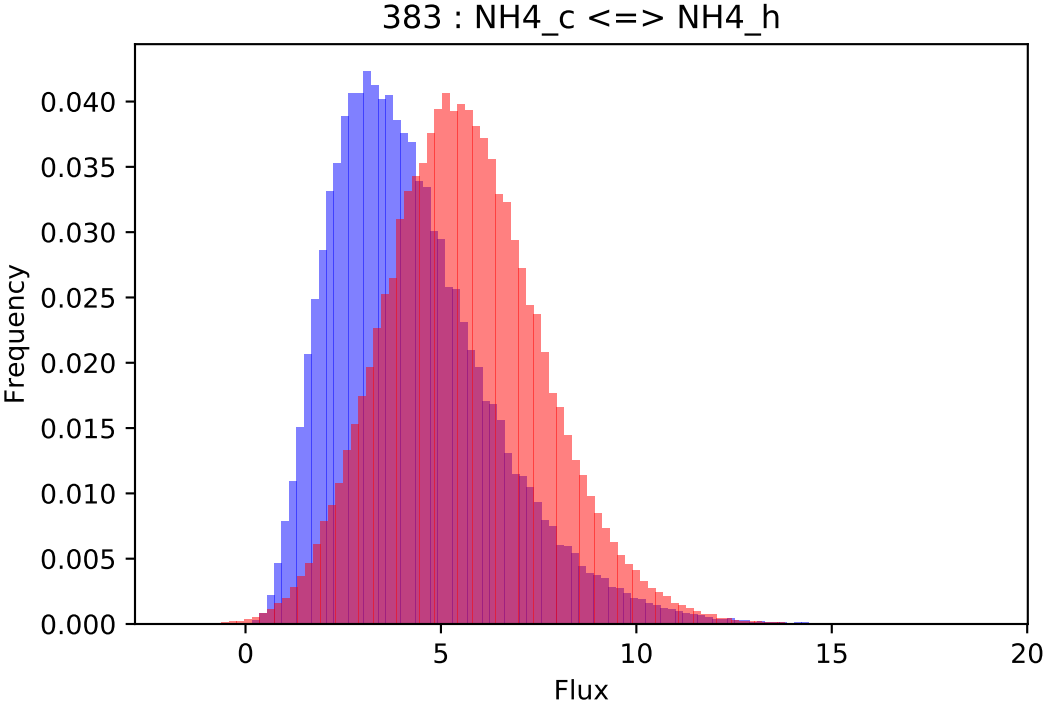

378 : CO2_c <=> CO2_m
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
−8
−6
−4
−2
Flux

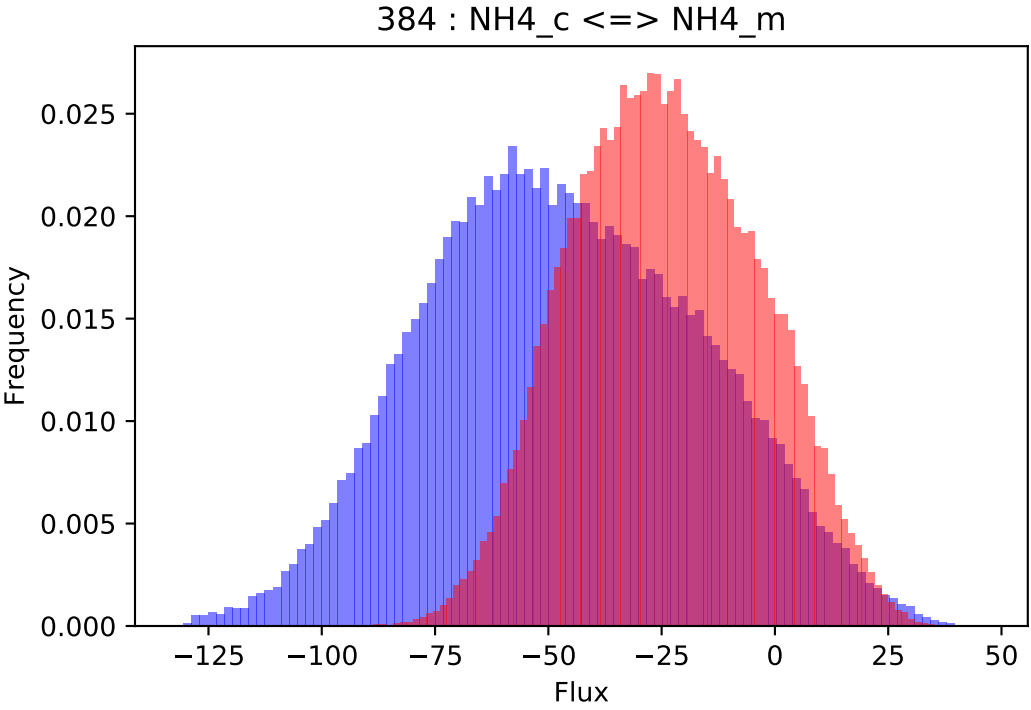

379 : H2O_c <=> H2O_h
Frequency
0.000
0.002
0.004
0.006
0.008
0.010
0
200
400
600
800
1000
Flux

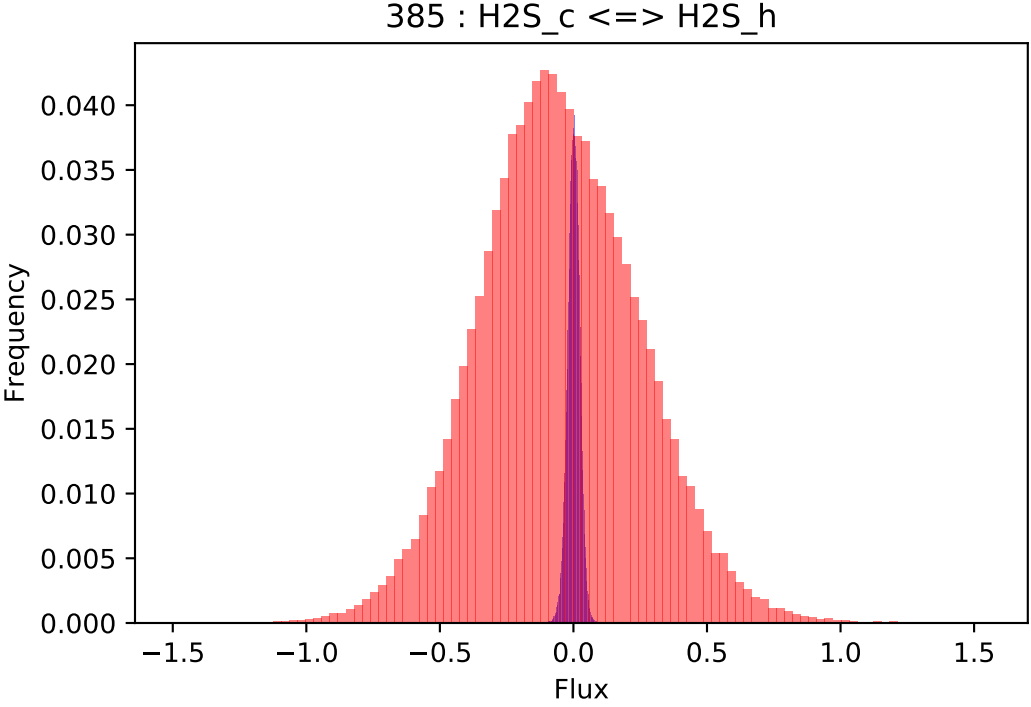

380 : H2O_c <=> H2O_m
0.030
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
−250
−200
−150
−100
−50
0
Flux

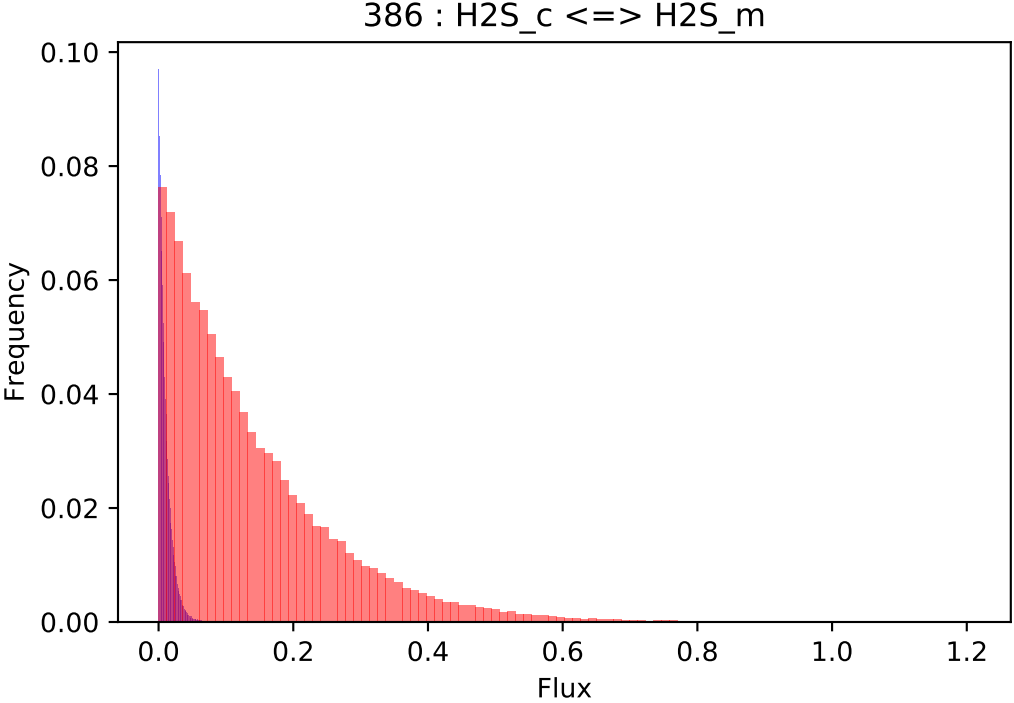

381 : H2O_c <=> H2O_p
Frequency
0.00
0.01
0.02
0.03
0.04
−3.0
−2.5
−2.0
−1.5
−1.0
−0.5
0.0
Flux

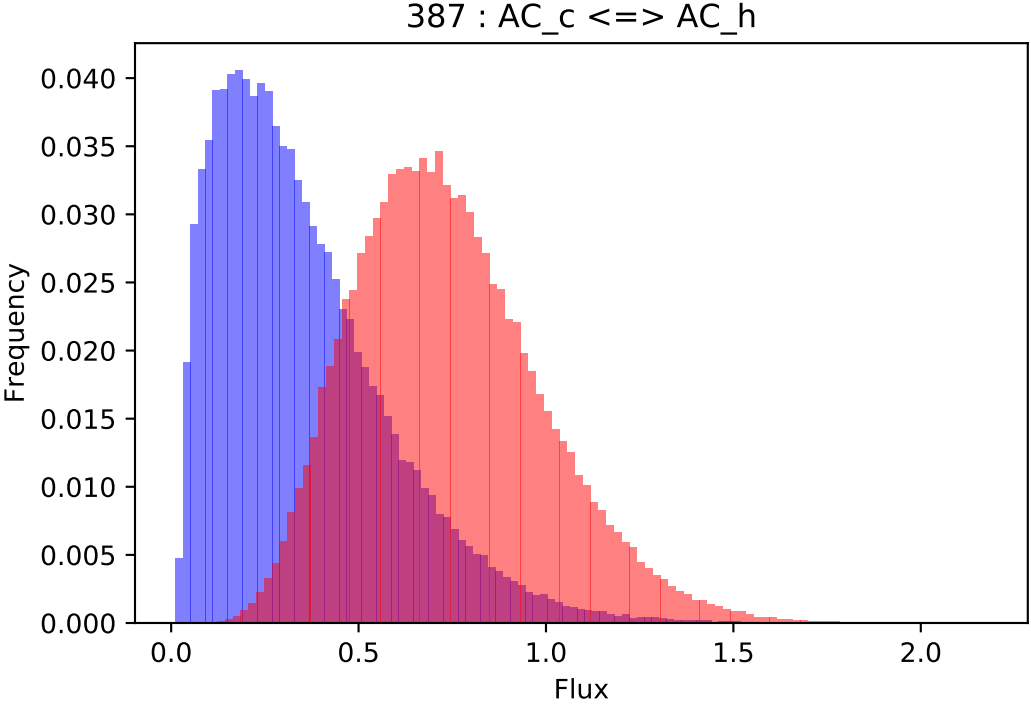

382 : H_c <=> H_p
Frequency
0.00
0.01
0.02
0.03
0.04
0.05
−2.0
−1.5
−1.0
−0.5
0.0
Flux

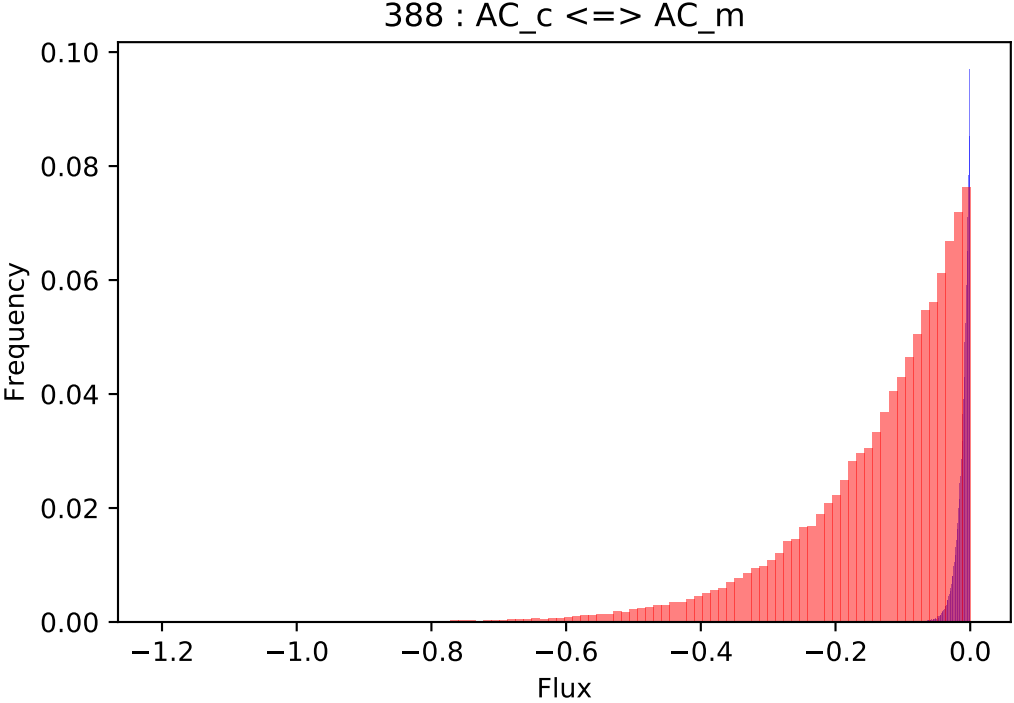

383 : NH4_c <=> NH4_h
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0
5
10
15
20
Flux

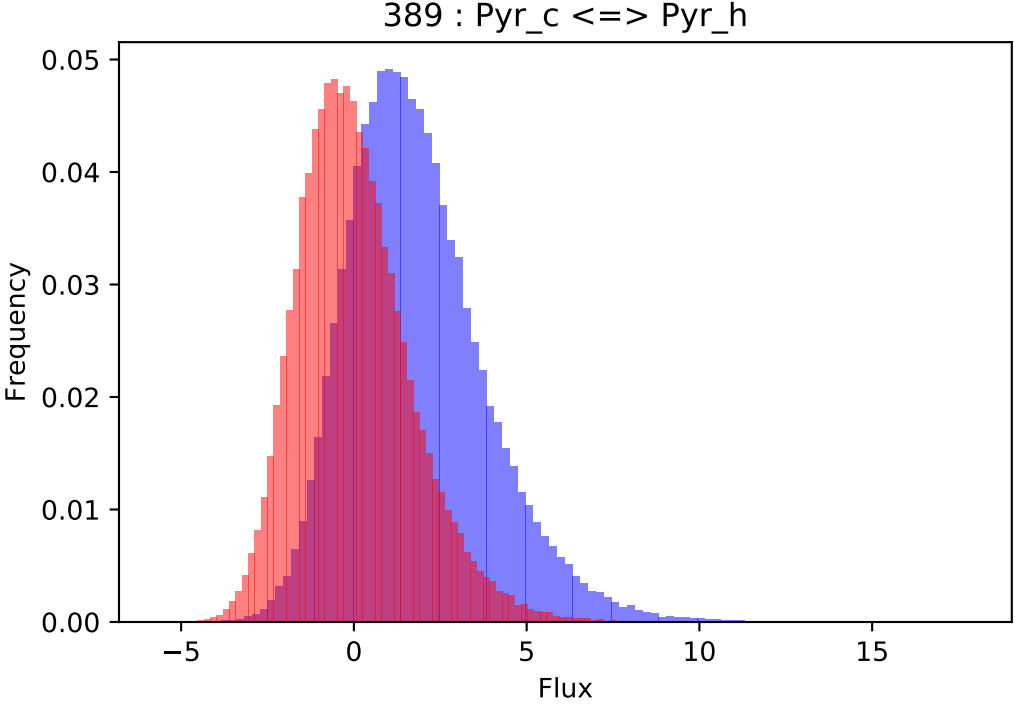

384 : NH4_c <=> NH4_m
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
−125
−100
−75
−50
−25
0
25
50
Flux

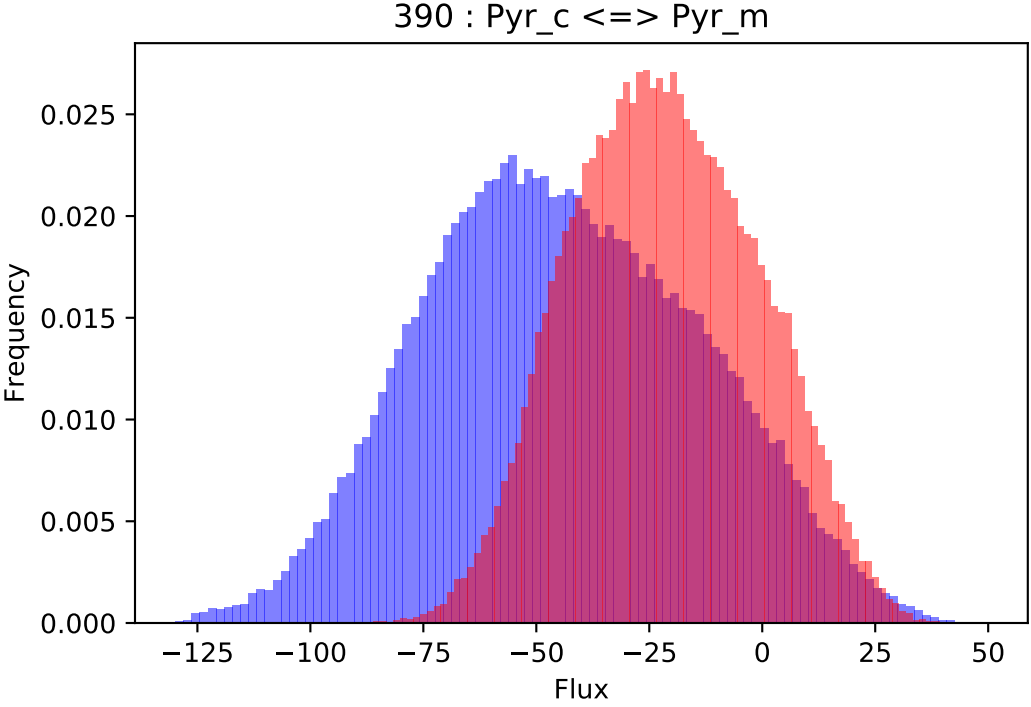

385 : H2S_c <=> H2S_h
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
Flux

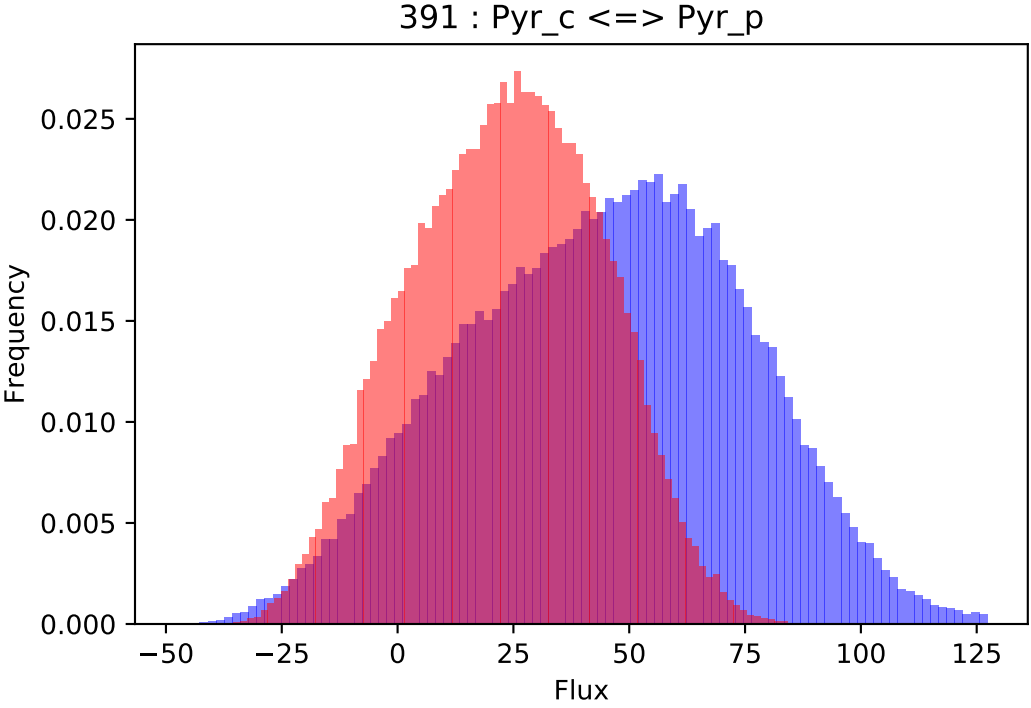

386 : H2S_c <=> H2S_m
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

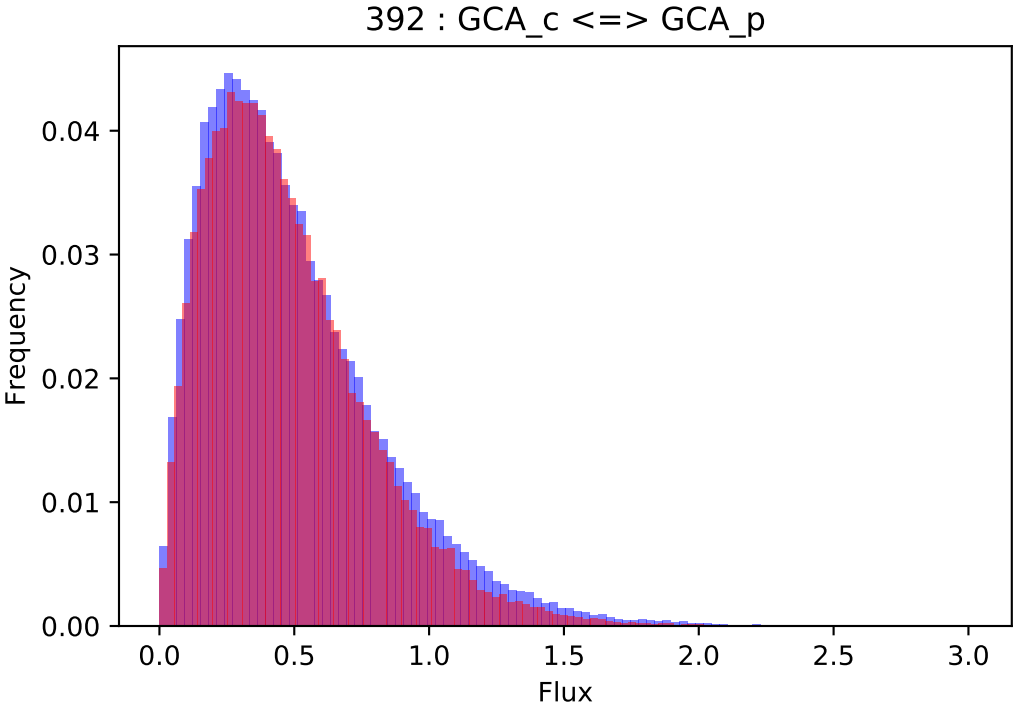

387 : AC_c <=> AC_h
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.5
1.0
1.5
2.0
Flux

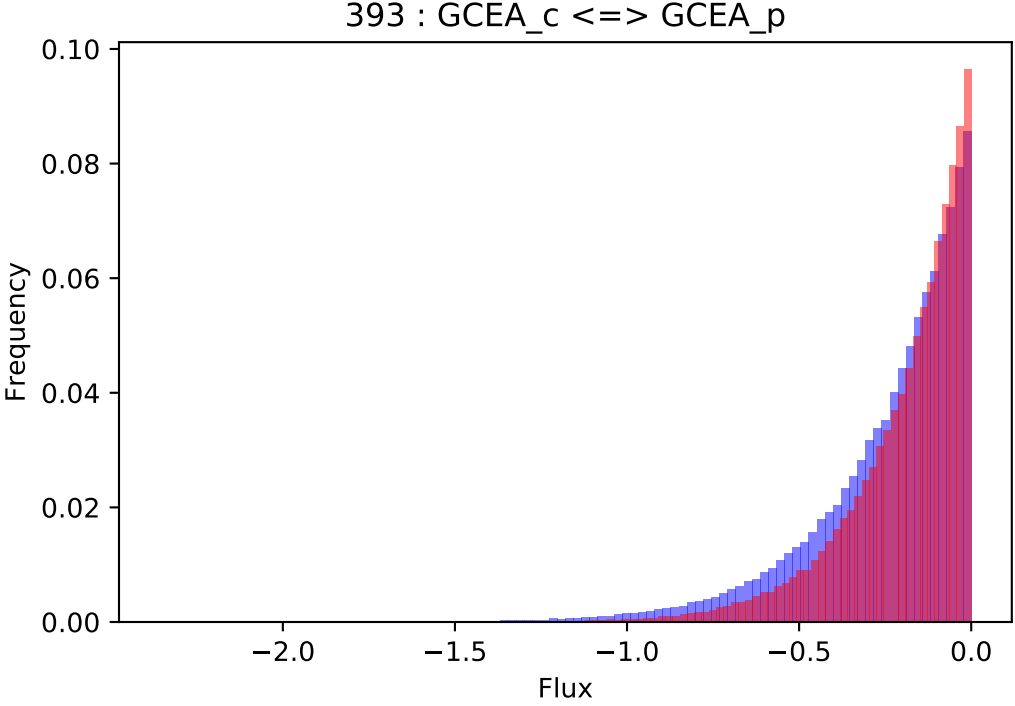

388 : AC_c <=> AC_m
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
−1.2
−1.0
−0.8
−0.6
−0.4
−0.2
0.0
Flux

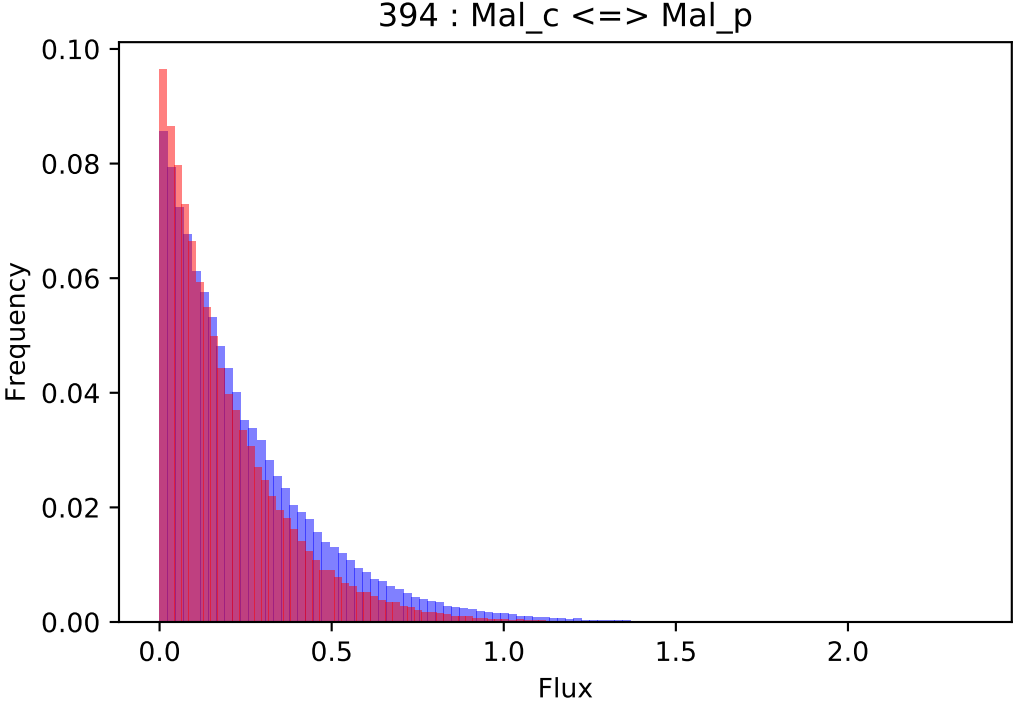

389 : Pyr_c <=> Pyr_h
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−5
0
5
10
15
Flux

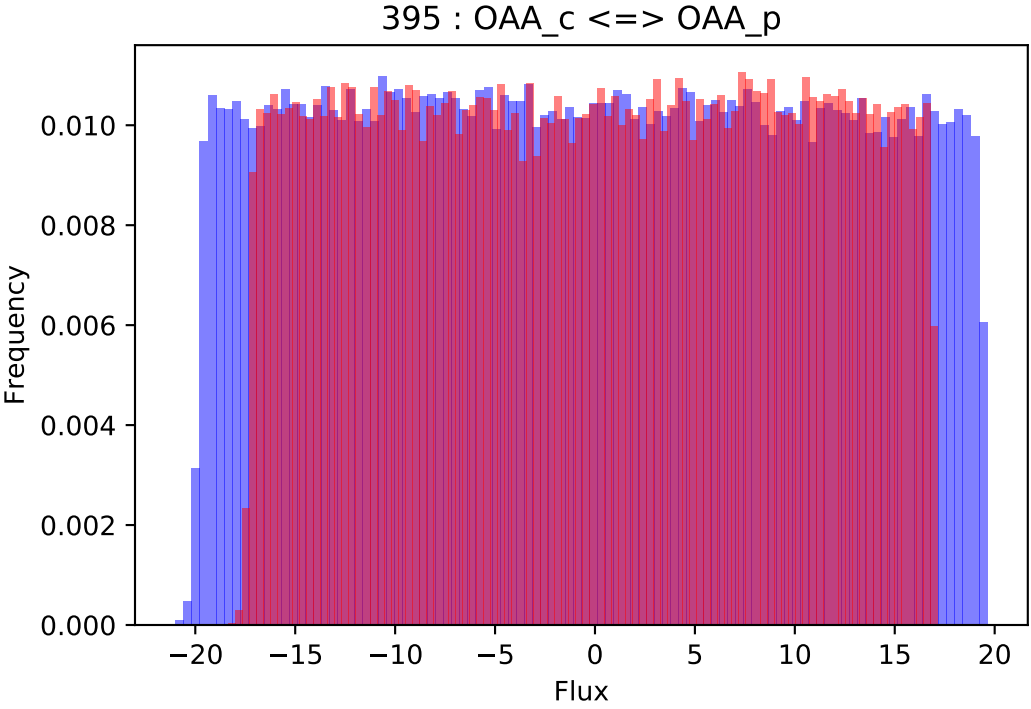

390 : Pyr_c <=> Pyr_m
Frequency
0.025
0.020
0.015
0.010
0.005
0.000
−125
−100
−75
−50
−25
0
25
50
Flux

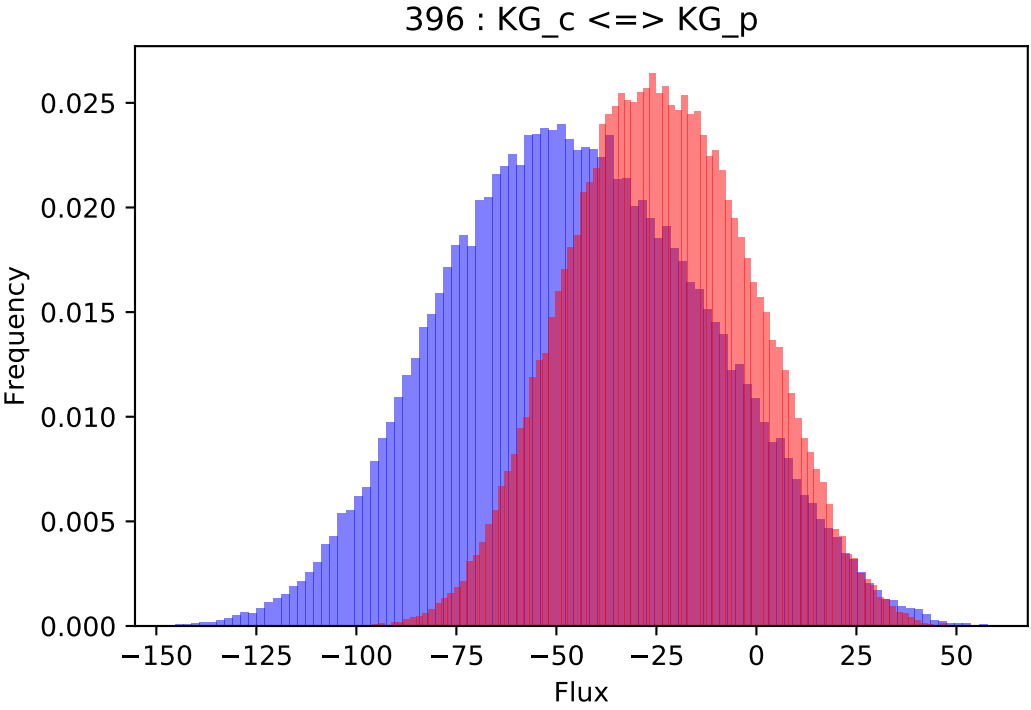

391 : Pyr_c <=> Pyr_p
Frequency
0.025
0.020
0.015
0.010
0.005
0.000
−50
−25
0
25
50
75
100
125
Flux

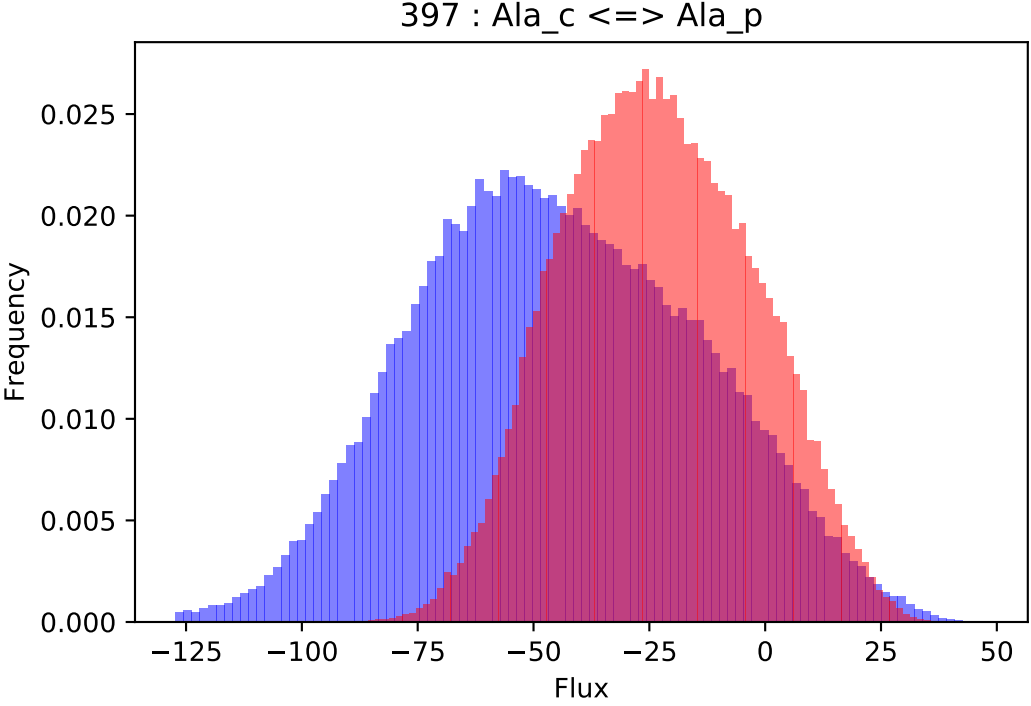

392 : GCA_c <=> GCA_p
Frequency
0.00
0.01
0.02
0.03
0.04
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Flux

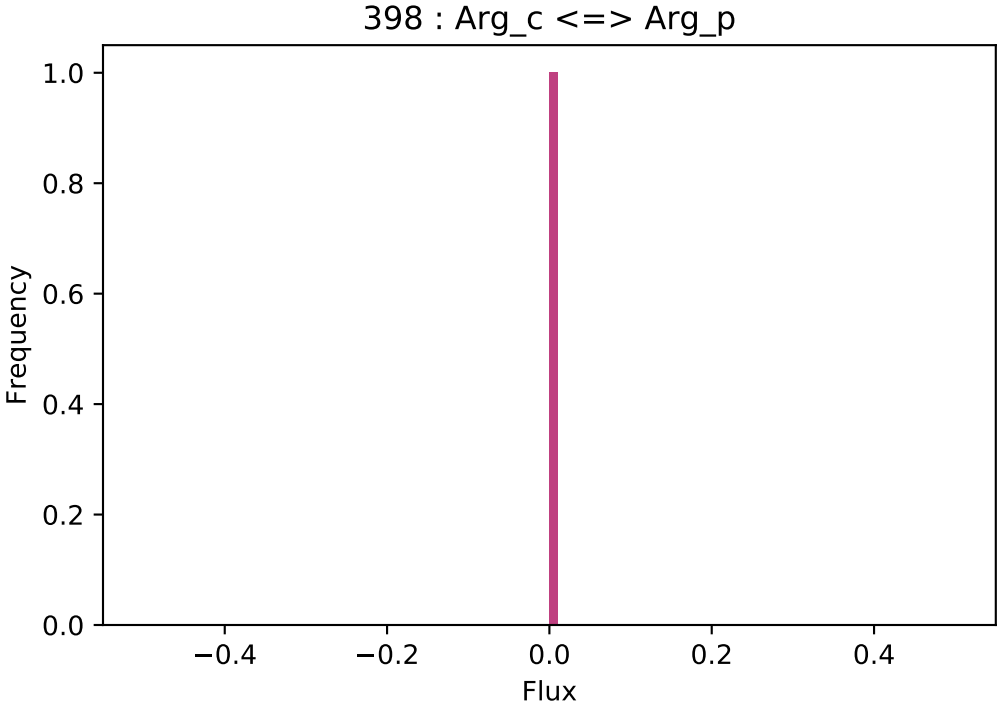

393 : GCEA_c <=> GCEA_p
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
−2.0
−1.5
−1.0
−0.5
0.0
Flux

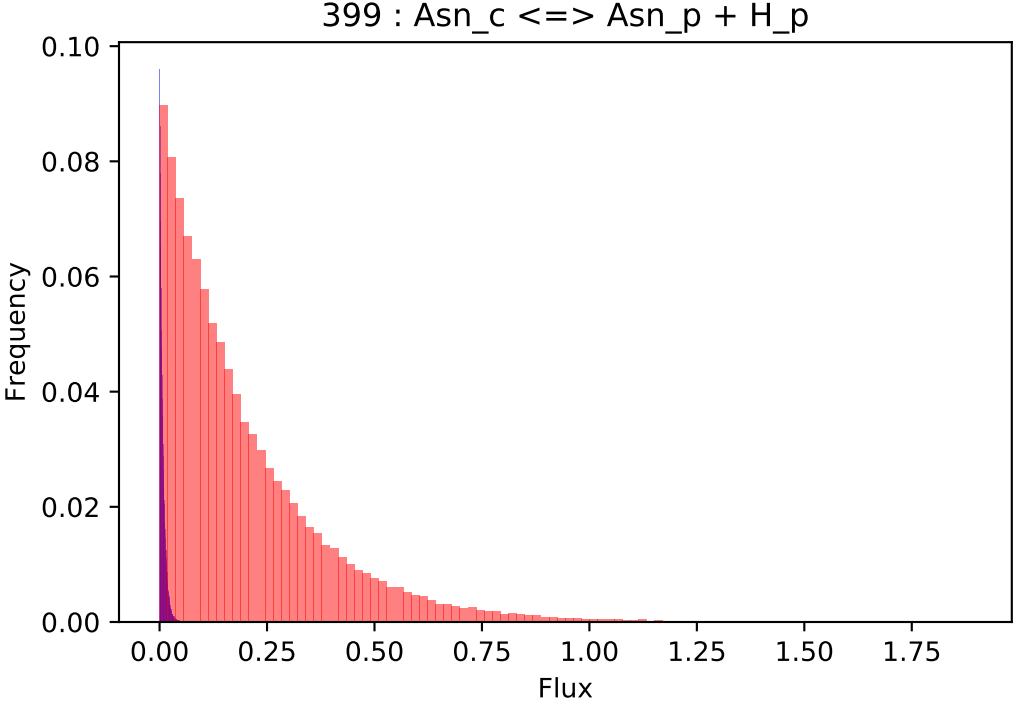

394 : Mal_c <=> Mal_p
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.5
1.0
1.5
2.0
Flux

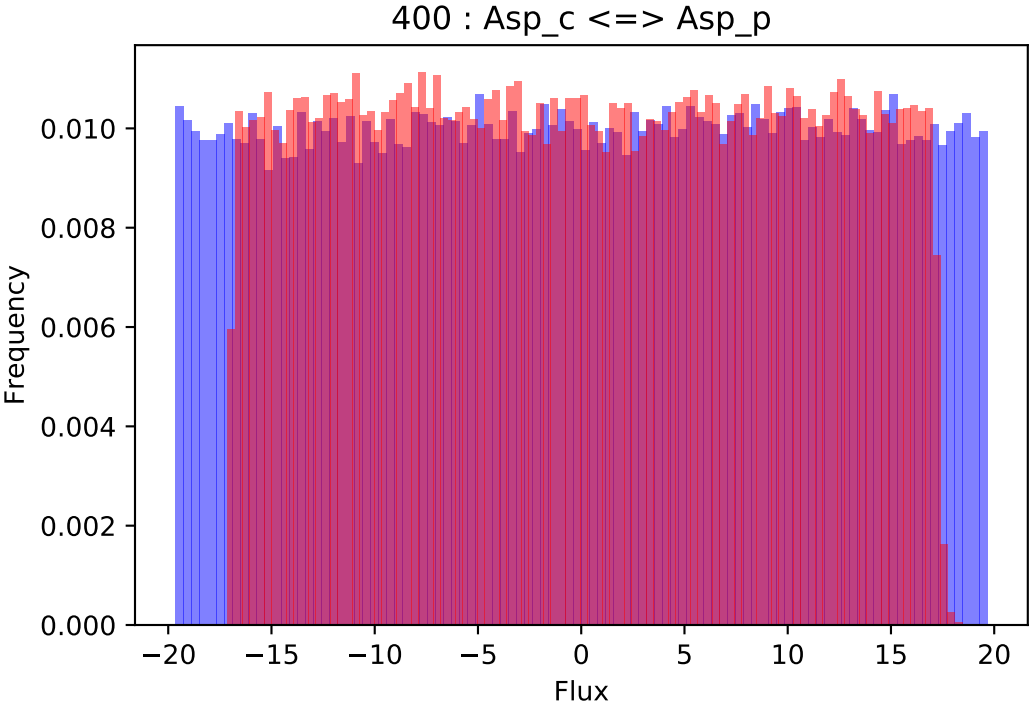

395 : OAA_c <=> OAA_p
0.010
0.008
0.006
0.004
0.002
0.000
Frequency
−20
−15
−10
−5
0
5
10
15
20
Flux

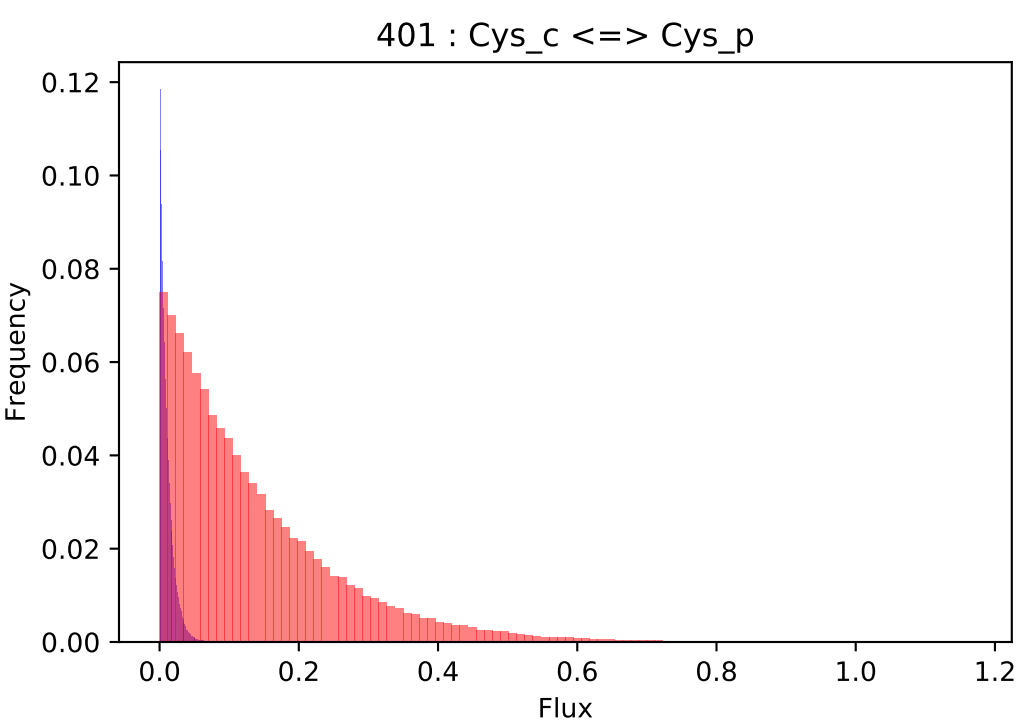

396 : KG_c <=> KG_p
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
−150
−125
−100
−75
−50
−25
0
25
50
Flux

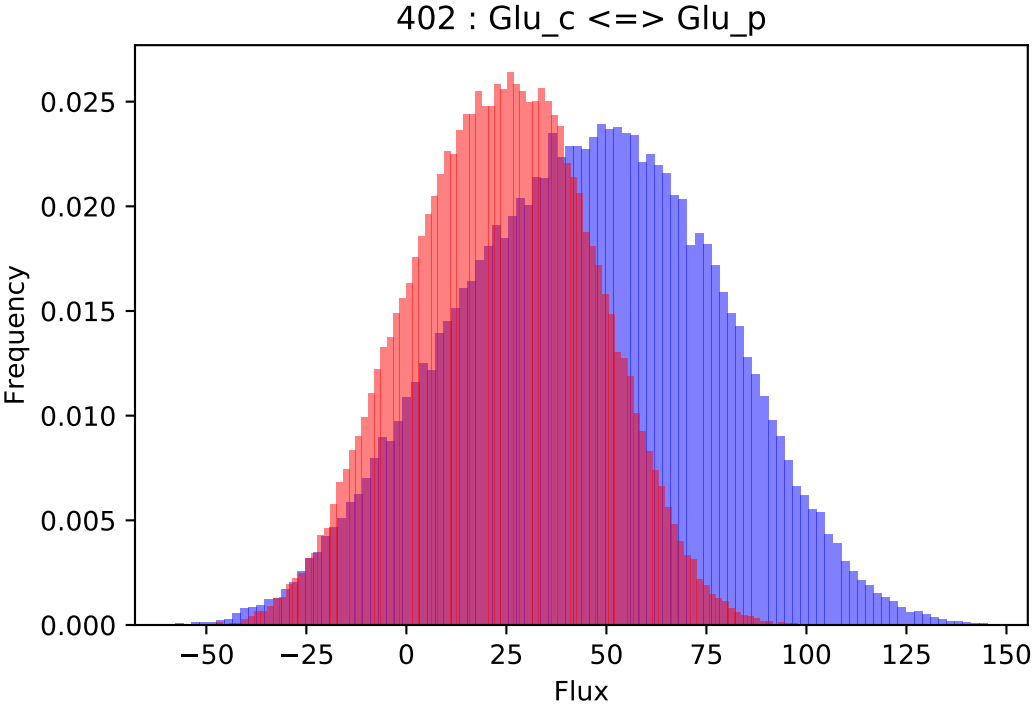

397 : Ala_c <=> Ala_p
Frequency
0.025
0.020
0.015
0.010
0.005
0.000
−125
−100
−75
−50
−25
0
25
50
Flux

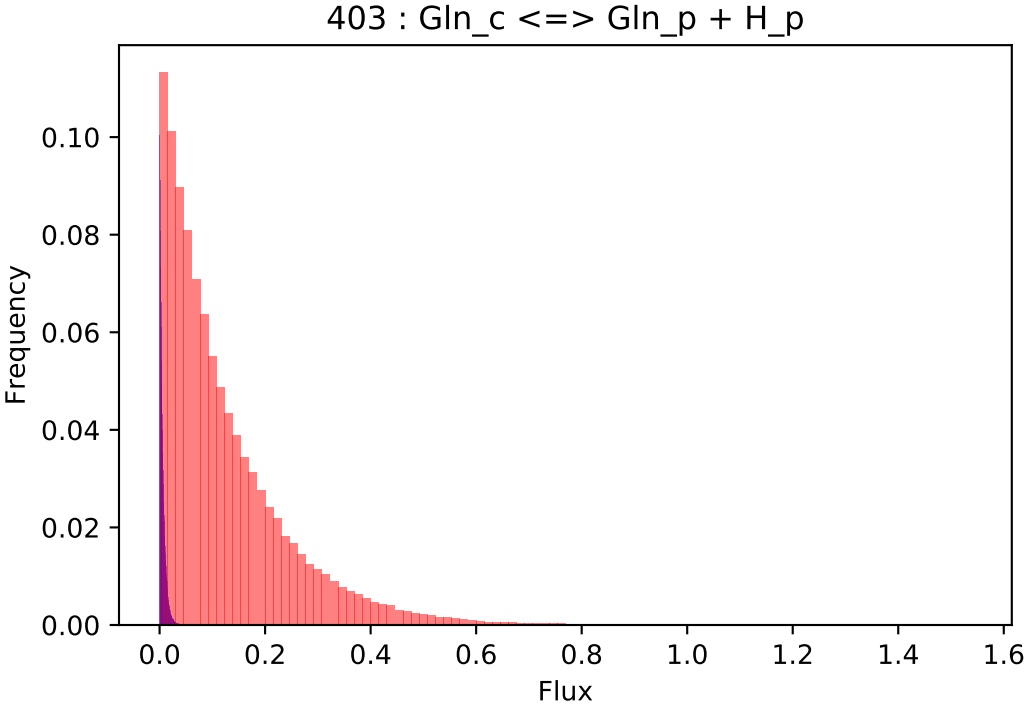

398 : Arg_c <=> Arg_p
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

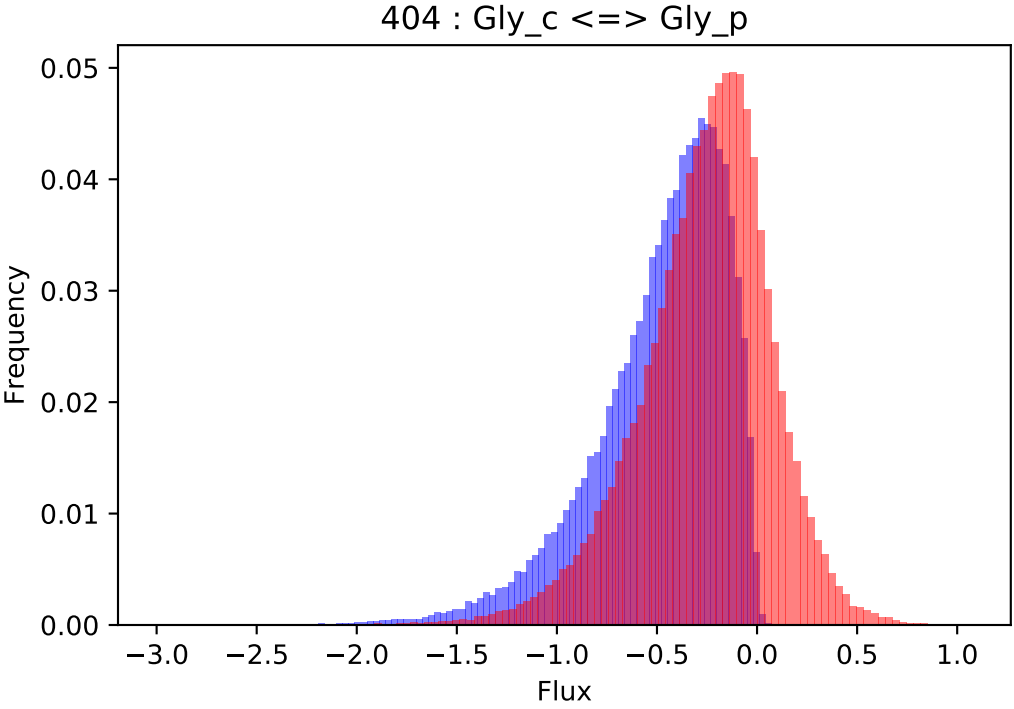

399 : Asn_c <=> Asn_p + H_p
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
Flux

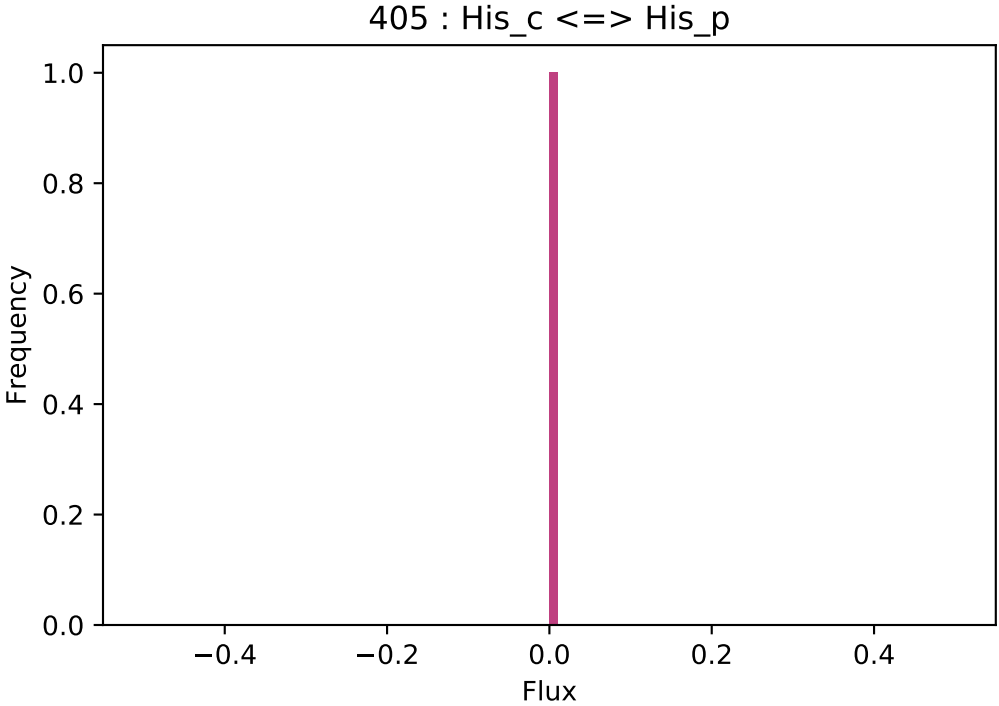

400 : Asp_c <=> Asp_p
0.010
0.008
0.006
0.004
0.002
0.000
Frequency
−20
−15
−10
−5
0
5
10
15
20
Flux

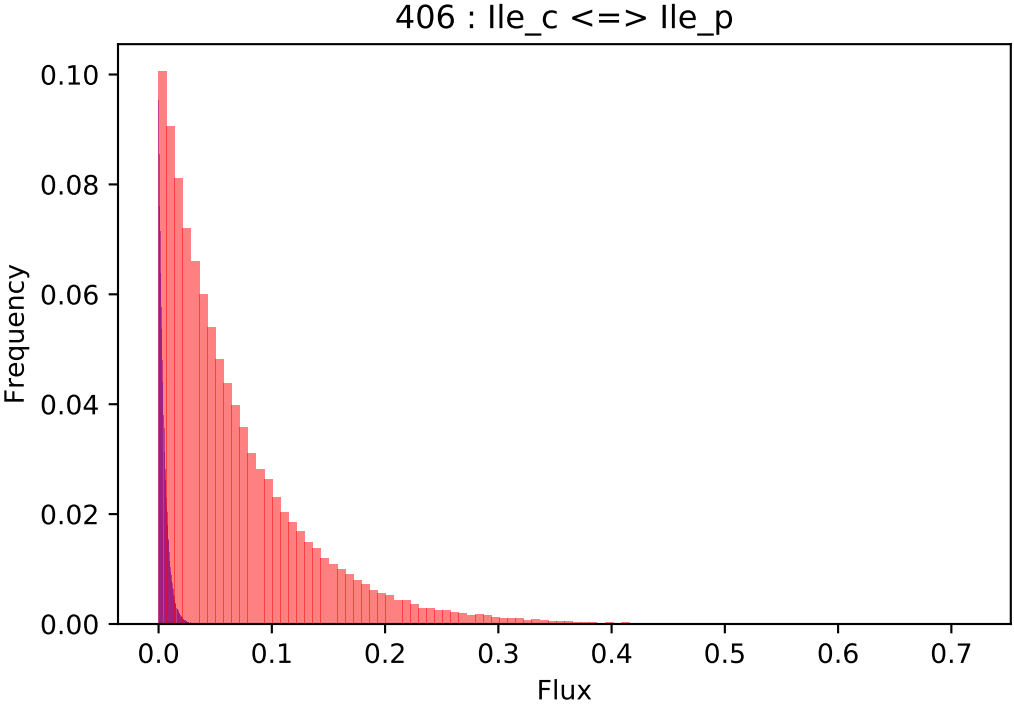

401 : Cys_c <=> Cys_p
Frequency
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

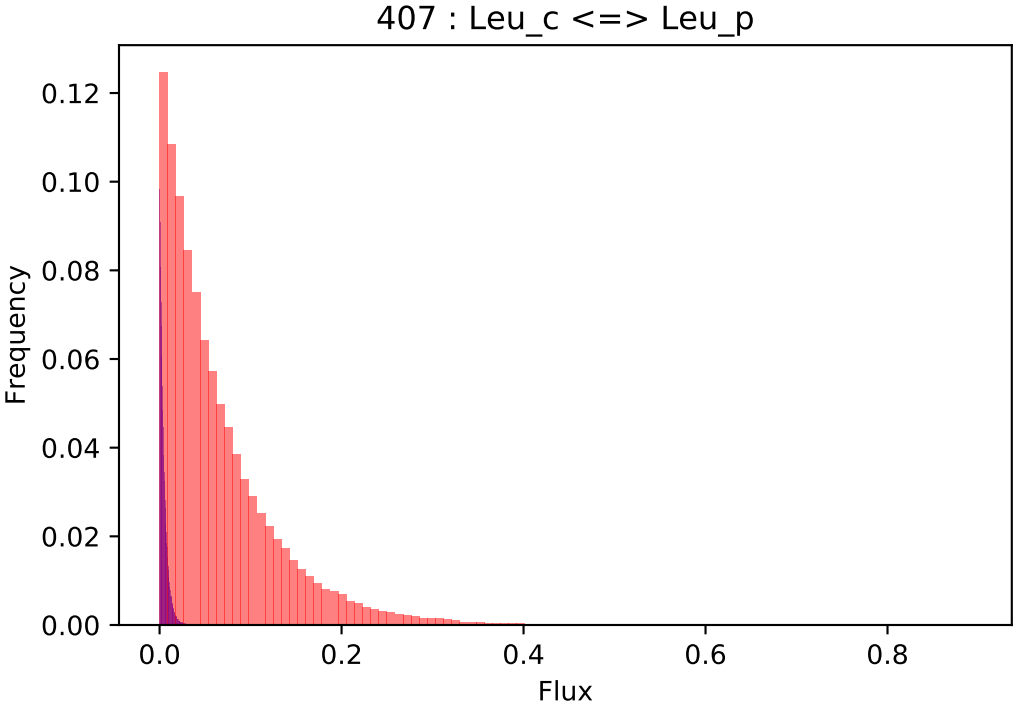

402 : Glu_c <=> Glu_p
Frequency
0.025
0.020
0.015
0.010
0.005
0.000
−50
−25
0
25
50
75
100
125
150
Flux

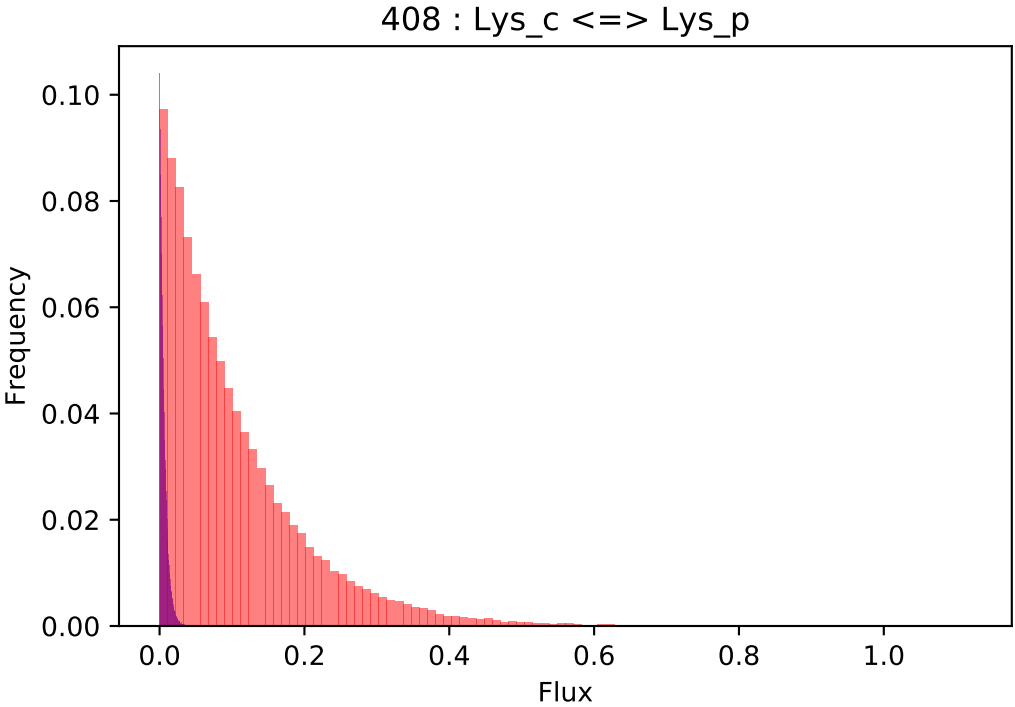

403 : Gln_c <=> Gln_p + H_p
Frequency
0.00
0.02
0.04
0.06
0.08
0.10
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
Flux

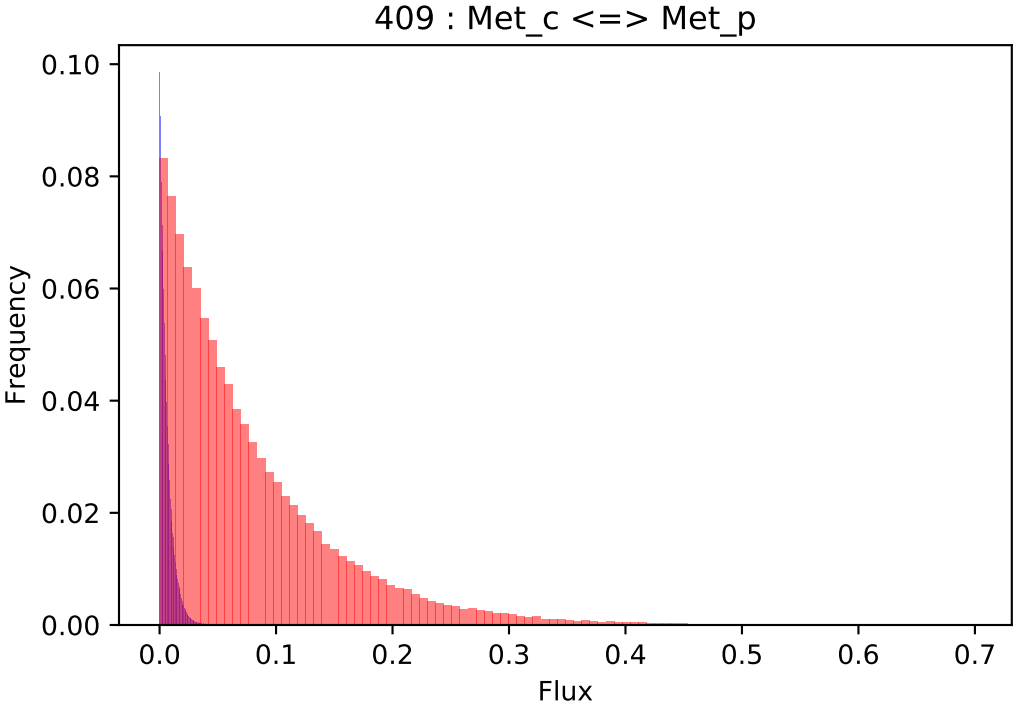

404 : Gly_c <=> Gly_p
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
−3.0
−2.5
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
Flux

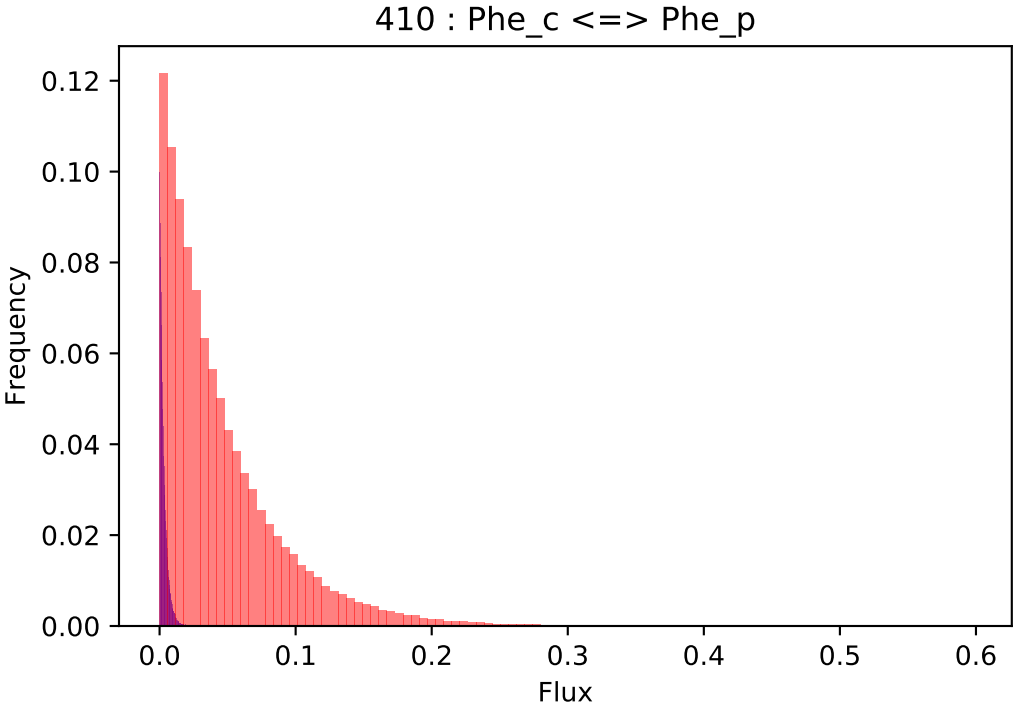

405 : His_c <=> His_p
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

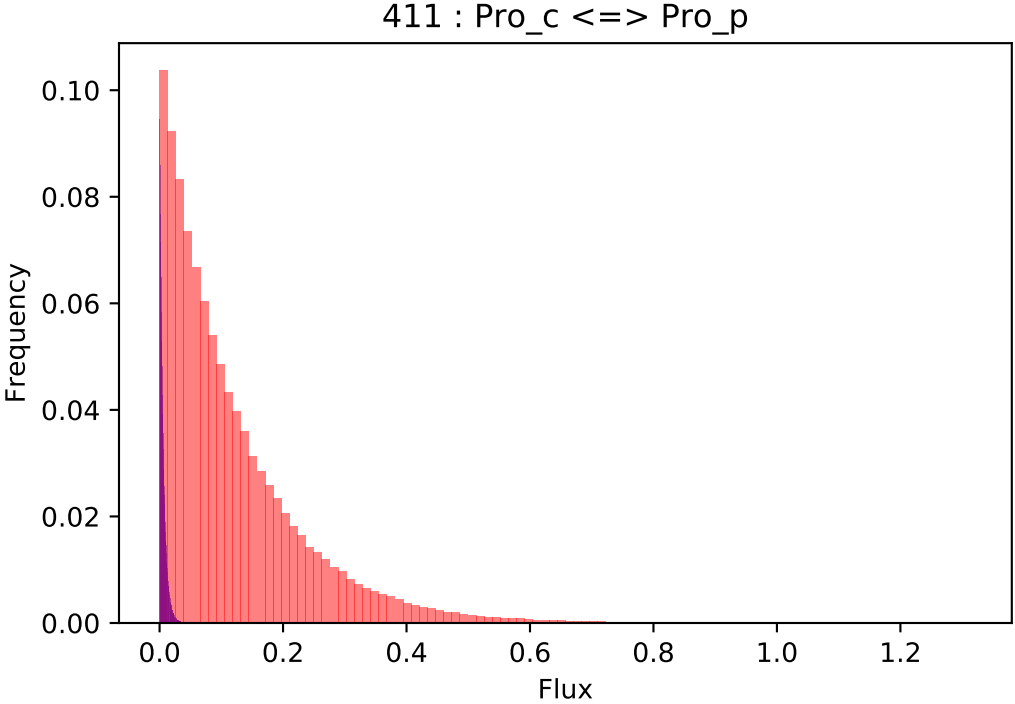

406 : Ile_c <=> Ile_p
Frequency
0.00
0.02
0.04
0.06
0.08
0.10
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
Flux

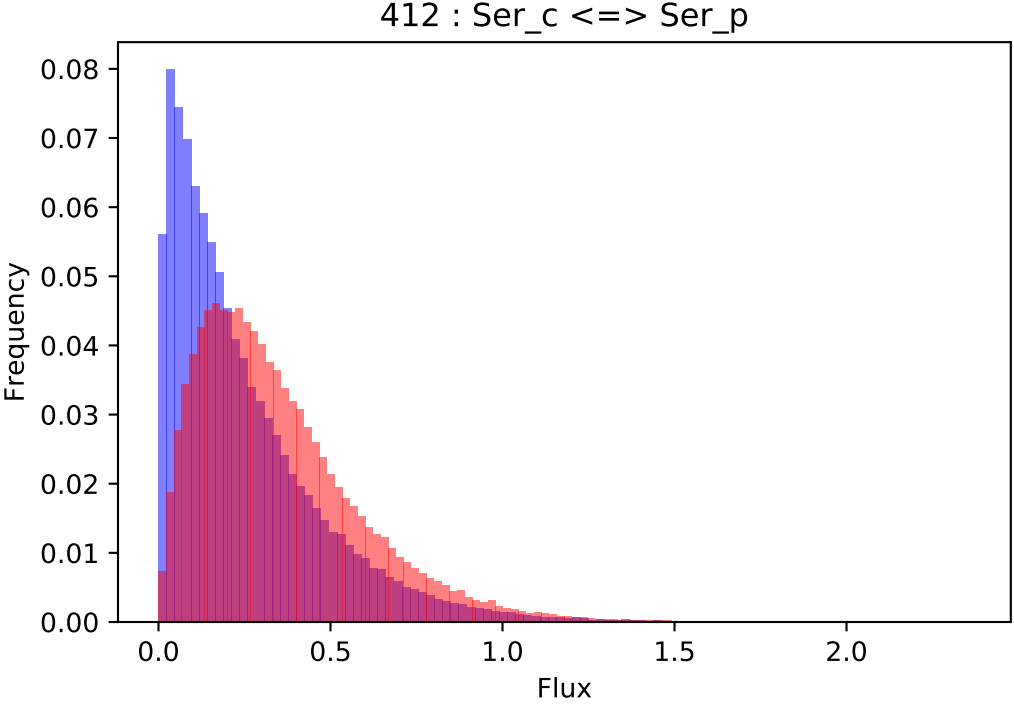

407 : Leu_c <=> Leu_p
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.2
0.4
0.6
0.8
Flux

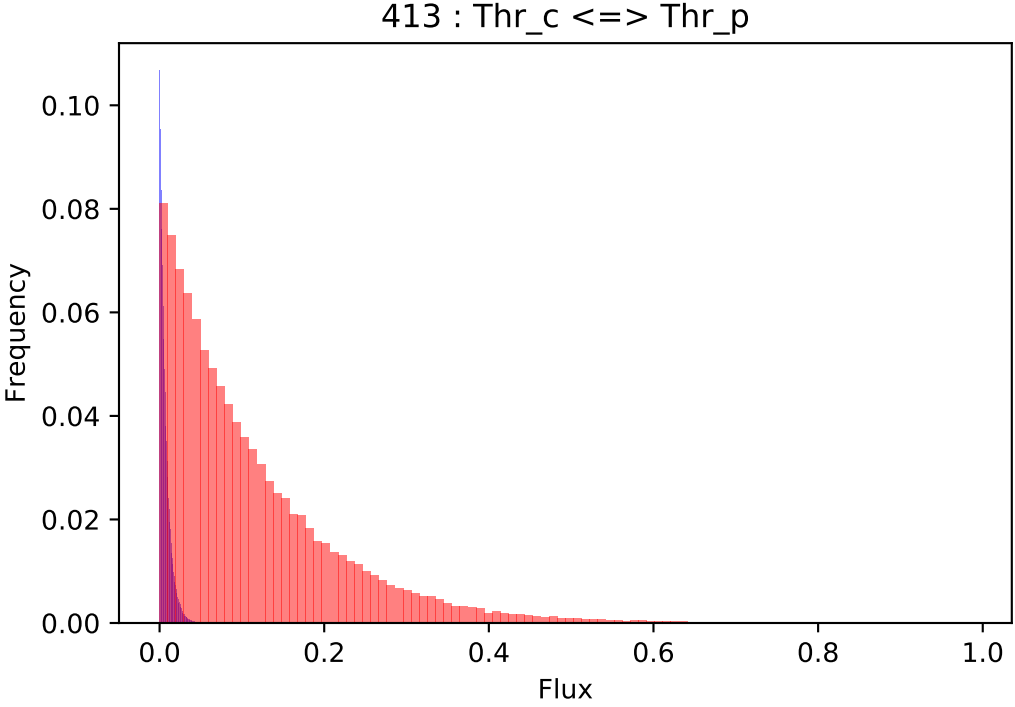

408 : Lys_c <=> Lys_p
Frequency
0.00
0.02
0.04
0.06
0.08
0.10
0.0
0.2
0.4
0.6
0.8
1.0
Flux

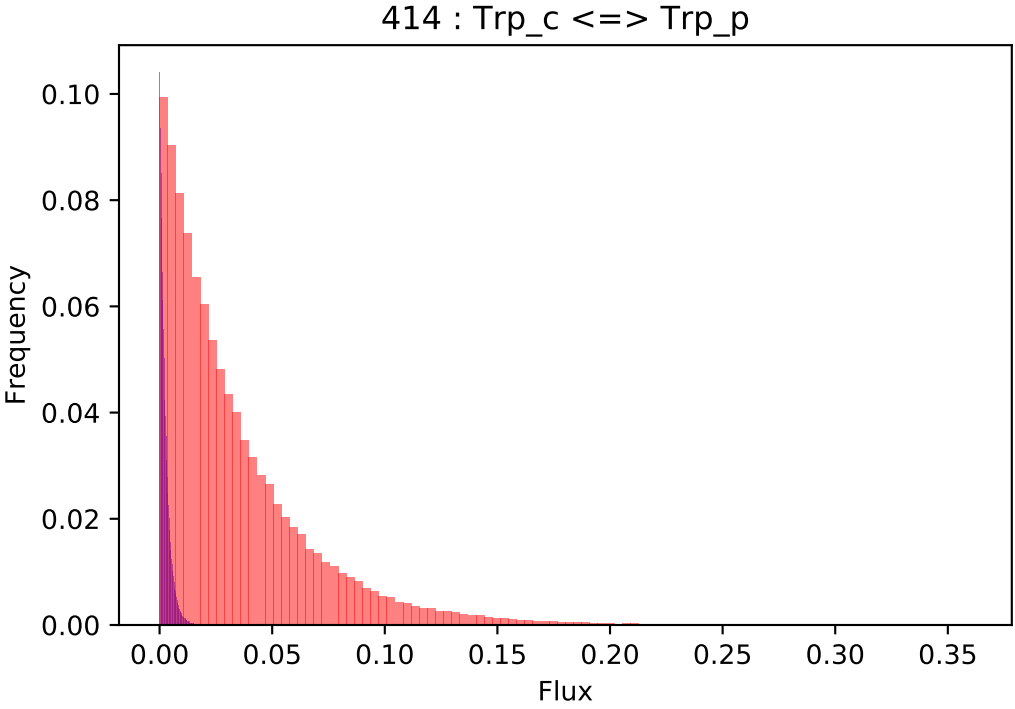

409 : Met_c <=> Met_p
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
Flux

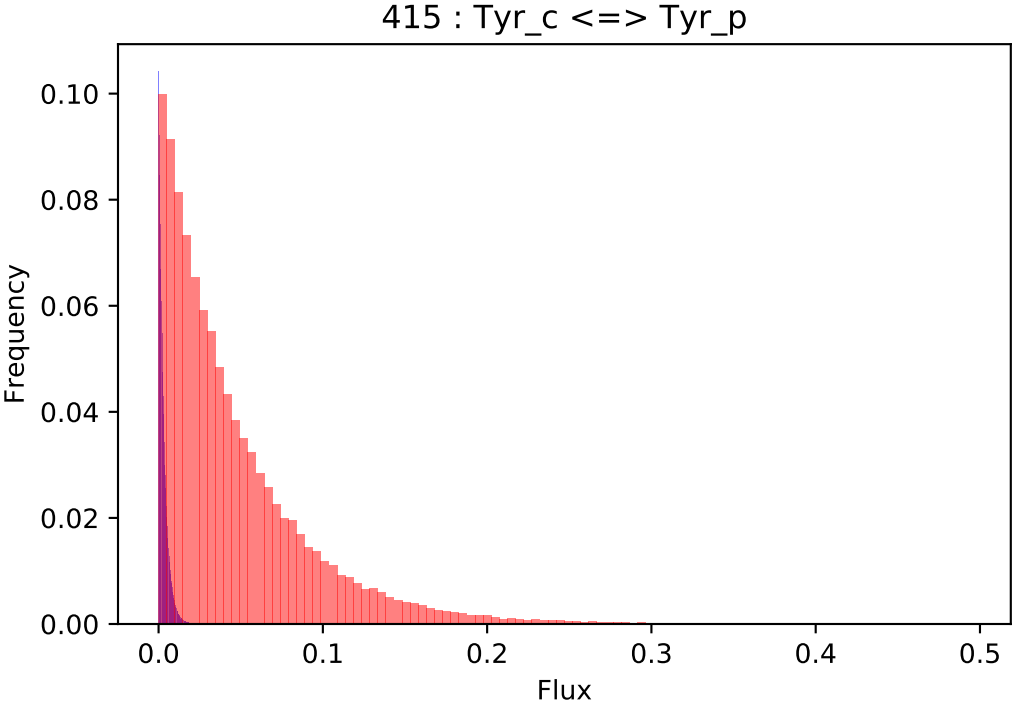

410 : Phe_c <=> Phe_p
Frequency
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.0
0.1
0.2
0.3
0.4
0.5
0.6
Flux

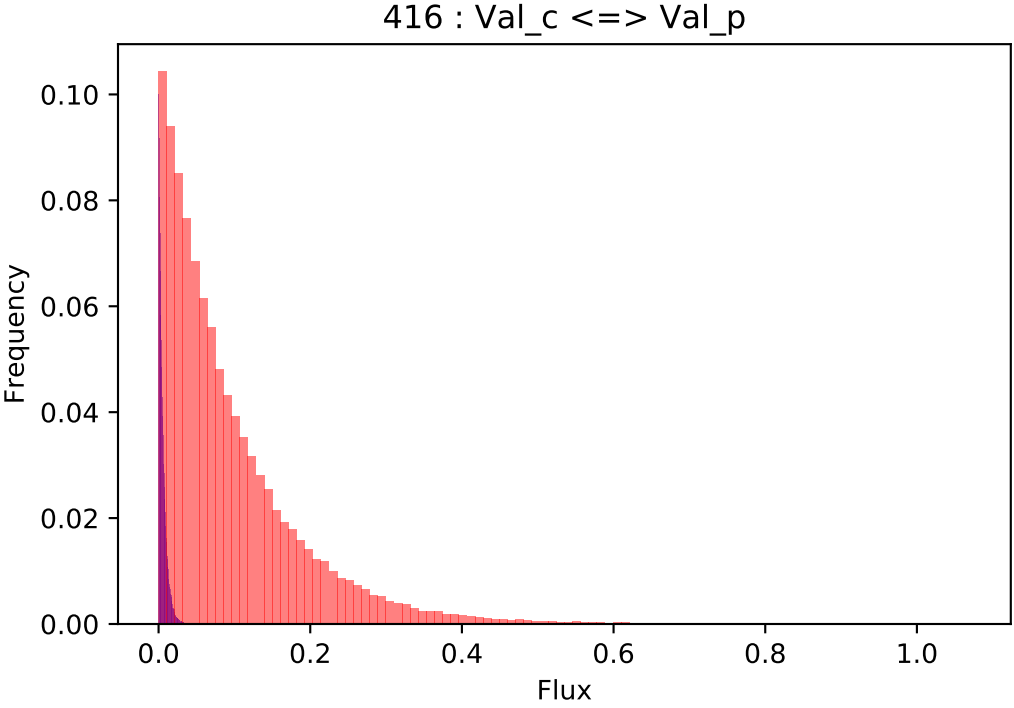

411 : Pro_c <=> Pro_p
Frequency
0.10
0.08
0.06
0.04
0.02
0.00
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

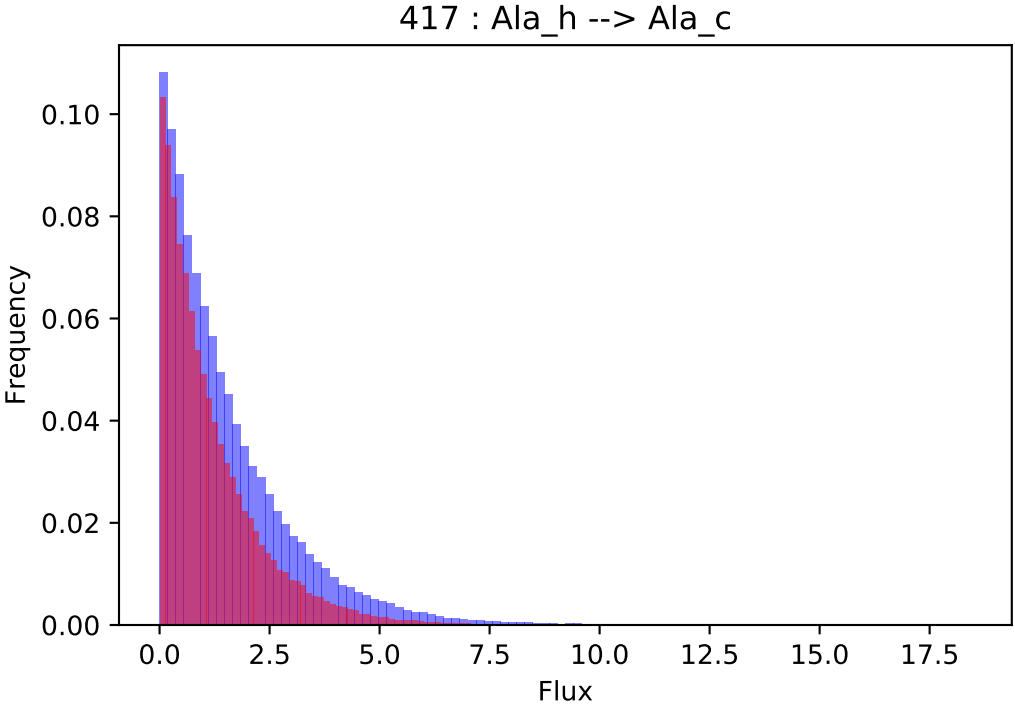

412 : Ser_c <=> Ser_p
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
Frequency
0.0
0.5
1.0
1.5
2.0
Flux

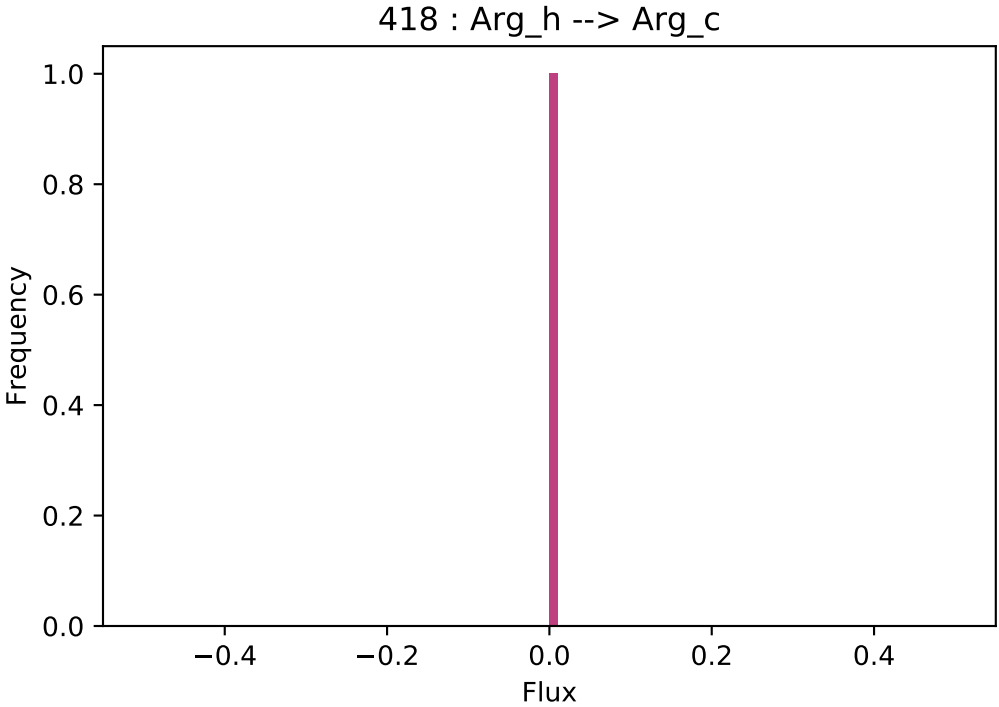

413 : Thr_c <=> Thr_p
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.2
0.4
0.6
0.8
1.0
Flux

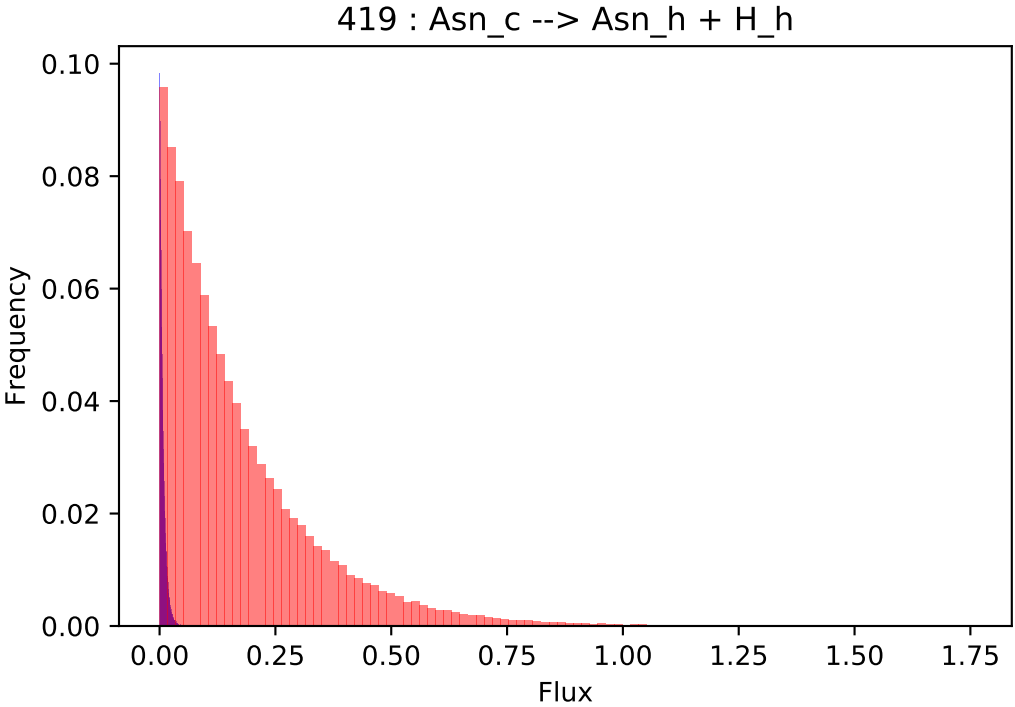

414 : Trp_c <=> Trp_p
Frequency
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
Flux

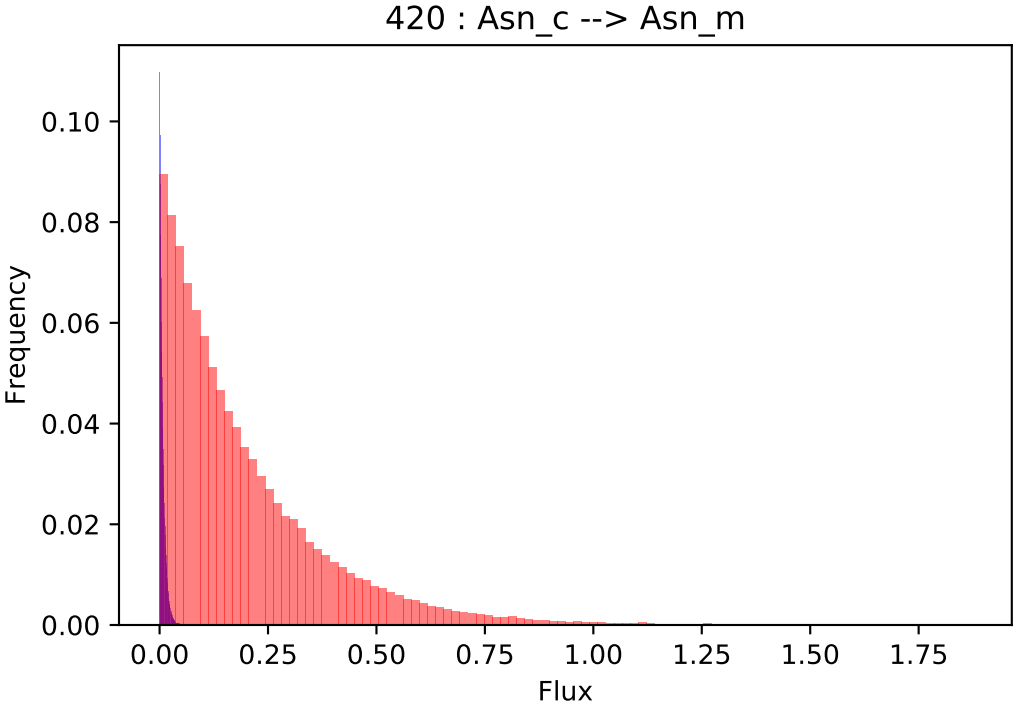

415 : Tyr_c <=> Tyr_p
Frequency
0.10
0.08
0.06
0.04
0.02
0.00
0.0
0.1
0.2
0.3
0.4
0.5
Flux

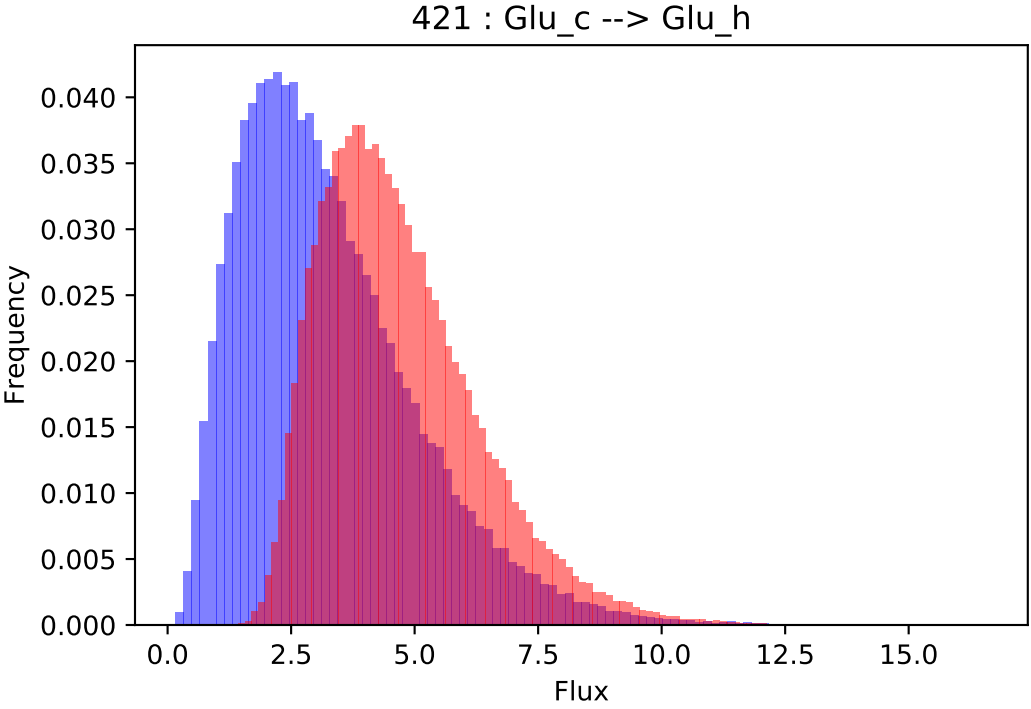

416 : Val_c <=> Val_p
Frequency
0.10
0.08
0.06
0.04
0.02
0.00
0.0
0.2
0.4
0.6
0.8
1.0
Flux

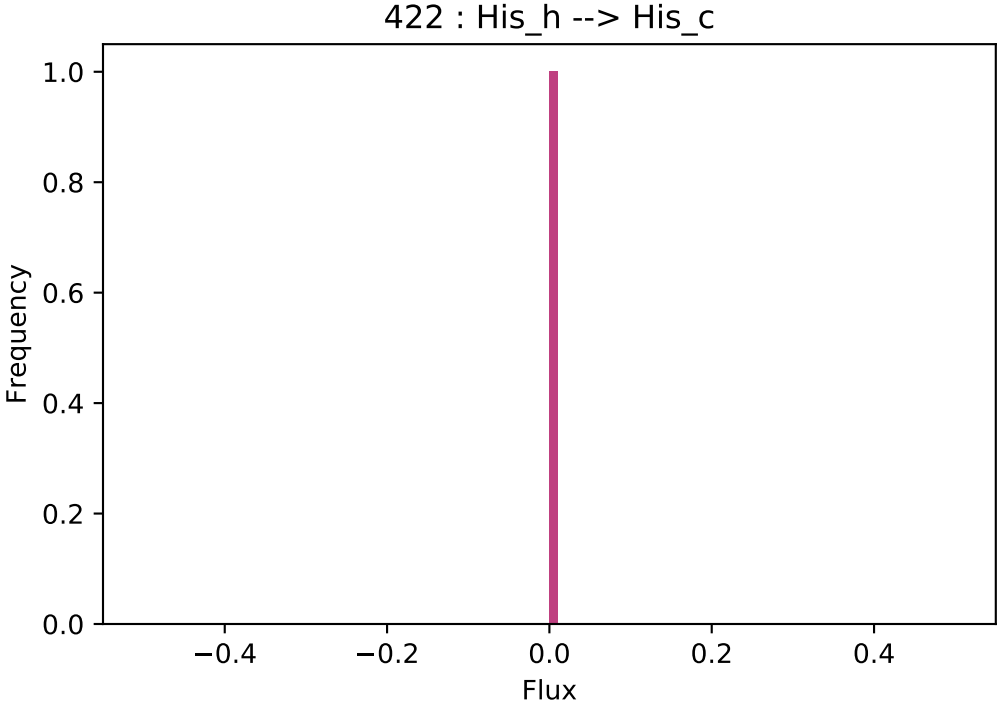

417 : Ala_h --> Ala_c
Frequency
0.00
0.02
0.04
0.06
0.08
0.10
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
Flux

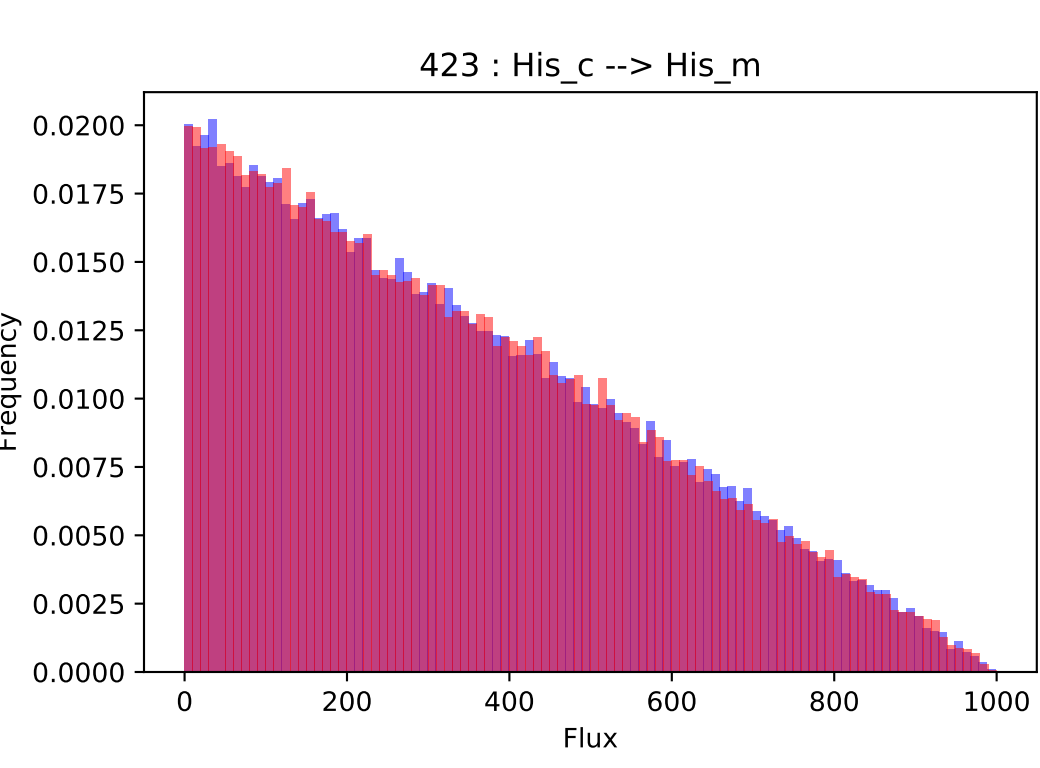

418 : Arg_h --> Arg_c
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

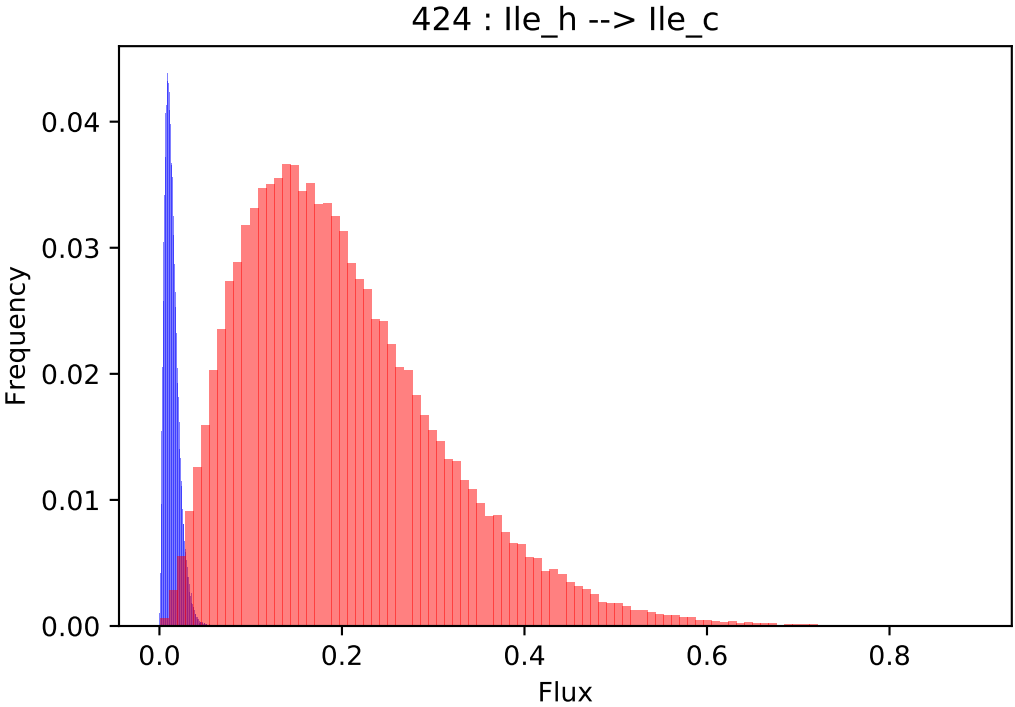

419 : Asn_c --> Asn_h + H_h
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
Flux

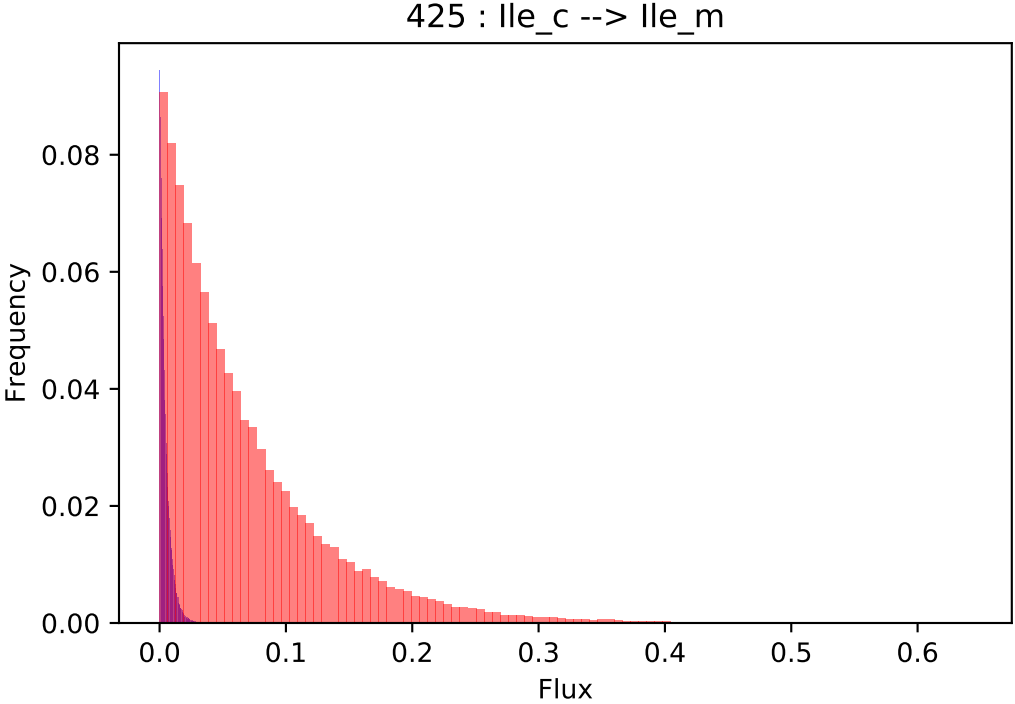

420 : Asn_c --> Asn_m
Frequency
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
Flux

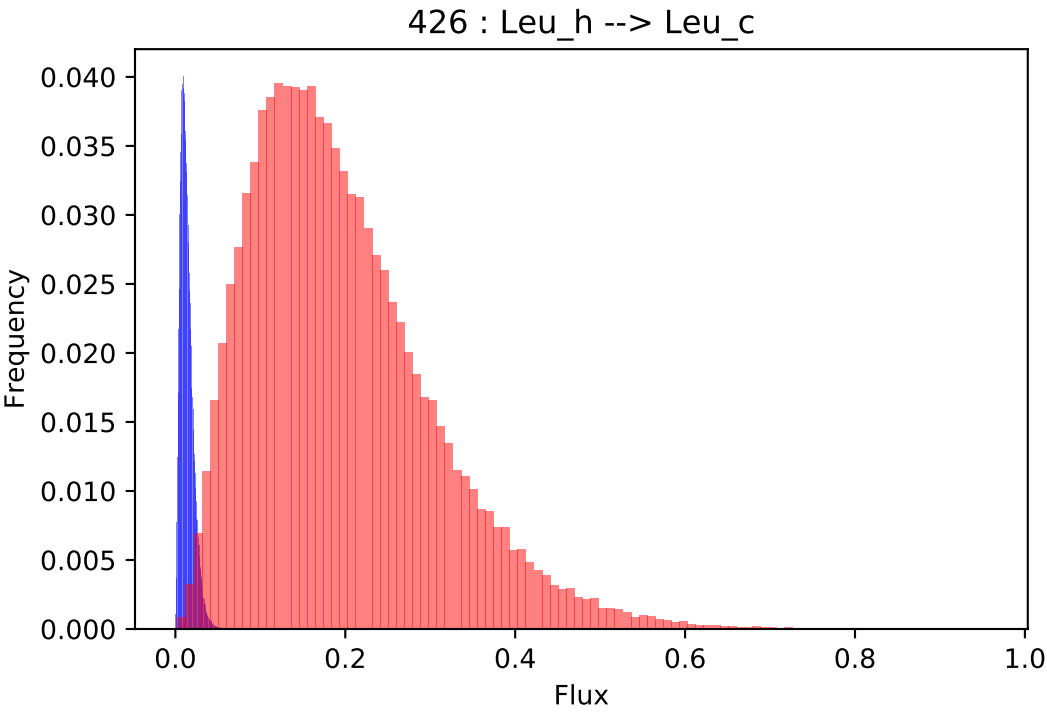

421 : Glu_c --> Glu_h
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
2.5
5.0
7.5
10.0
12.5
15.0
Flux

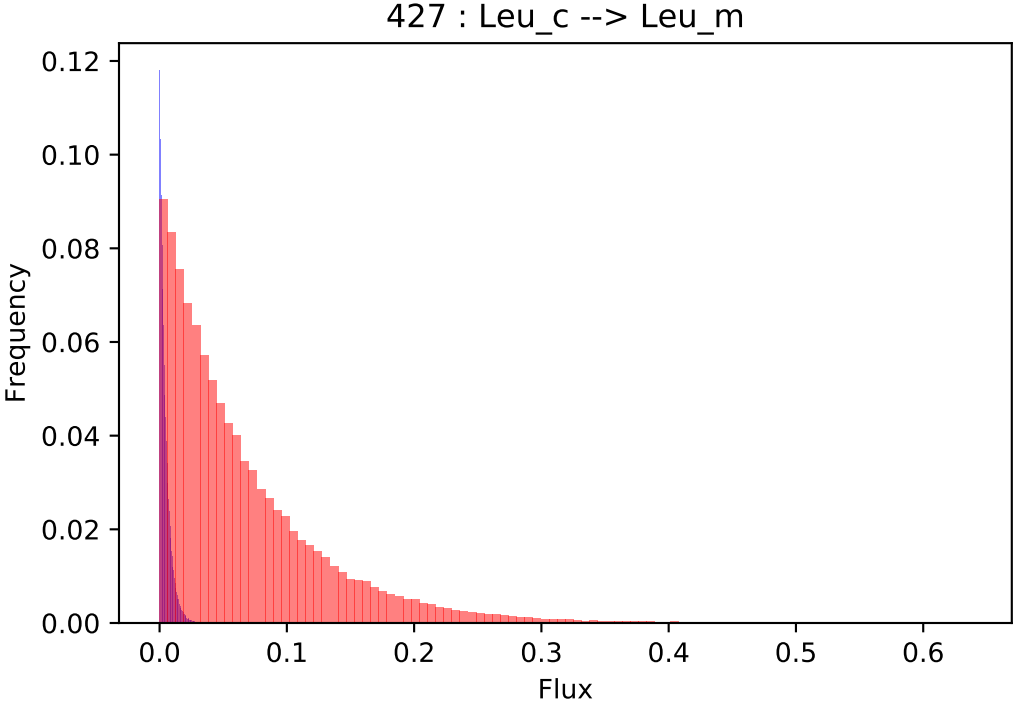

422 : His_h --> His_c
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

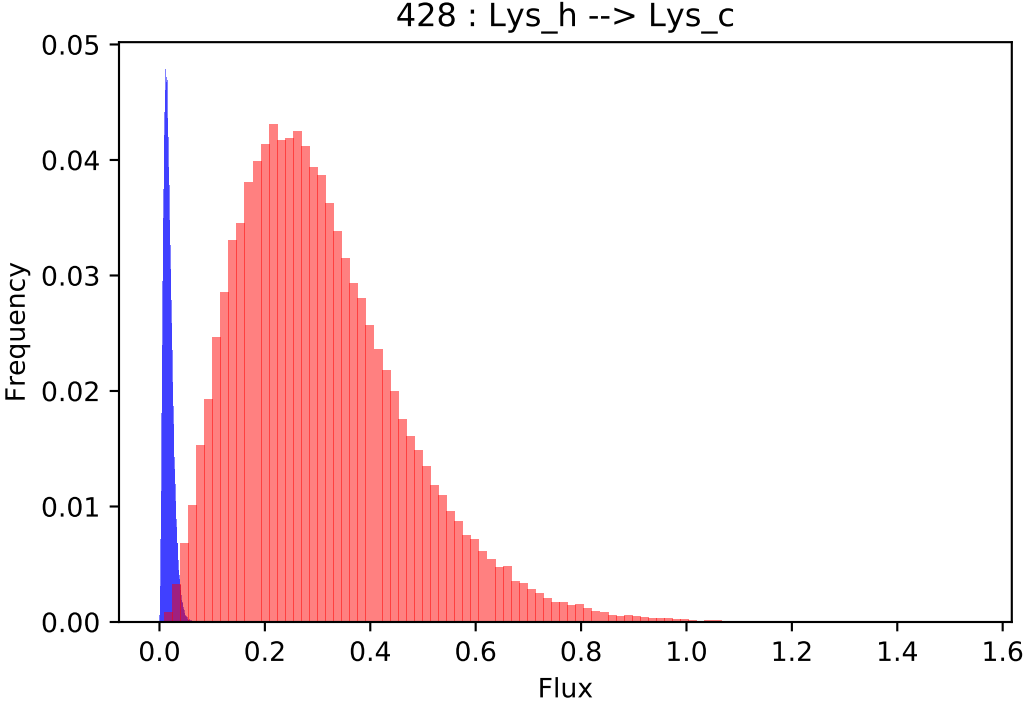

423 : His_c --> His_m
Frequency
0.0200
0.0175
0.0150
0.0125
0.0100
0.0075
0.0050
0.0025
0.0000
0
200
400
600
800
1000
Flux

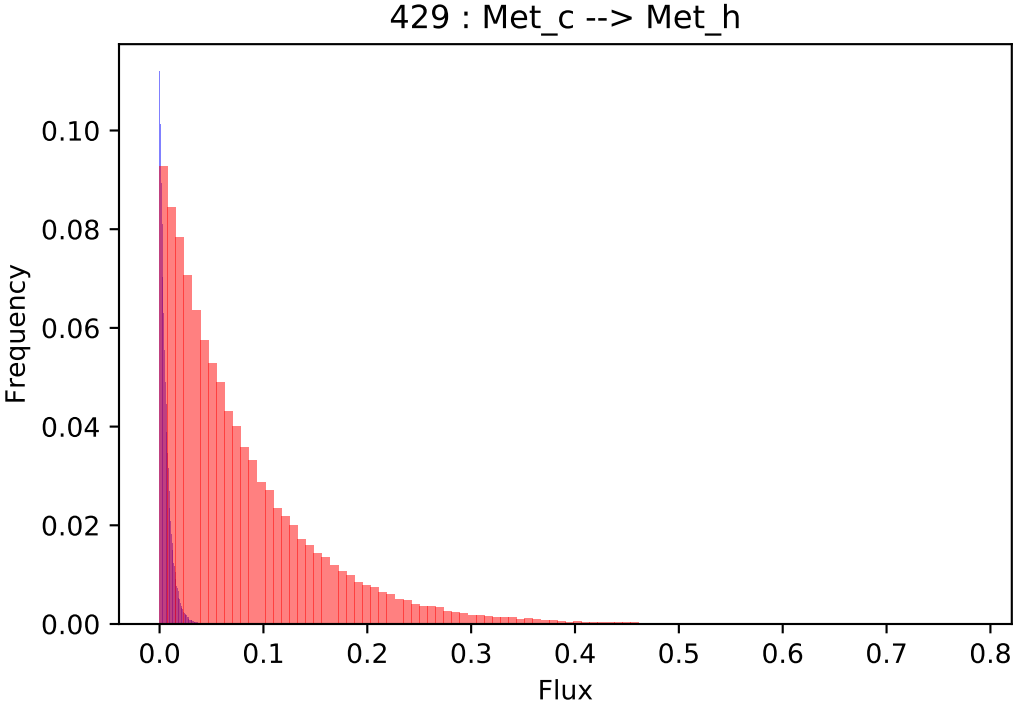

424 : Ile_h --> Ile_c
Frequency
0.00
0.01
0.02
0.03
0.04
0.0
0.2
0.4
0.6
0.8
Flux

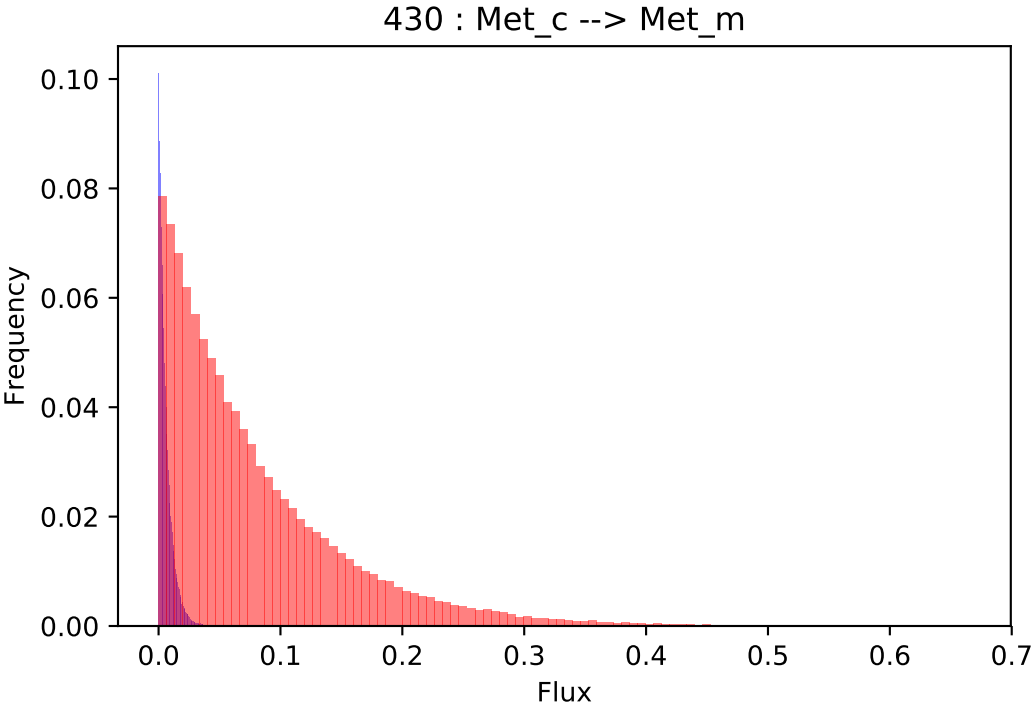

425 : Ile_c --> Ile_m
Frequency
0.00
0.02
0.04
0.06
0.08
0.0
0.1
0.2
0.3
0.4
0.5
0.6
Flux

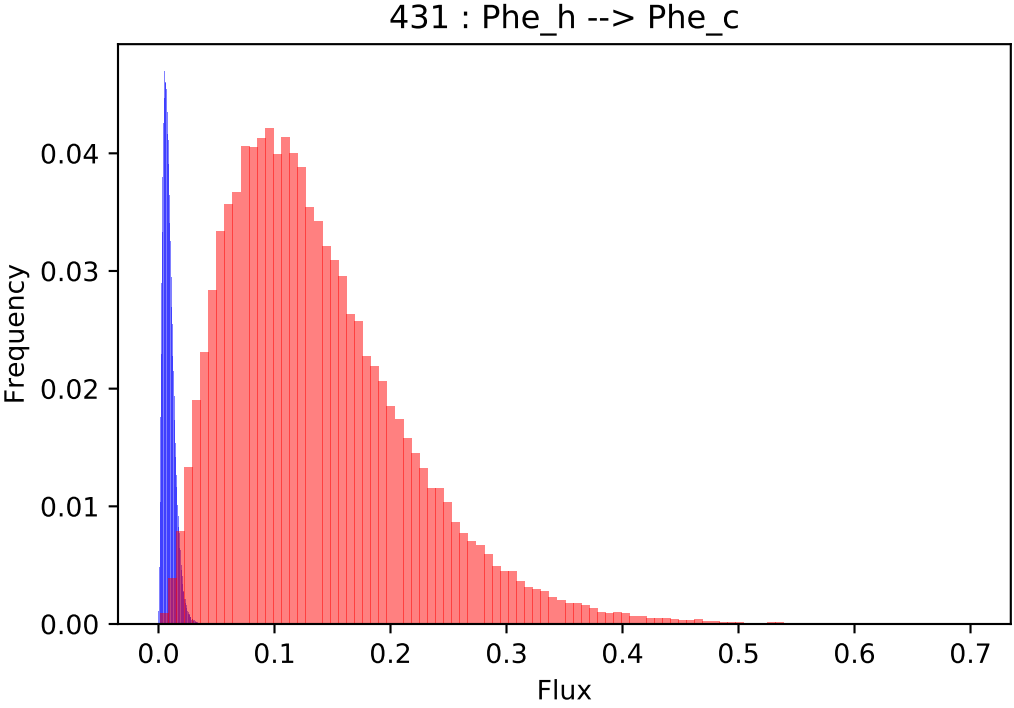

426 : Leu_h --> Leu_c
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.2
0.4
0.6
0.8
1.0
Flux

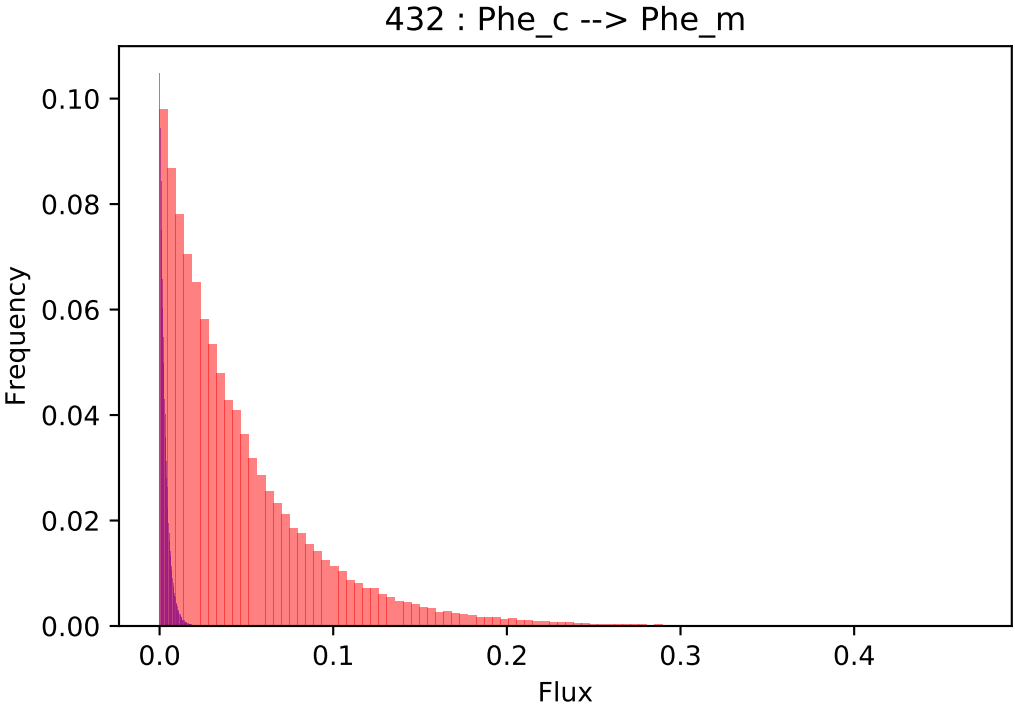

427 : Leu_c --> Leu_m
Frequency
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.0
0.1
0.2
0.3
0.4
0.5
0.6
Flux

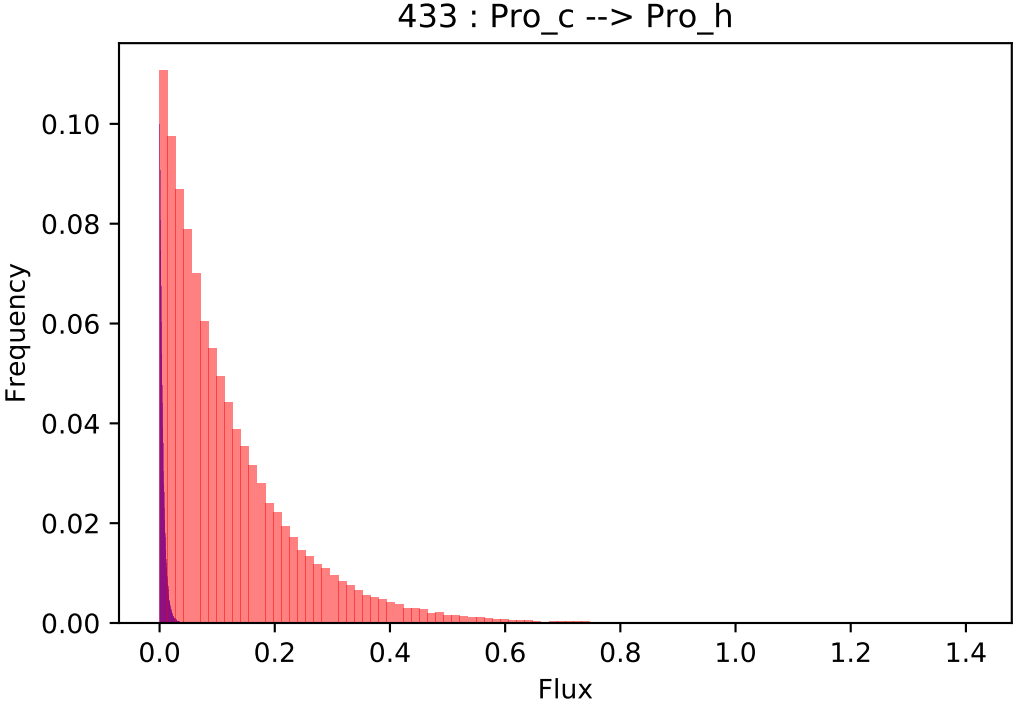

428 : Lys_h --> Lys_c
Frequency
Flux
0.00
0.01
0.02
0.03
0.04
0.05
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6

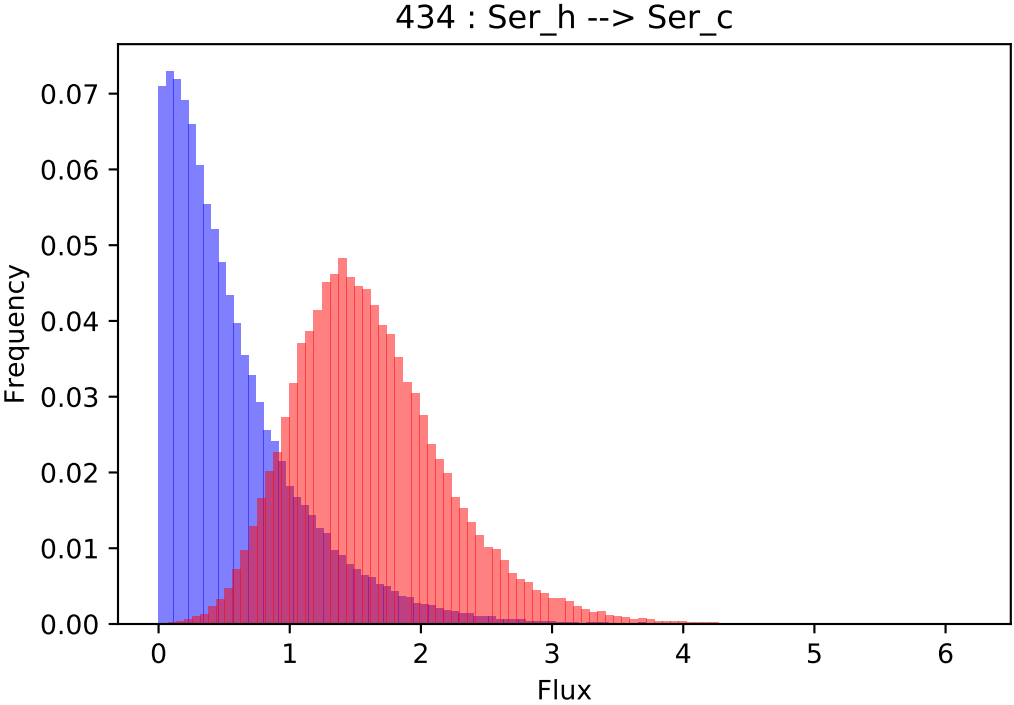

429 : Met_c --> Met_h
Frequency
0.00
0.02
0.04
0.06
0.08
0.10
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
Flux

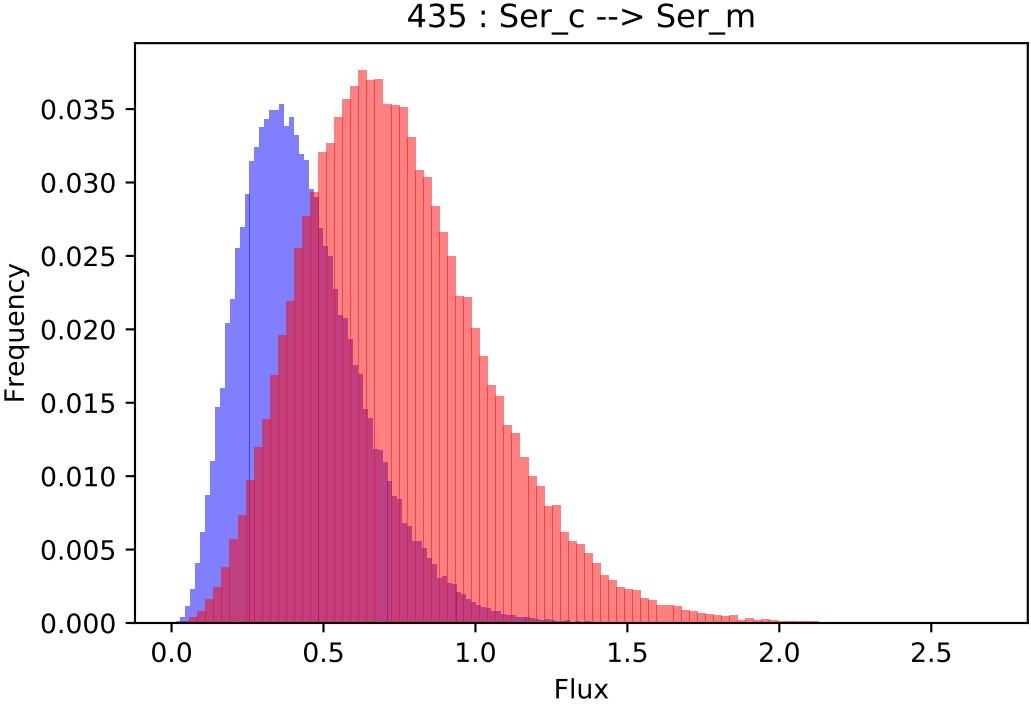

430 : Met_c --> Met_m
Frequency
Flux
0.00
0.02
0.04
0.06
0.08
0.10
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7

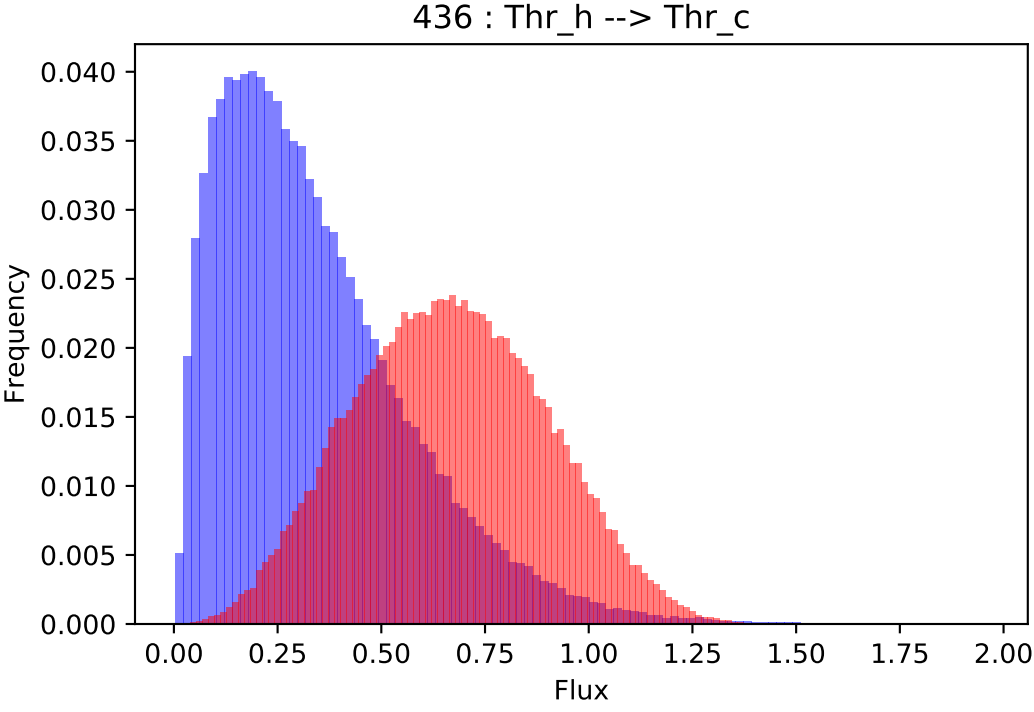

431 : Phe_h --> Phe_c
Frequency
0.00
0.01
0.02
0.03
0.04
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
Flux

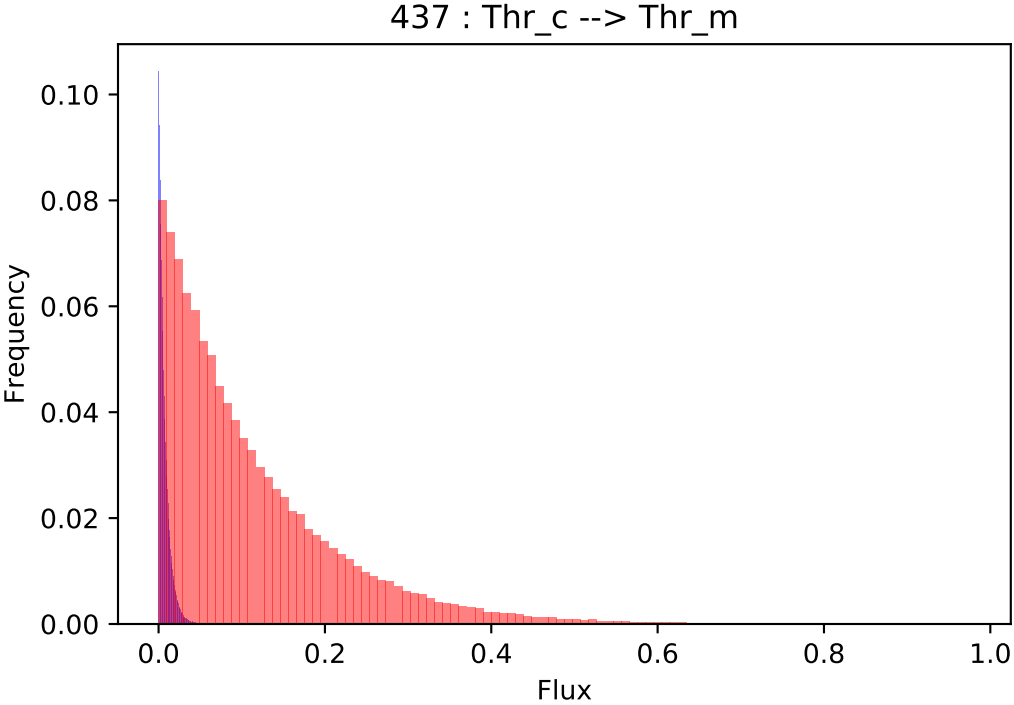

432 : Phe_c --> Phe_m
Frequency
0.10
0.08
0.06
0.04
0.02
0.00
0.0
0.1
0.2
0.3
0.4
Flux

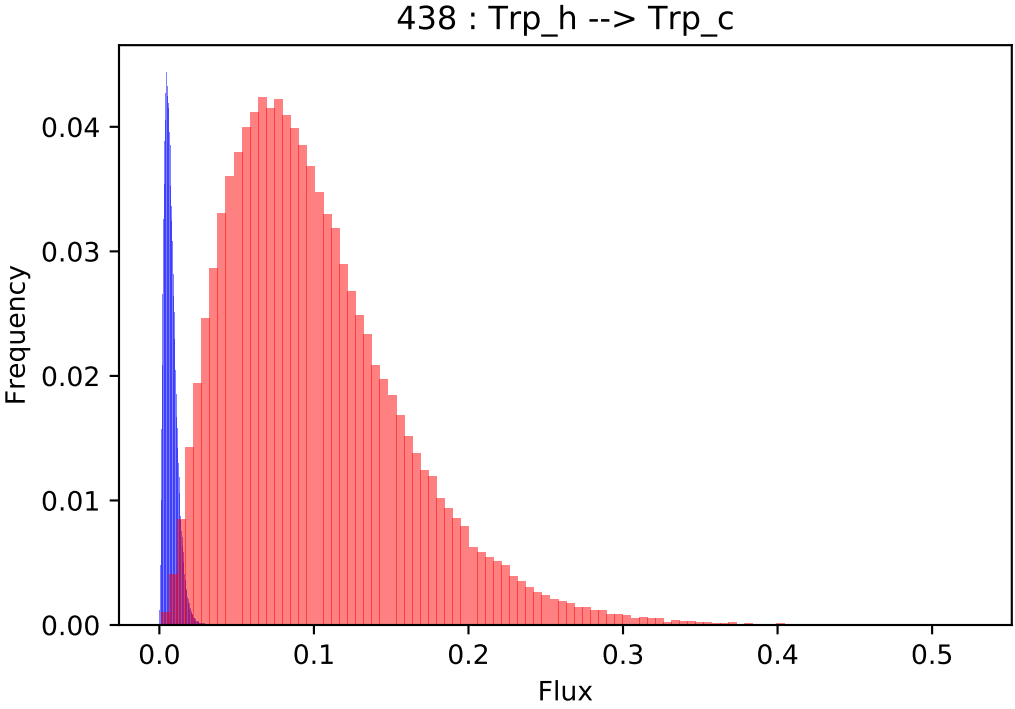

433 : Pro_c --> Pro_h
Frequency
0.00
0.02
0.04
0.06
0.08
0.10
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
Flux

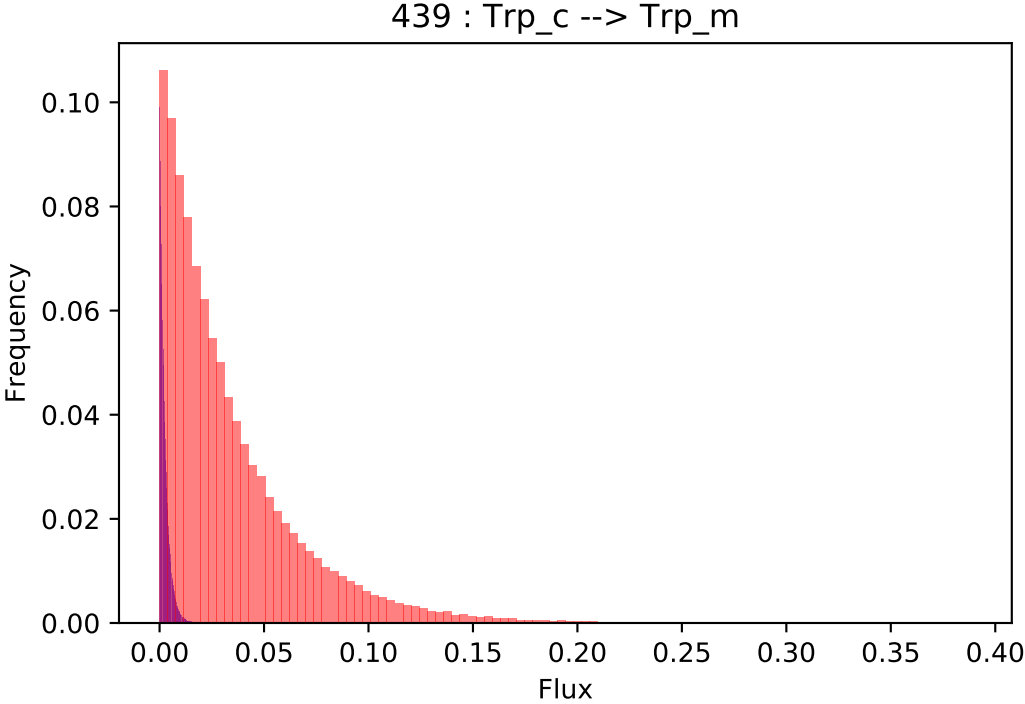

434 : Ser_h --> Ser_c
Frequency
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0
1
2
3
4
5
6
Flux

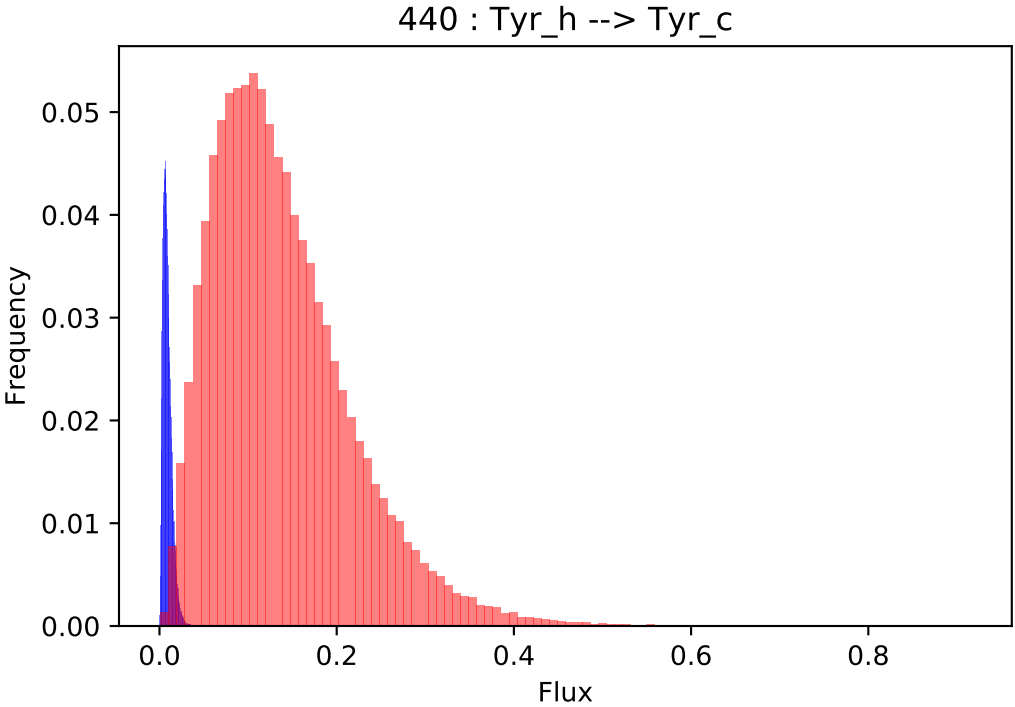

435 : Ser_c --> Ser_m
Frequency
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.5
1.0
1.5
2.0
2.5
Flux

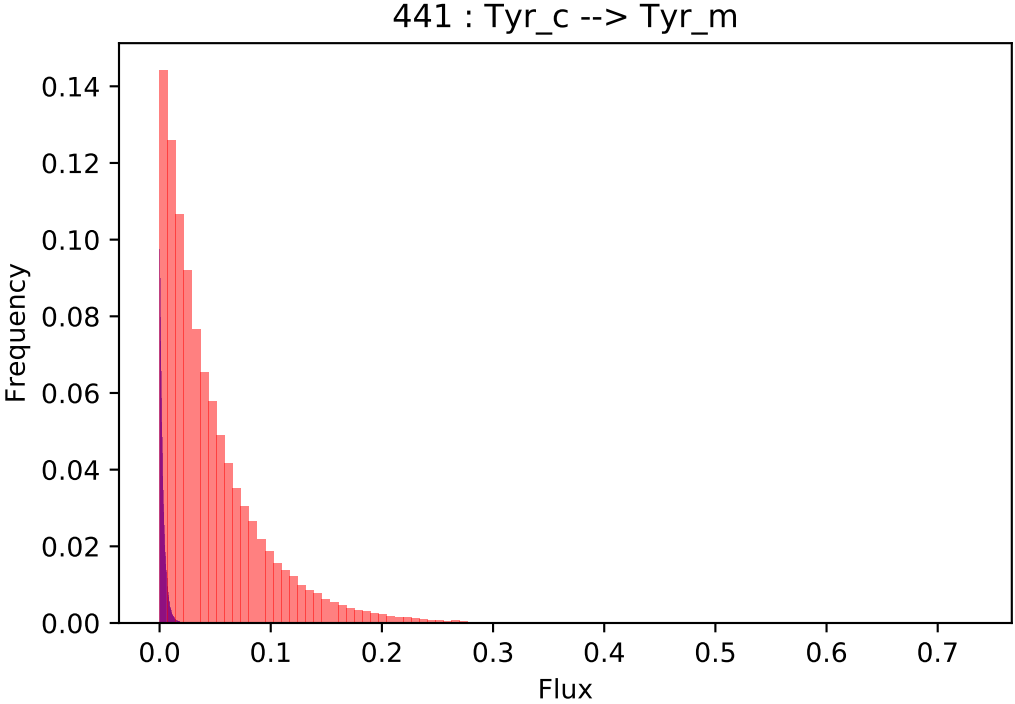

436 : Thr_h --> Thr_c
Frequency
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
Flux

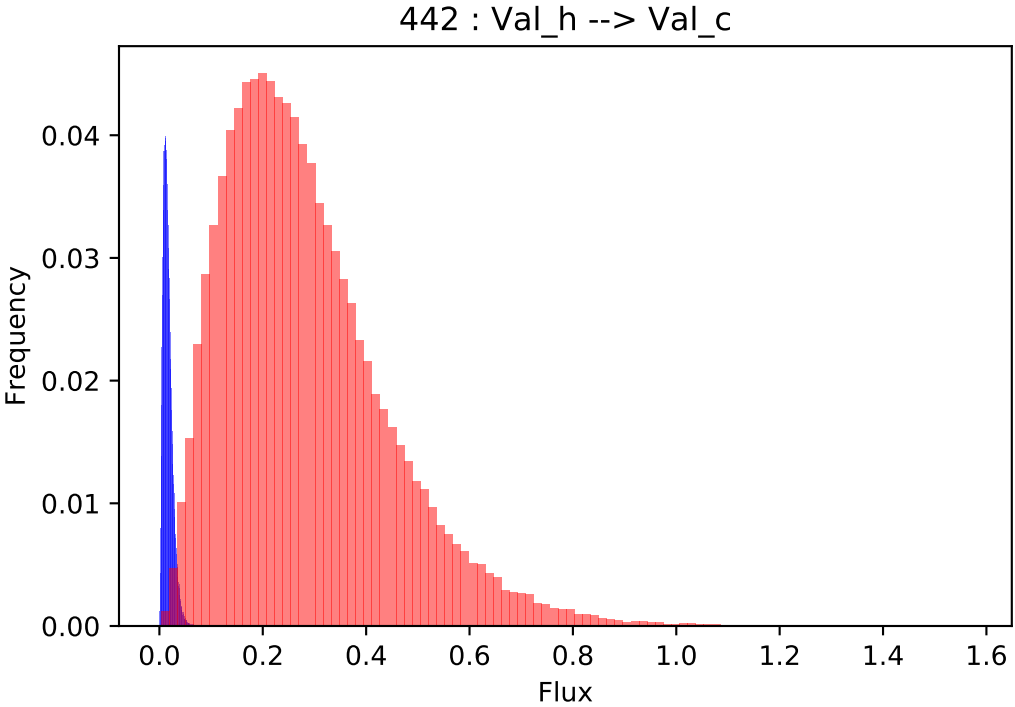

437 : Thr_c --> Thr_m
Frequency
0.10
0.08
0.06
0.04
0.02
0.00
0.0
0.2
0.4
0.6
0.8
1.0
Flux

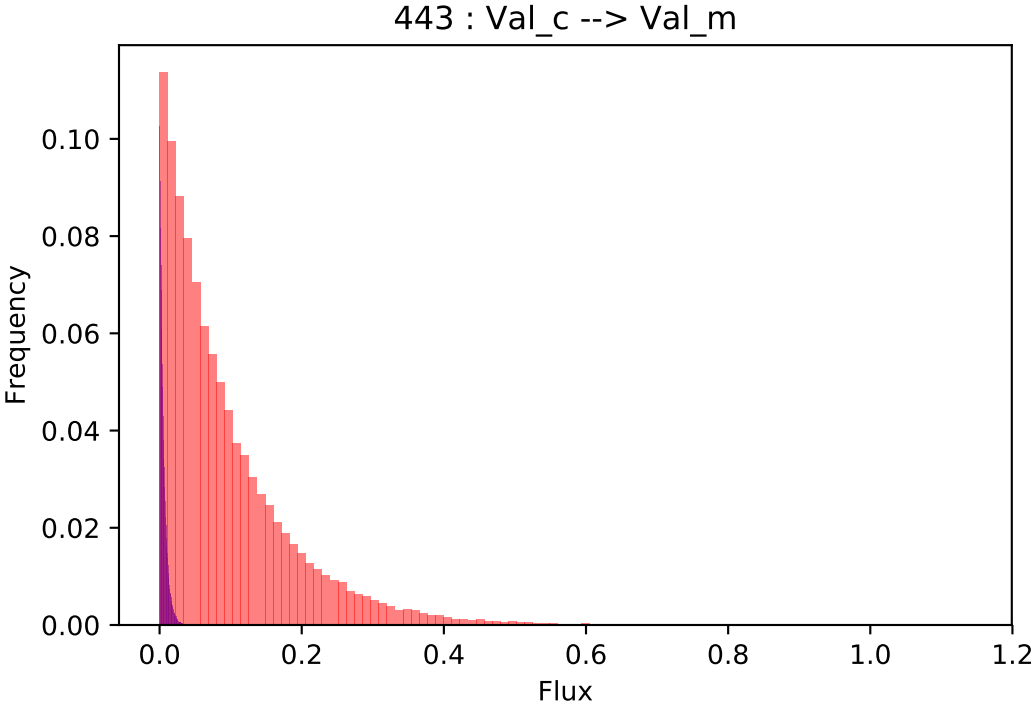

438 : Trp_h --> Trp_c
Frequency
0.00
0.01
0.02
0.03
0.04
0.0
0.1
0.2
0.3
0.4
0.5
Flux

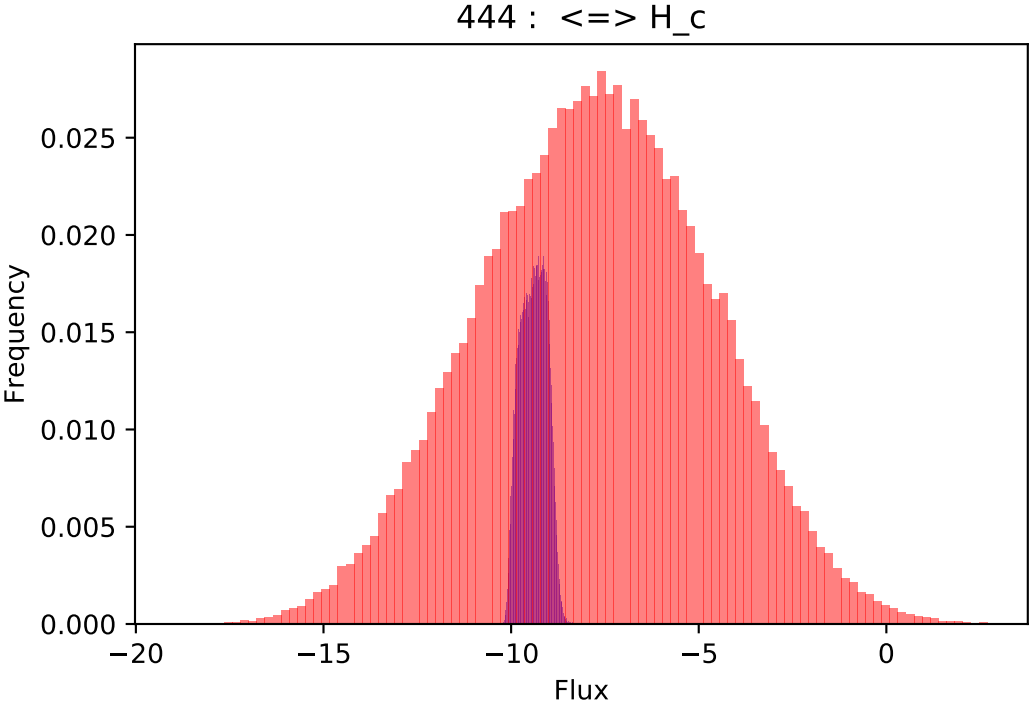

439 : Trp_c --> Trp_m
Frequency
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.40
Flux

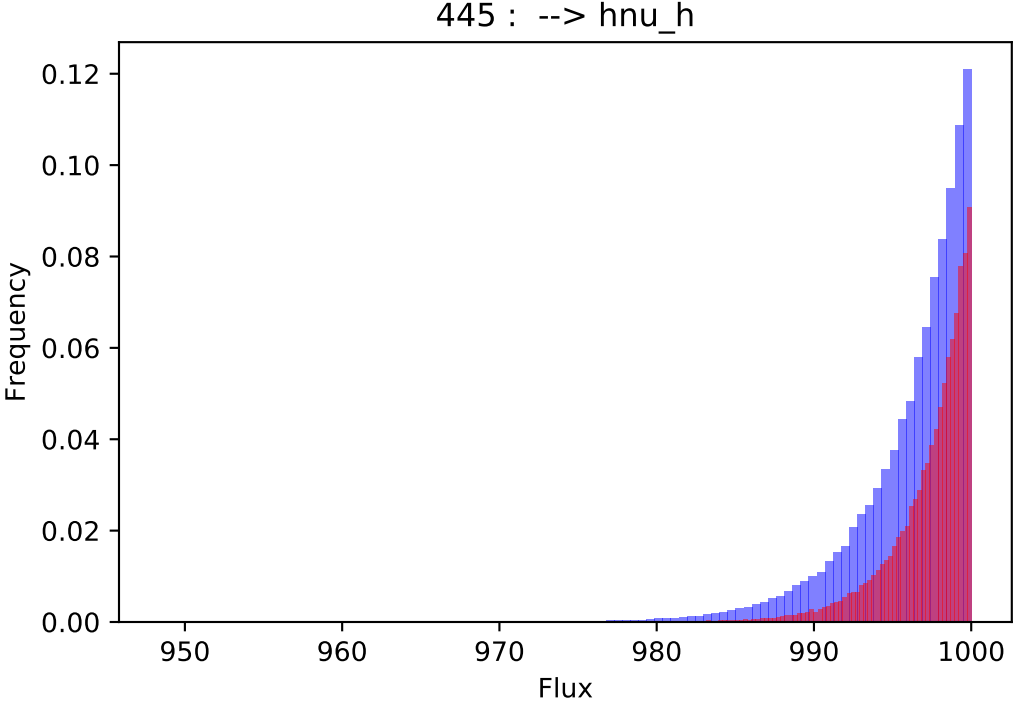

440 : Tyr_h --> Tyr_c
Frequency
0.05
0.04
0.03
0.02
0.01
0.00
0.0
0.2
0.4
0.6
0.8
Flux

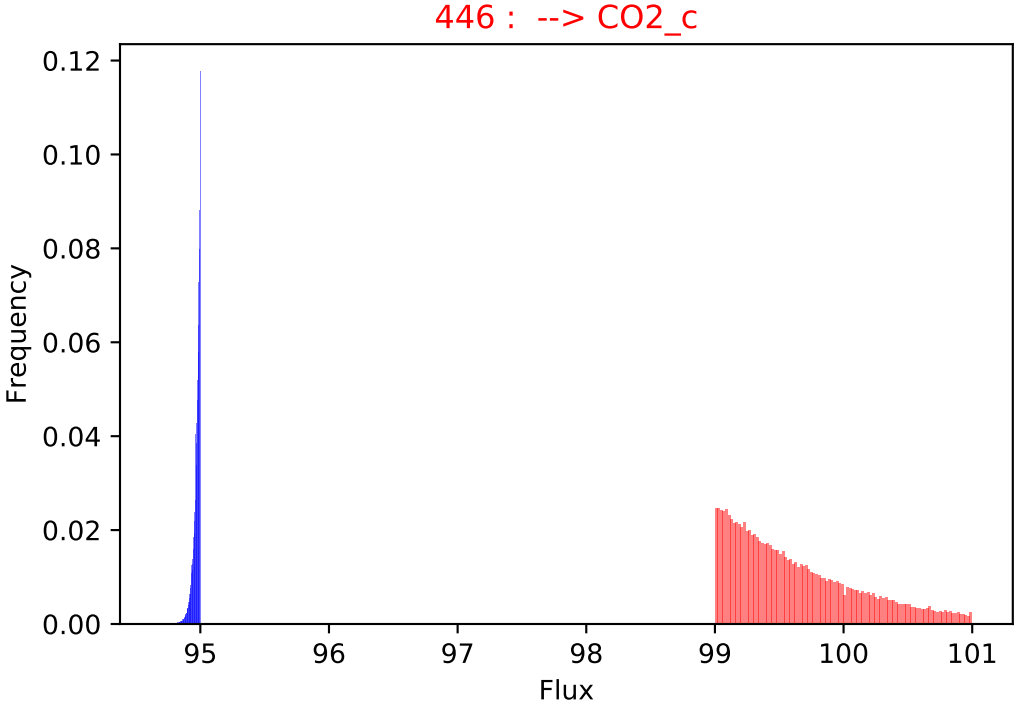

441 : Tyr_c --> Tyr_m
Frequency
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
Flux

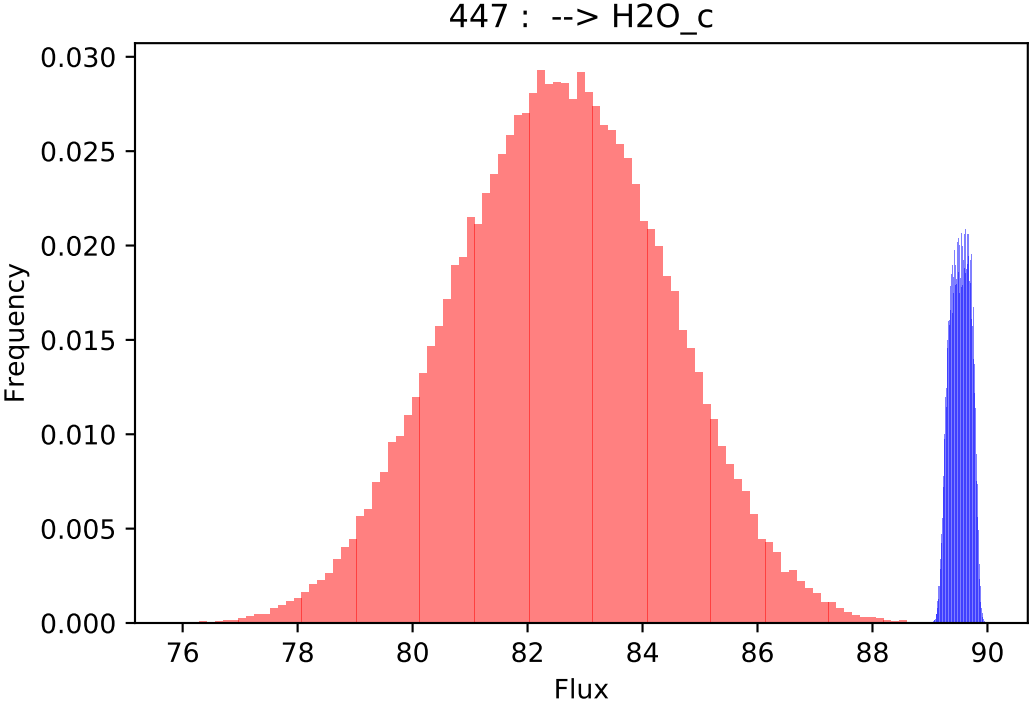

442 : Val_h --> Val_c
Frequency
0.00
0.01
0.02
0.03
0.04
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
Flux

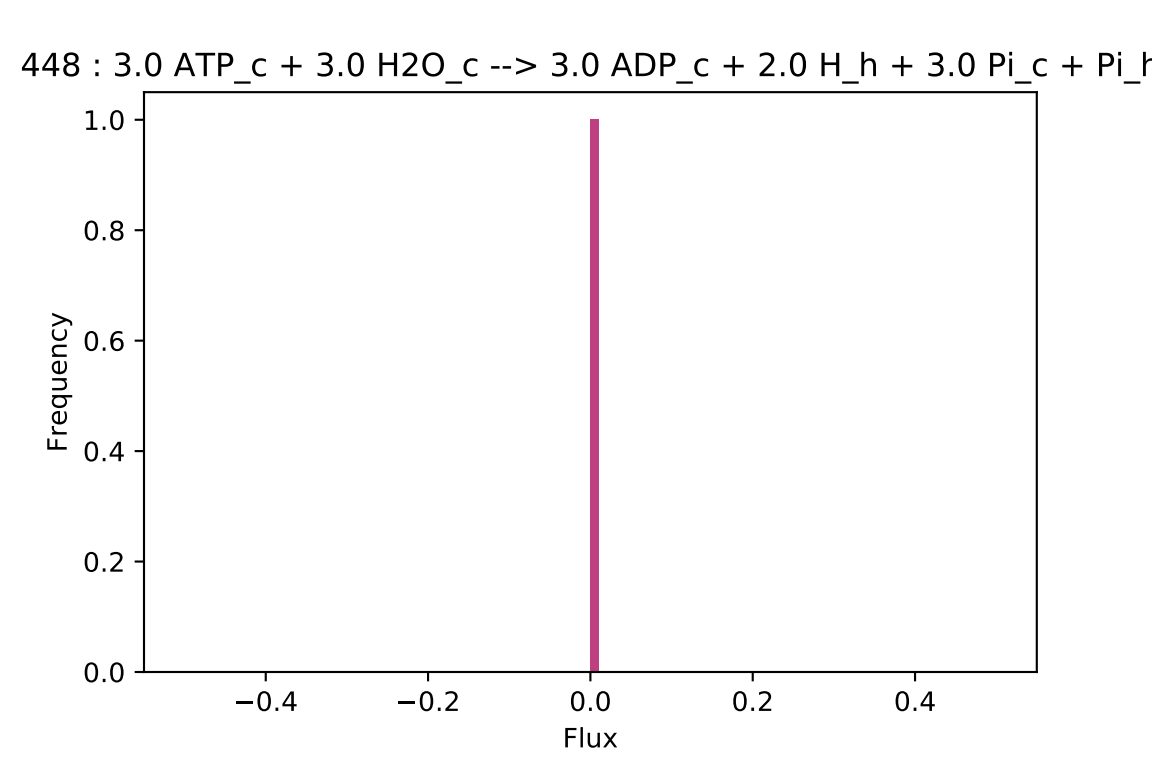

443 : Val_c --> Val_m
Frequency
0.00
0.02
0.04
0.06
0.08
0.10
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

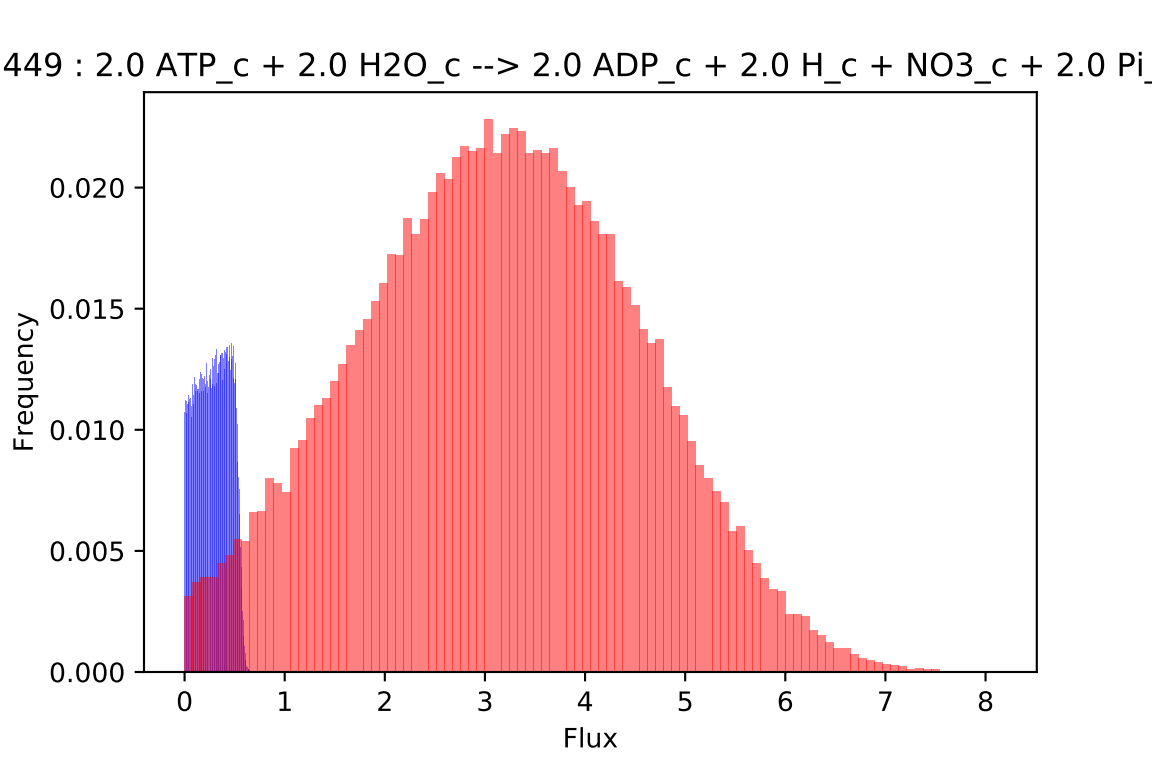

444 : <=> H_c
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
−20
−15
−10
−5
0
Flux

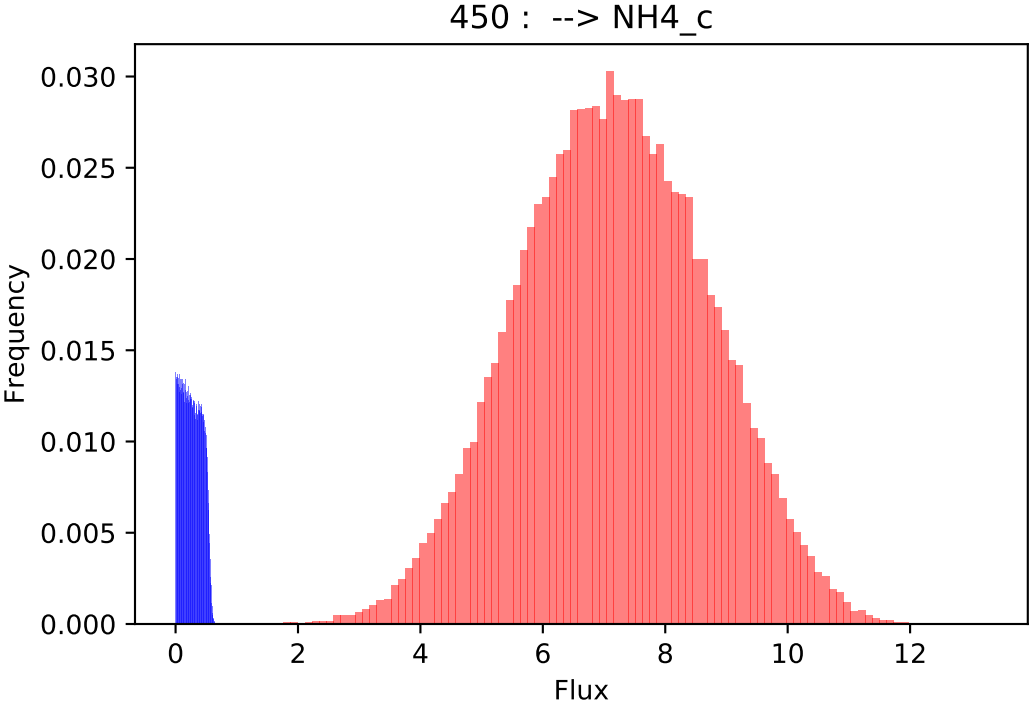

445 : --> hnu_h
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
950
960
970
980
990
1000
Flux

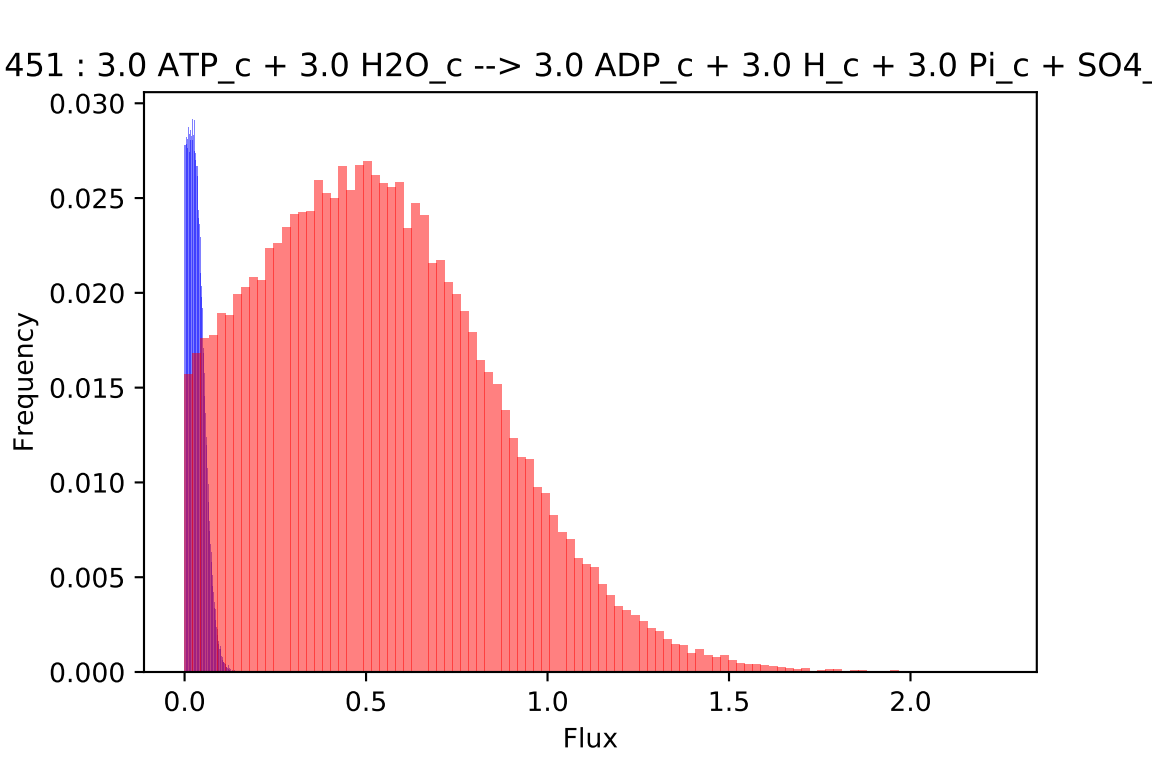

446 : --> CO2_c
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
95
96
97
98
99
100
101
Flux

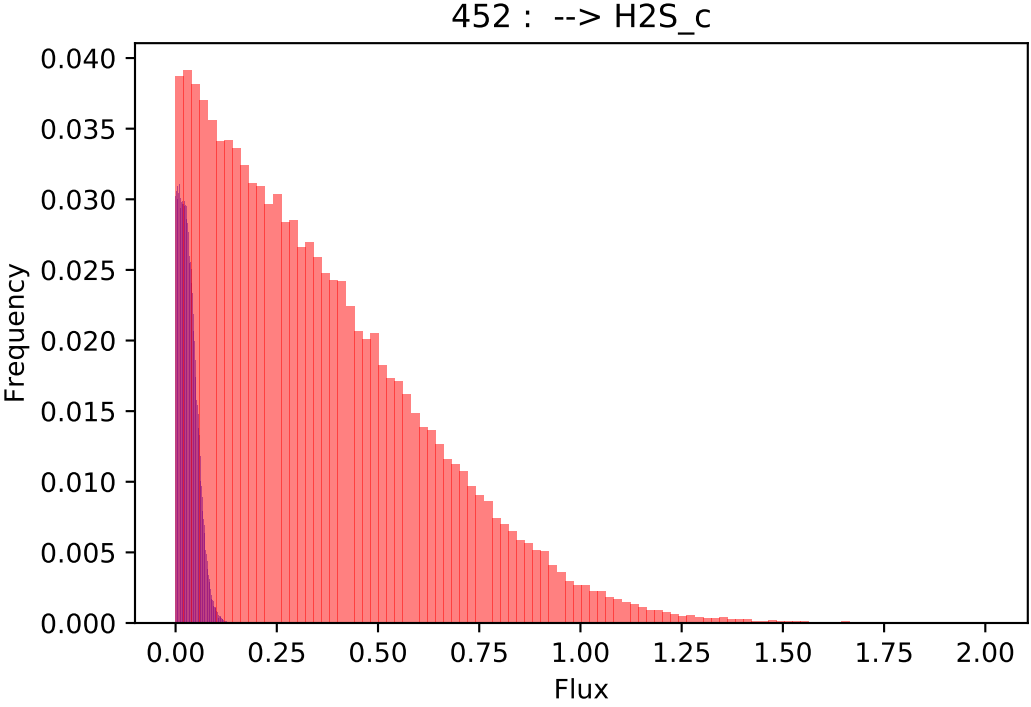

447 : --> H2O_c
0.030
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
76
78
80
82
84
86
88
90
Flux

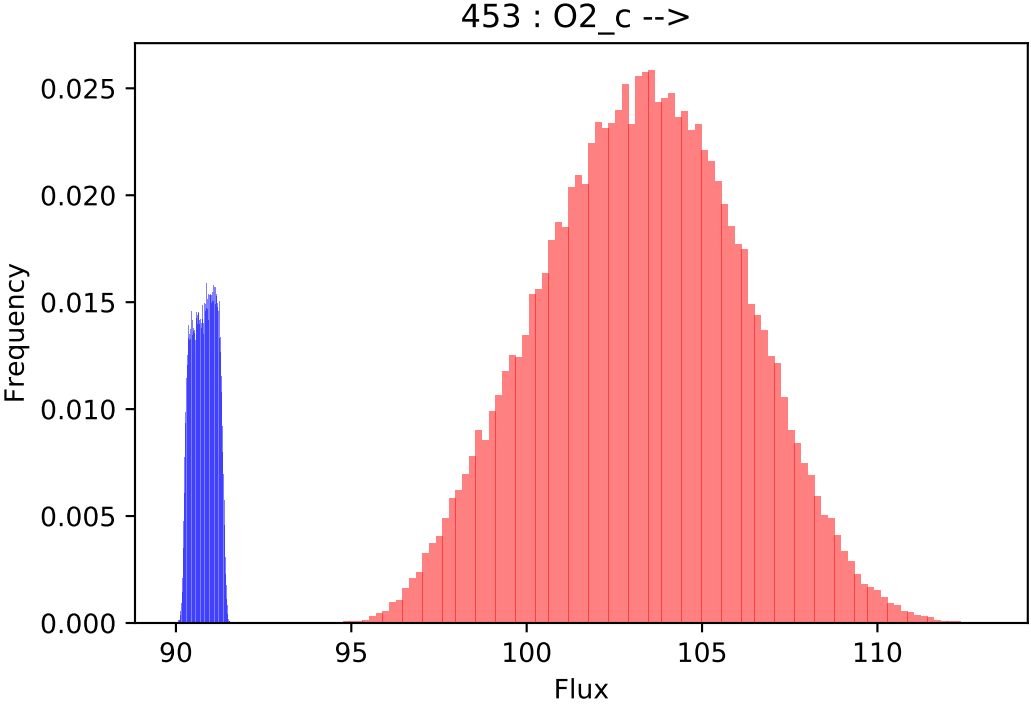

448 : 3.0 ATP_c + 3.0 H2O_c --> 3.0 ADP_c + 2.0 H_h + 3.0 Pi_c + Pi_h
Frequency
1.0
0.8
0.6
0.4
0.2
0.0
−0.4
−0.2
0.0
0.2
0.4
Flux

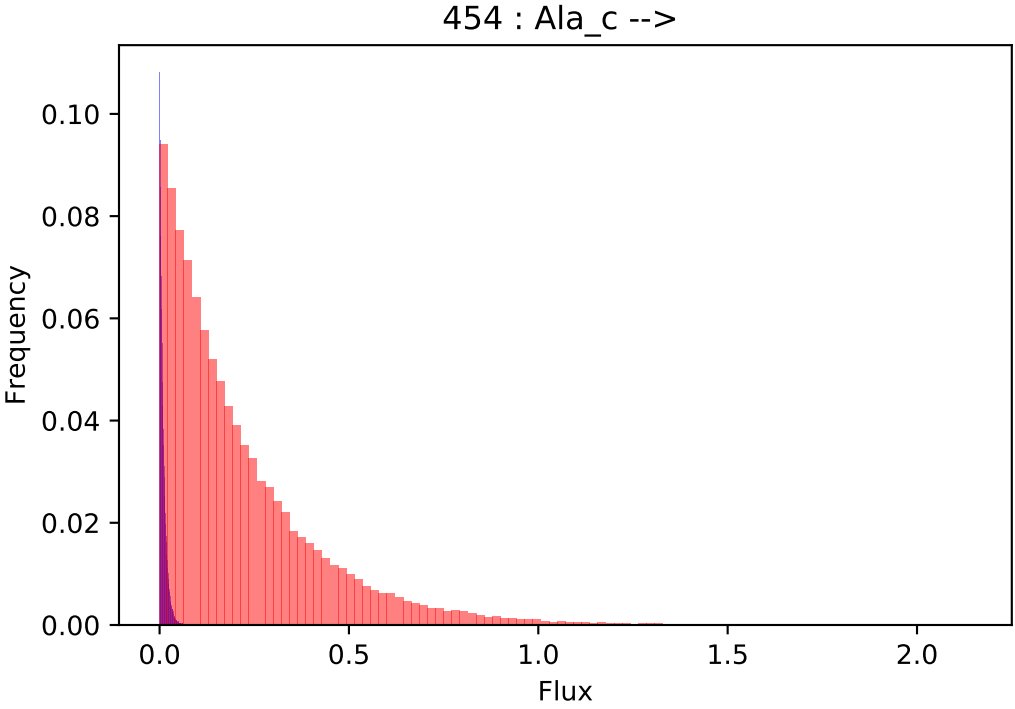

449 : 2.0 ATP_c + 2.0 H2O_c --> 2.0 ADP_c + 2.0 H_c + NO3_c + 2.0 Pi_
0.020
0.015
0.010
0.005
0.000
Frequency
0
1
2
3
4
5
6
7
8
Flux

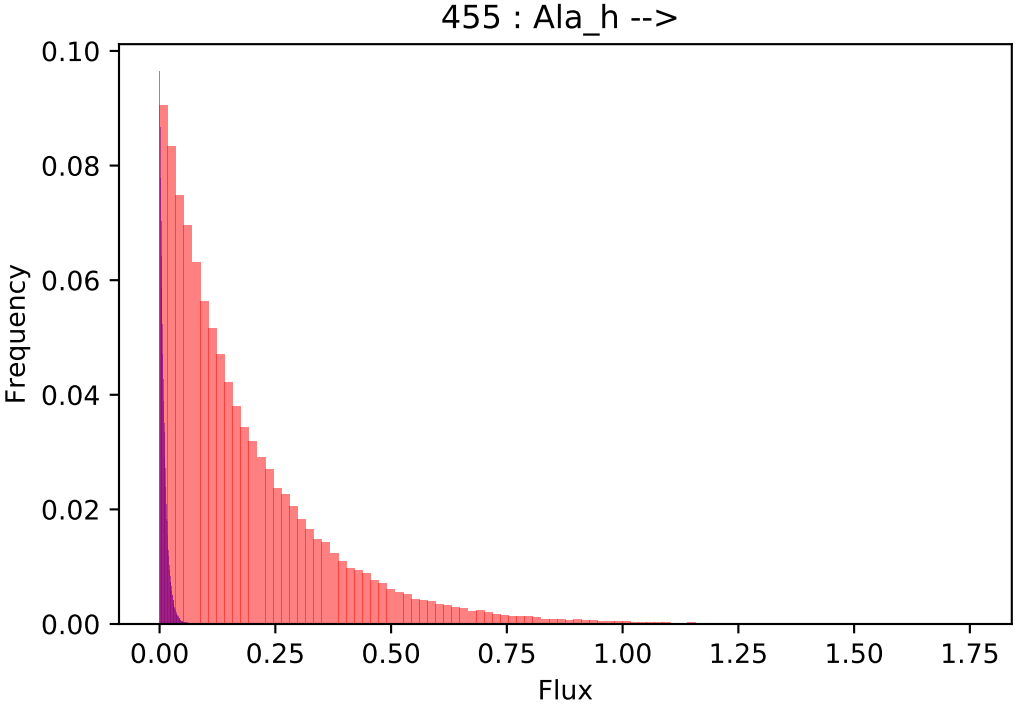

450 : --> NH4_c
0.030
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
0
2
4
6
8
10
12
Flux

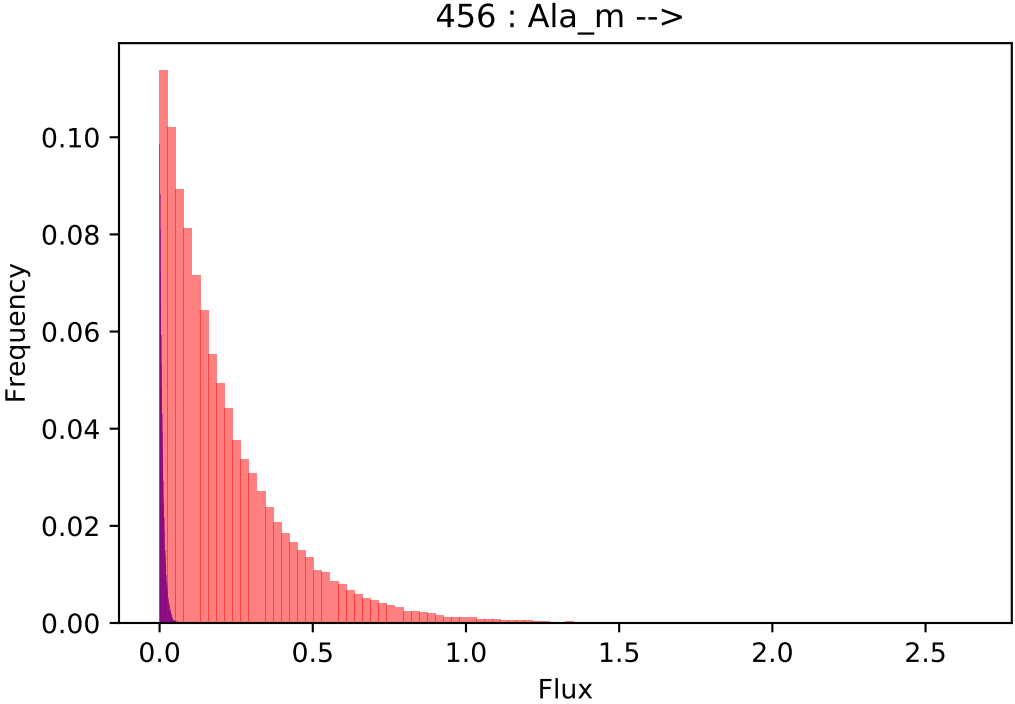

451 : 3.0 ATP_c + 3.0 H2O_c --> 3.0 ADP_c + 3.0 H_c + 3.0 Pi_c + SO4_
0.030
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
0.0
0.5
1.0
1.5
2.0
Flux

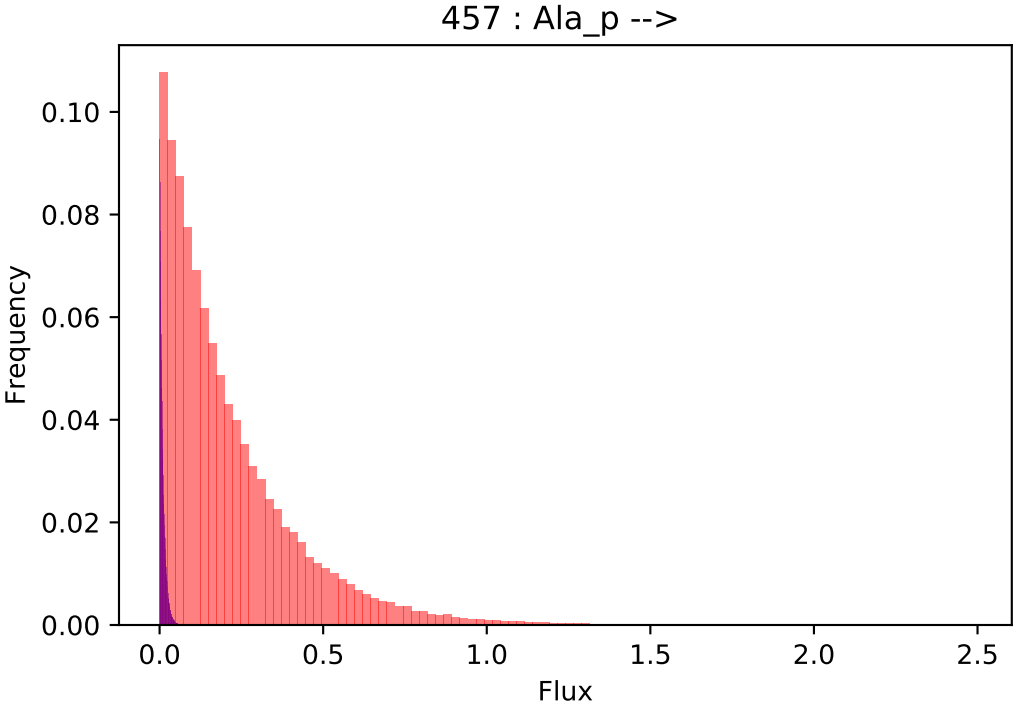

452 : --> H2S_c
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
Flux

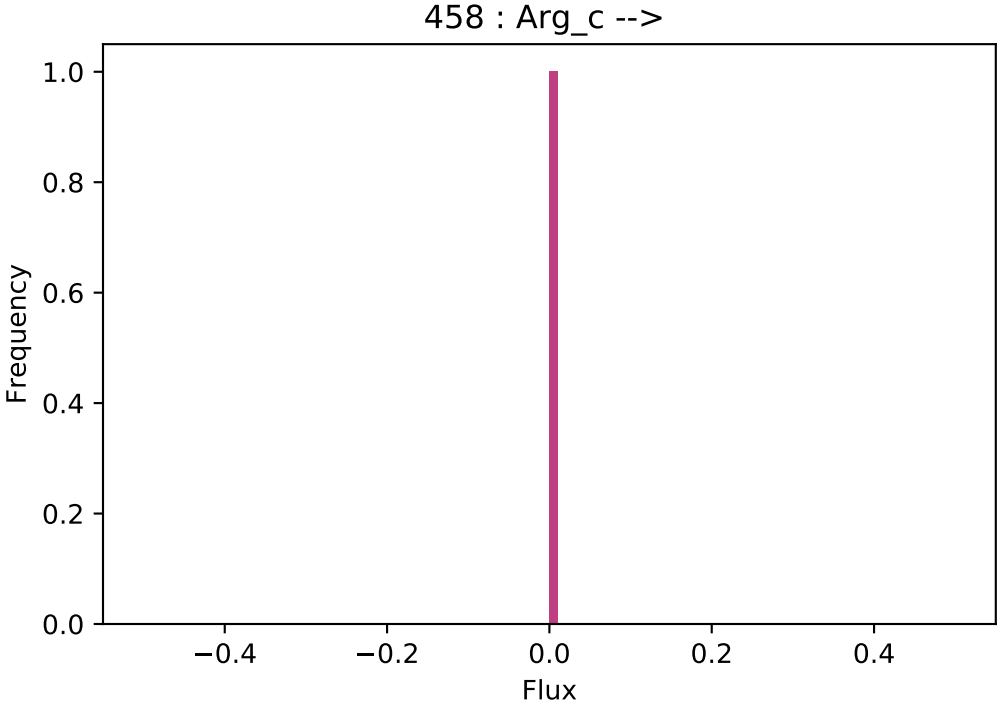

453 : O2_c -->
0.025
0.020
0.015
0.010
0.005
0.000
Frequency
90
95
100
105
110
Flux

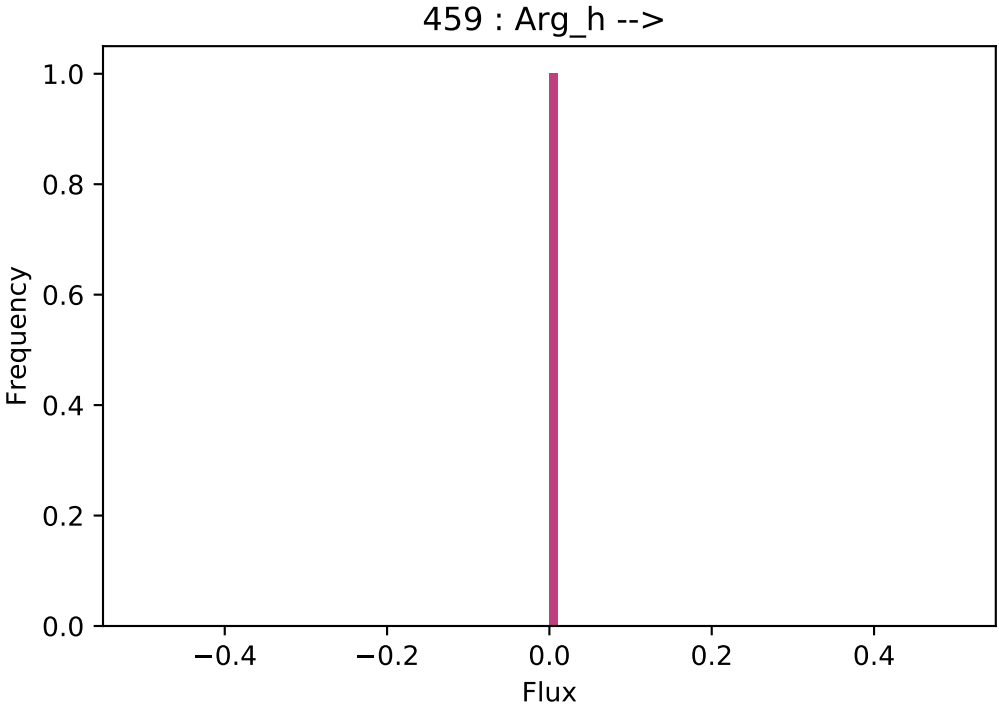

454 : Ala_c -->
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.5
1.0
1.5
2.0
Flux

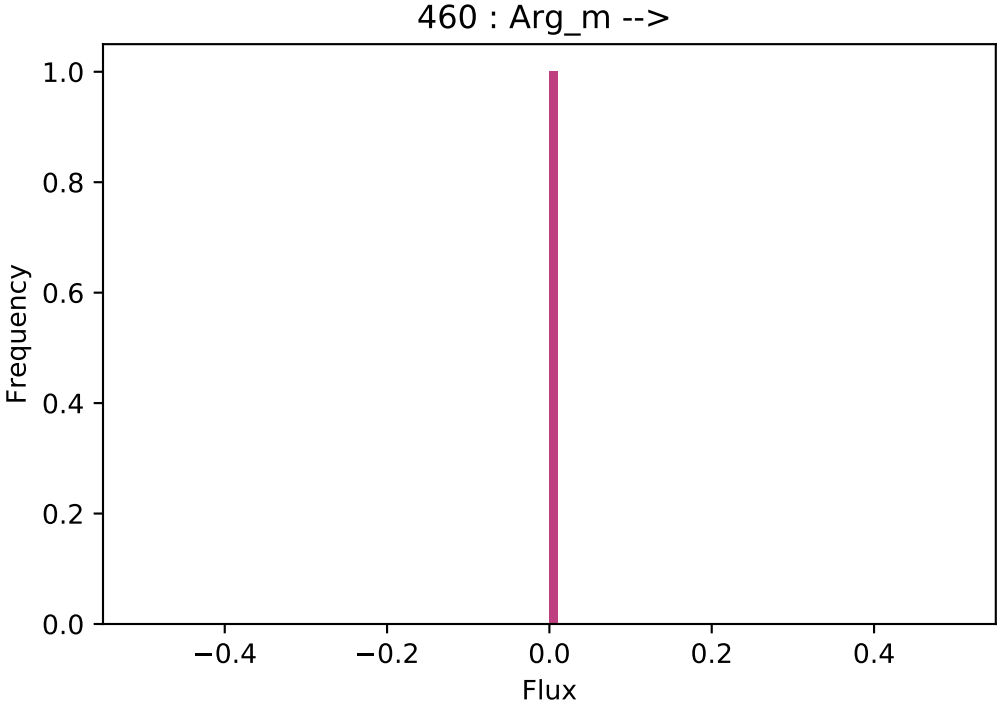

455 : Ala_h -->
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
Flux

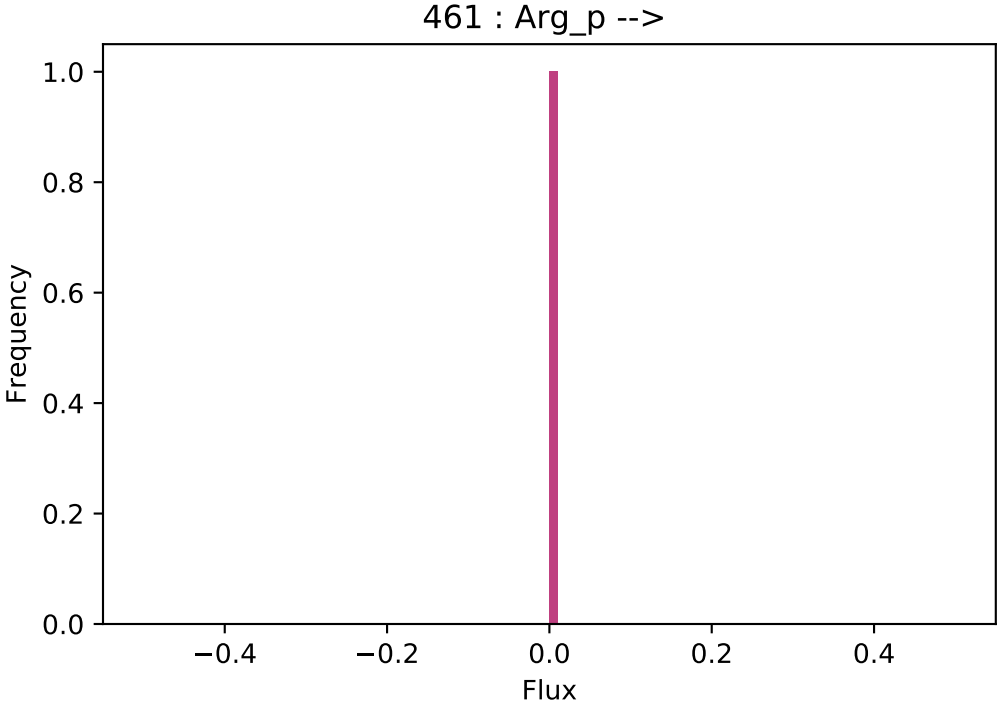

456 : Ala_m -->
Frequency
0.00
0.02
0.04
0.06
0.08
0.10
0.0
0.5
1.0
1.5
2.0
2.5
Flux

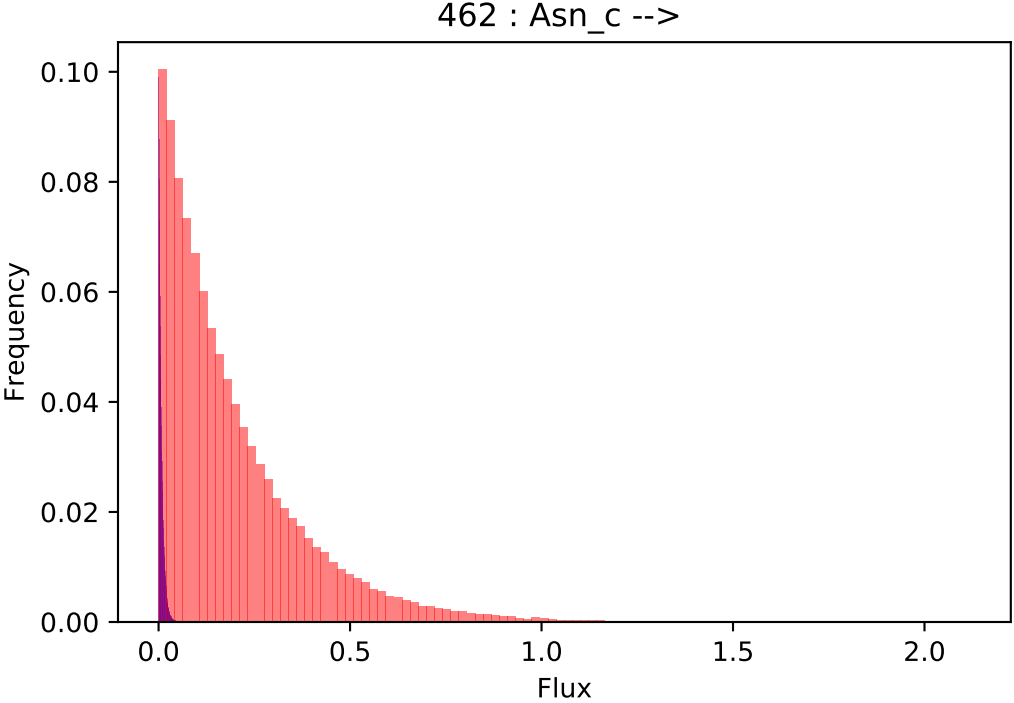

457 : Ala_p -->
Frequency
0.00
0.02
0.04
0.06
0.08
0.10
0.0
0.5
1.0
1.5
2.0
2.5
Flux

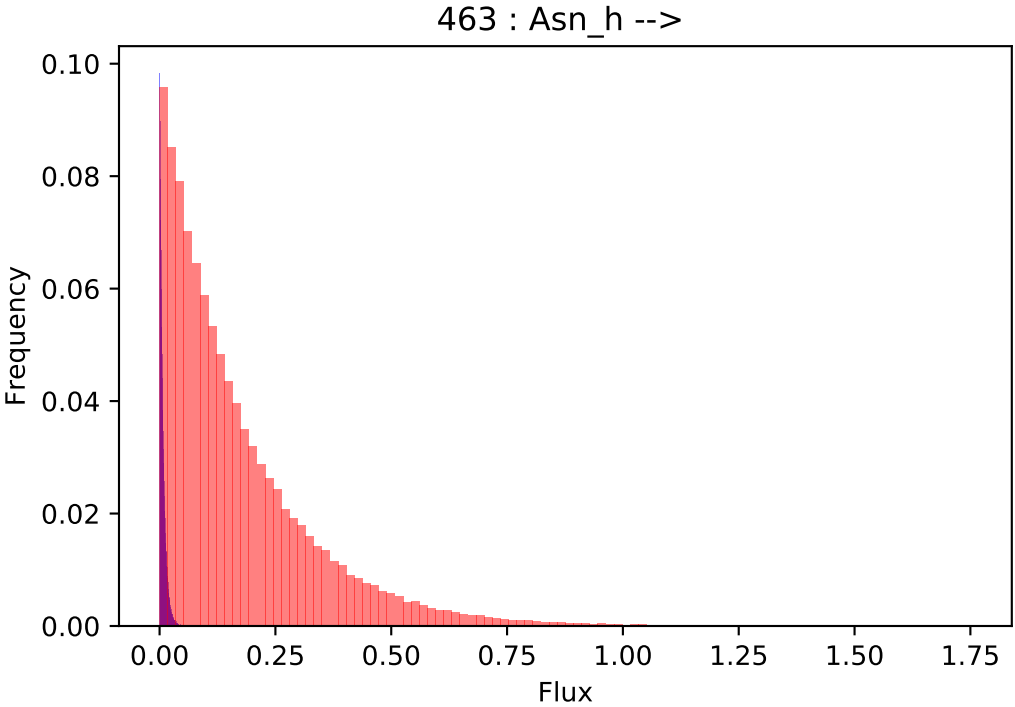

458 : Arg_c -->
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

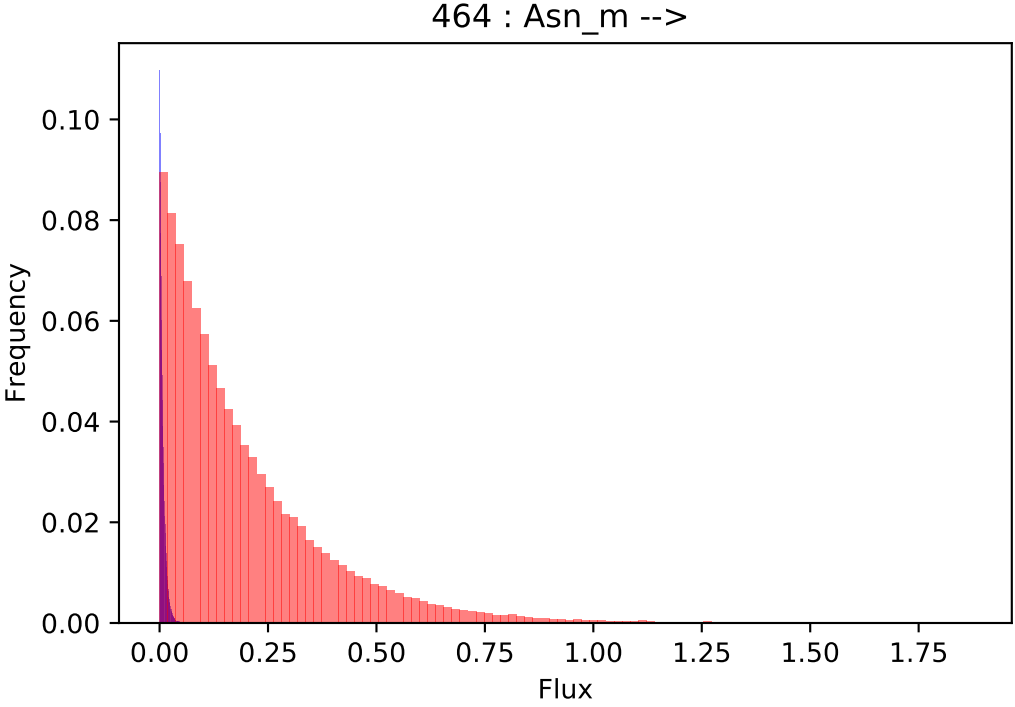

459 : Arg_h -->
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

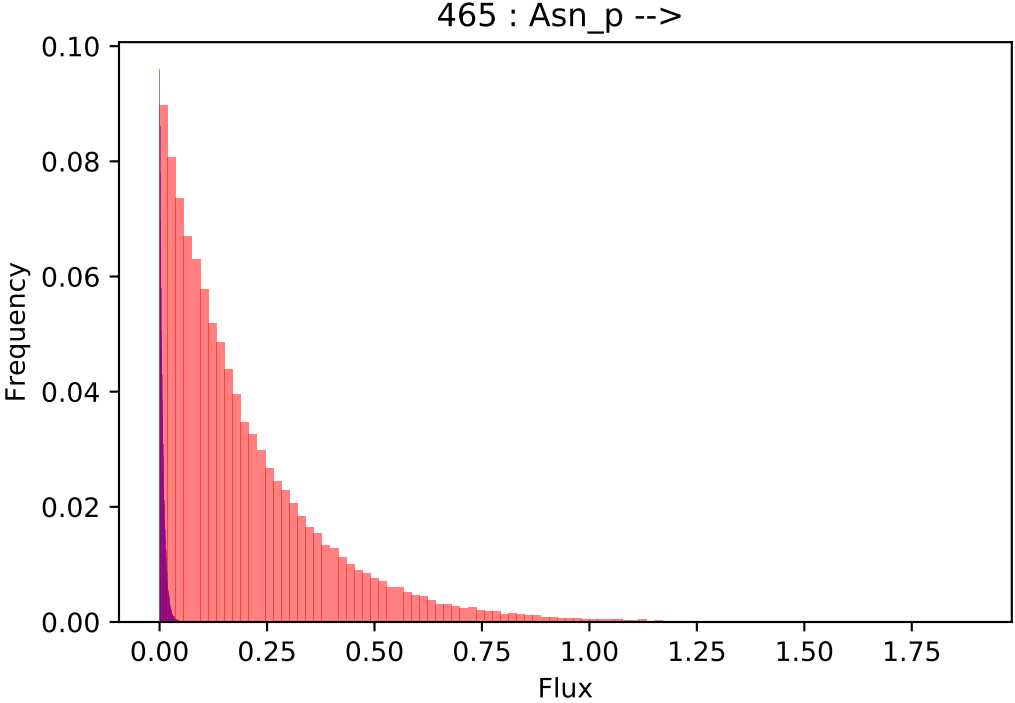

460 : Arg_m -->
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

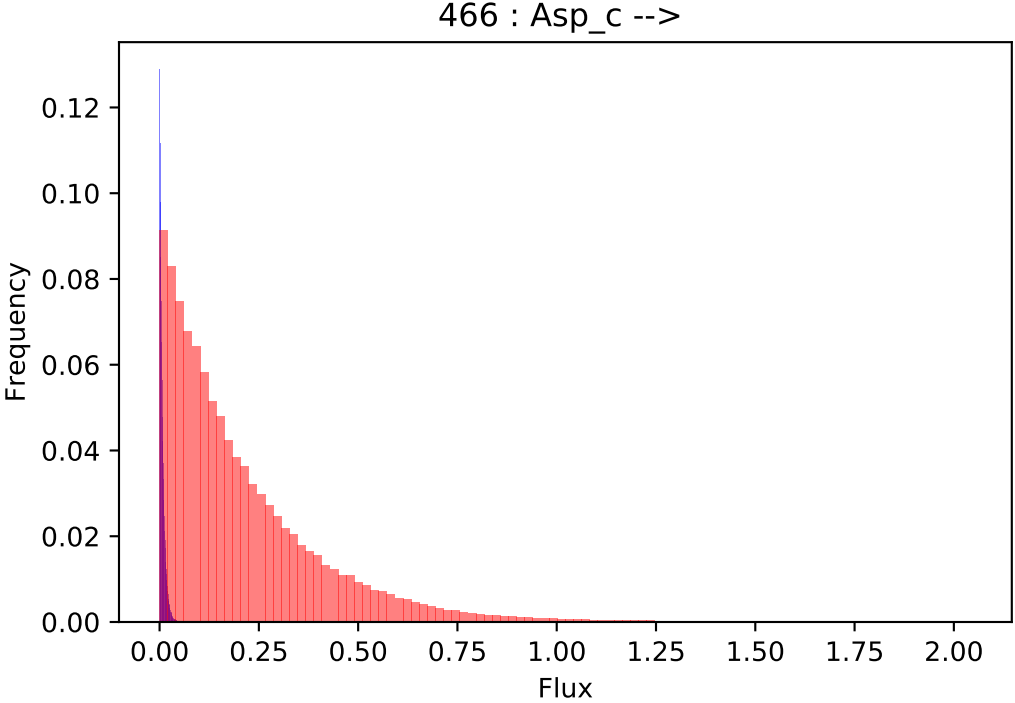

461 : Arg_p -->
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

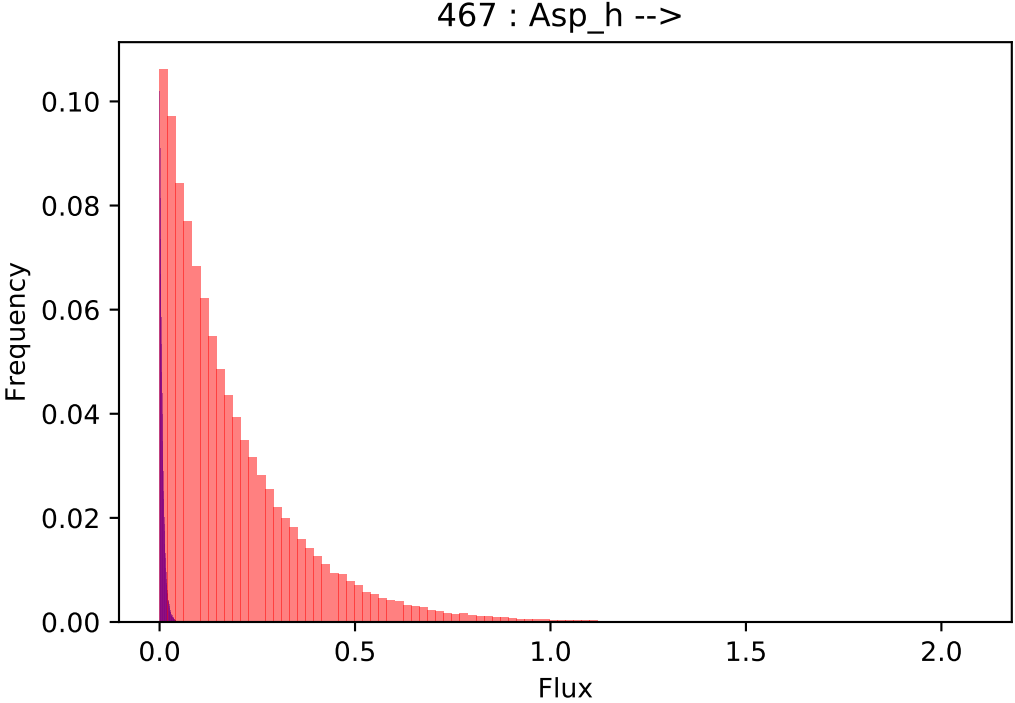

462 : Asn_c -->
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.5
1.0
1.5
2.0
Flux

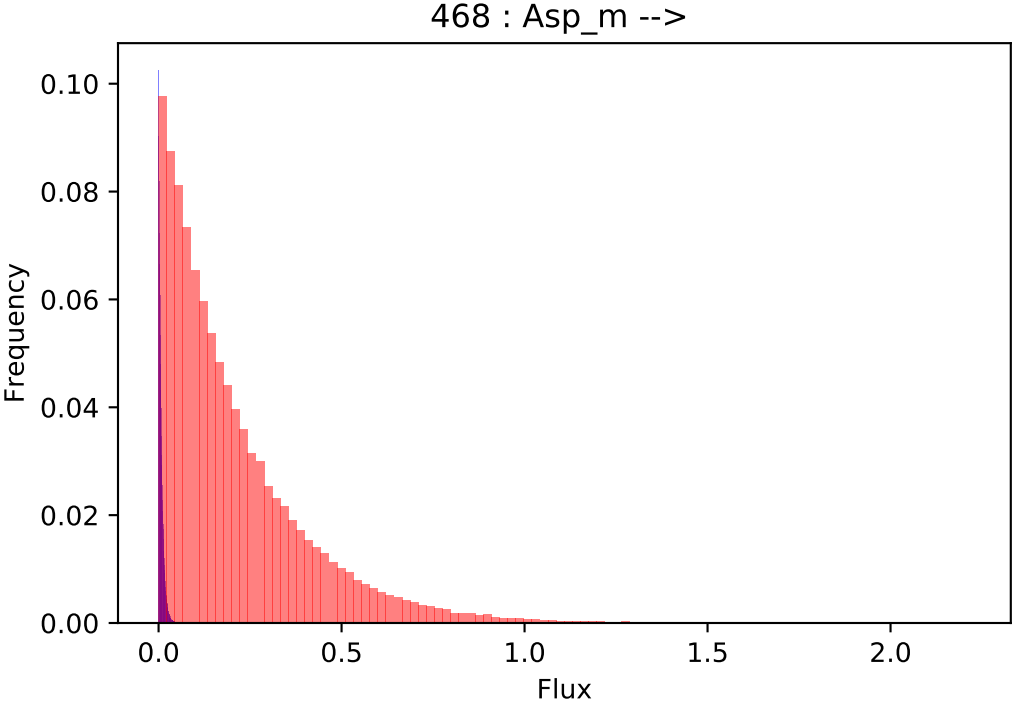

463 : Asn_h -->
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
Flux

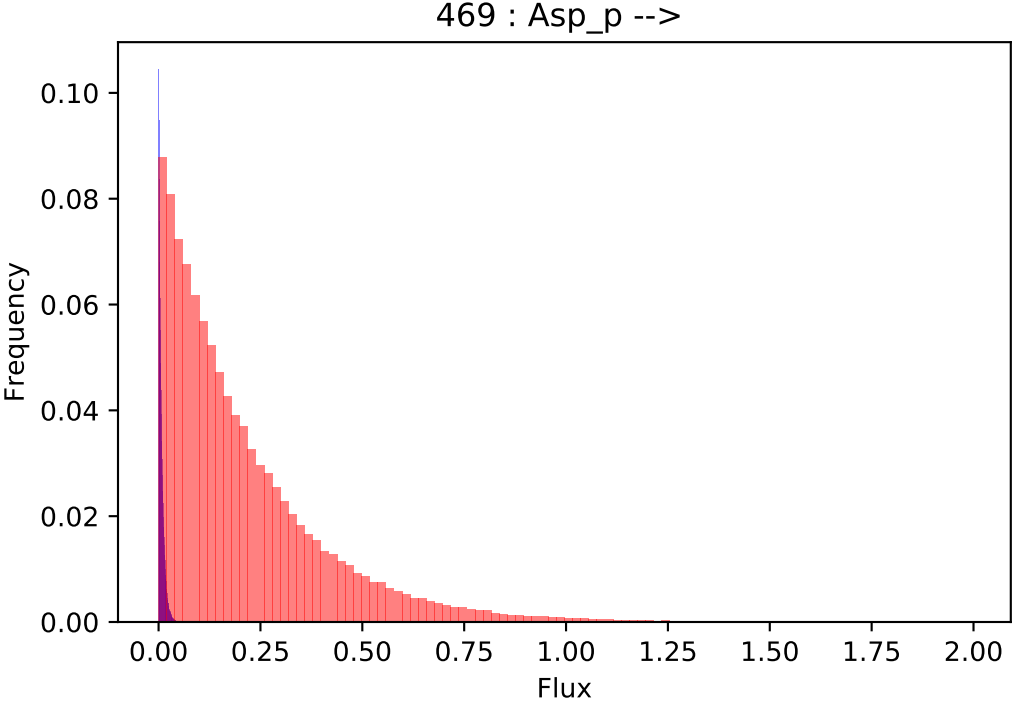

464 : Asn_m -->
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
Flux

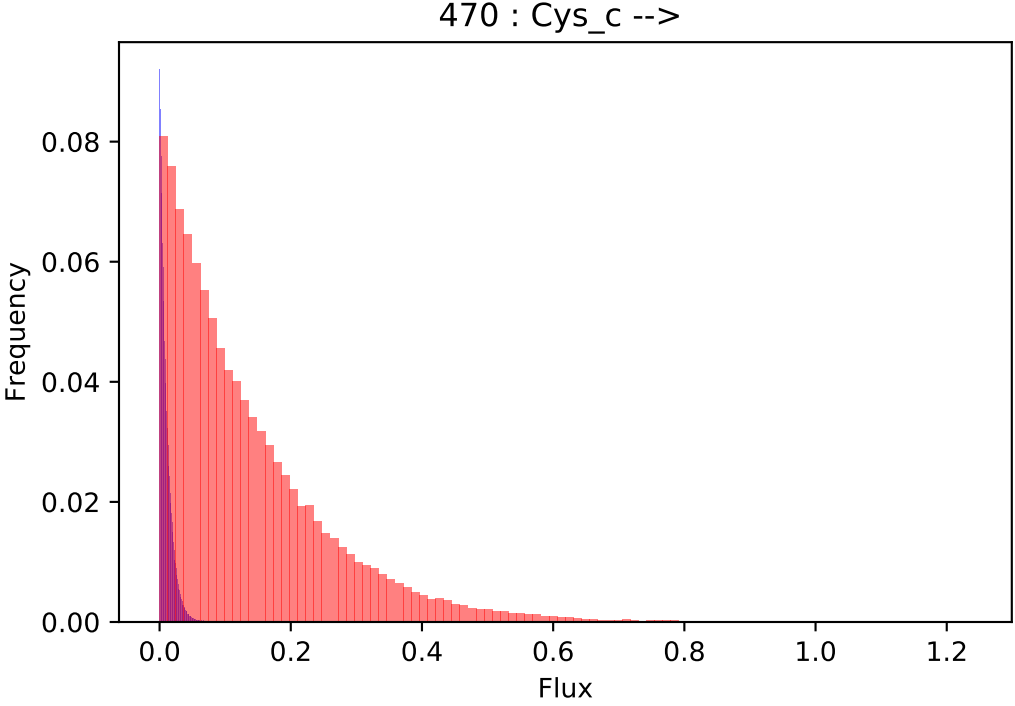

465 : Asn_p -->
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
Flux

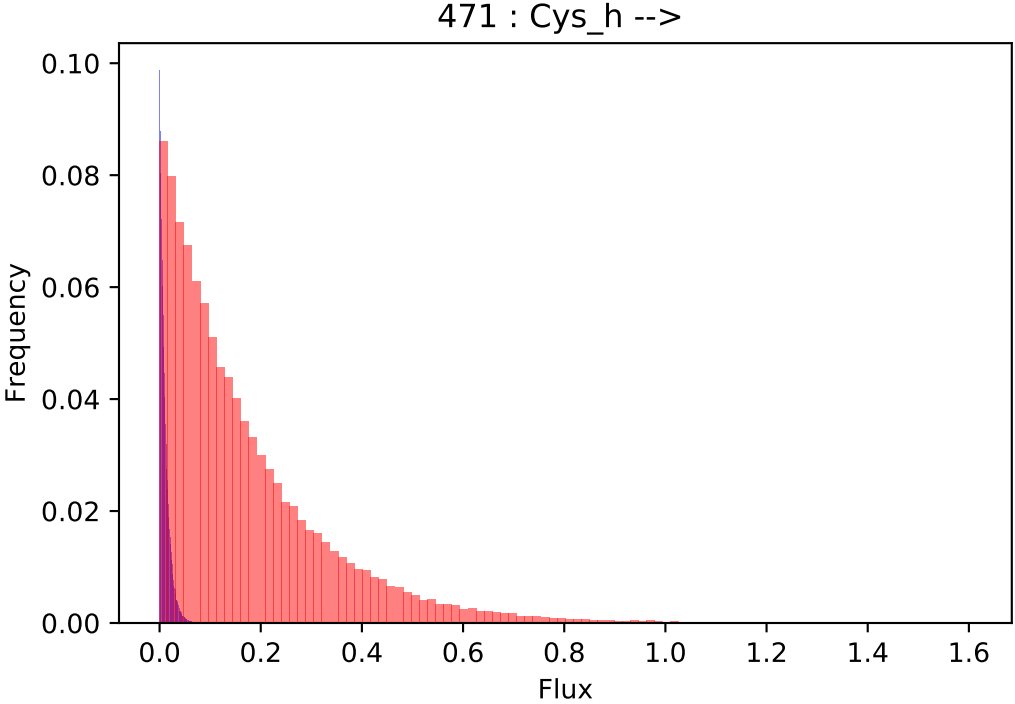

466 : Asp_c -->
Frequency
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
Flux

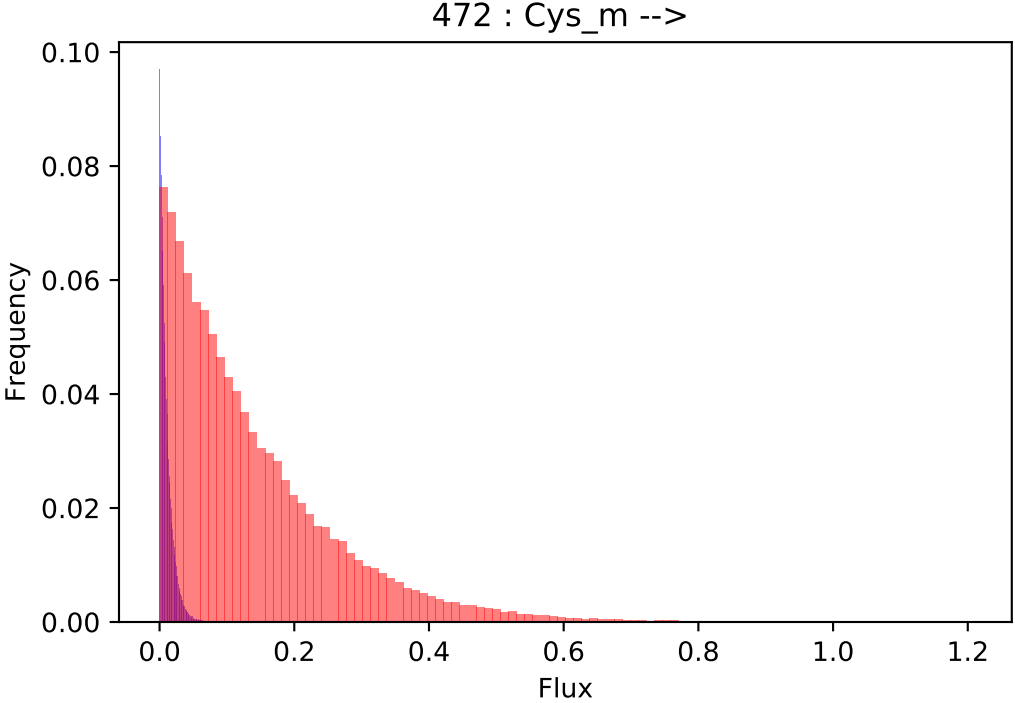

467 : Asp_h -->
Frequency
0.00
0.02
0.04
0.06
0.08
0.10
0.0
0.5
1.0
1.5
2.0
Flux

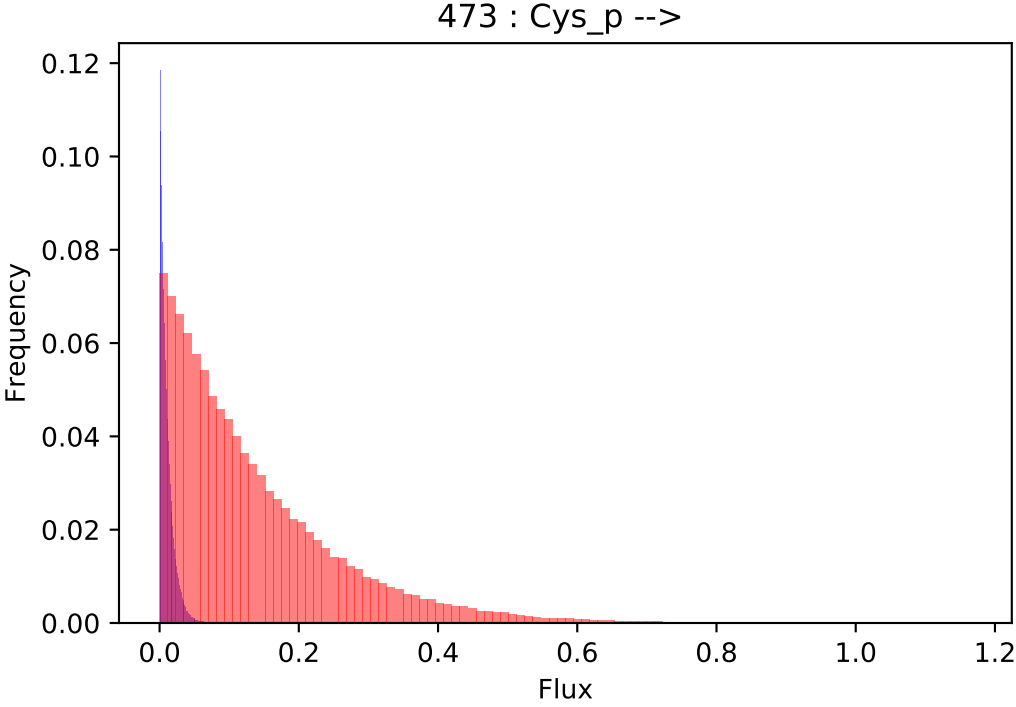

468 : Asp_m -->
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.5
1.0
1.5
2.0
Flux

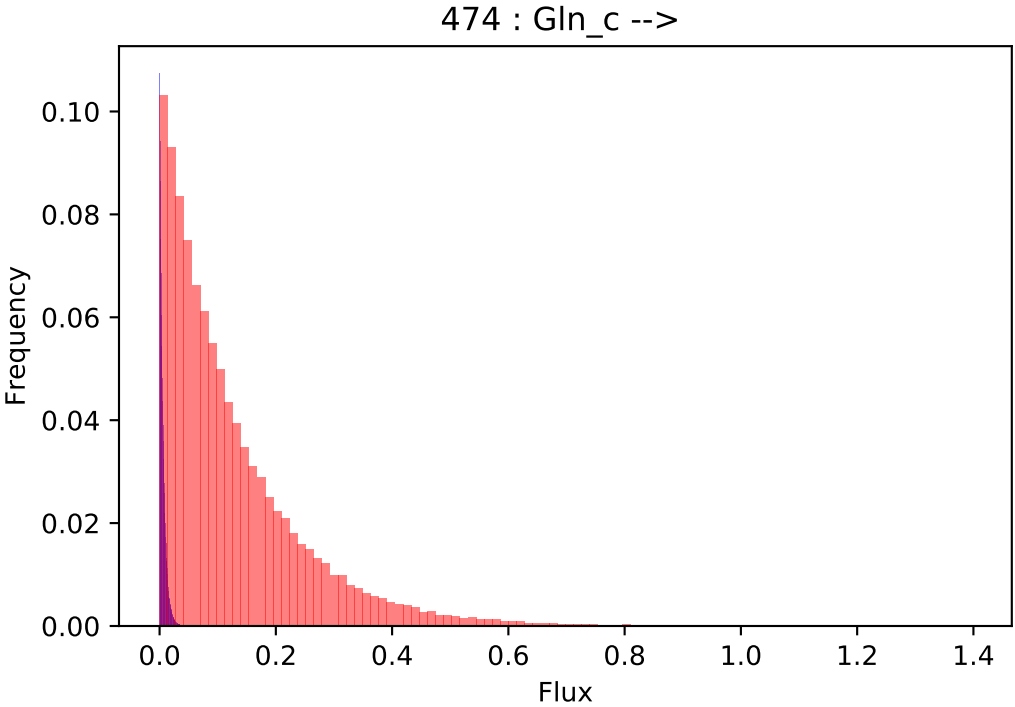

469 : Asp_p -->
Frequency
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
Flux

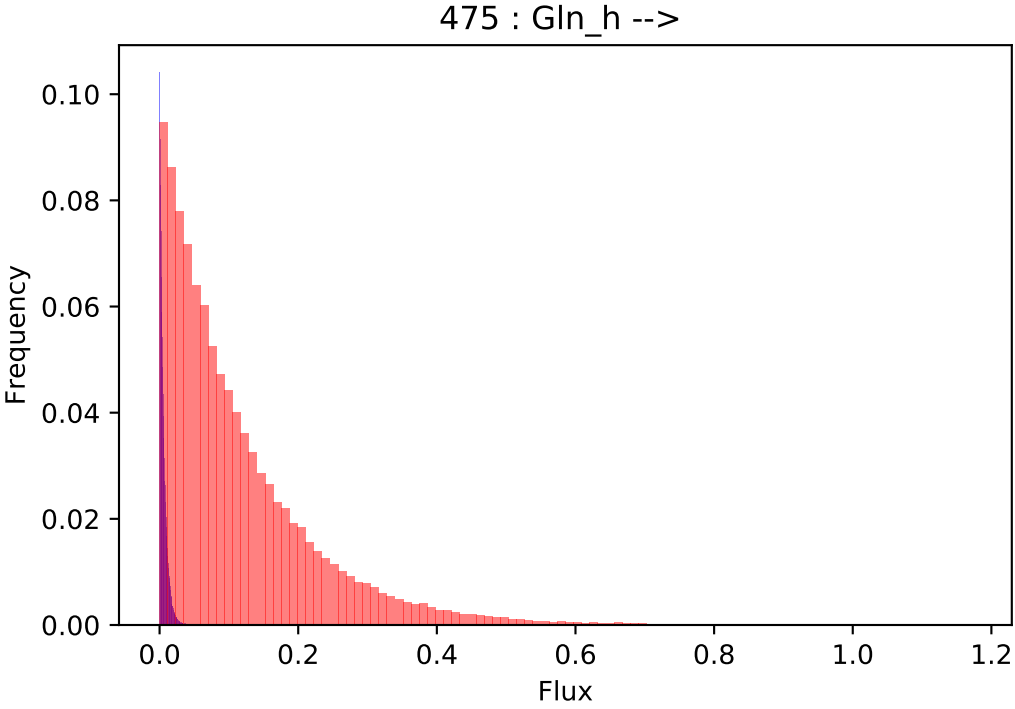

470 : Cys_c -->
Frequency
0.00
0.02
0.04
0.06
0.08
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

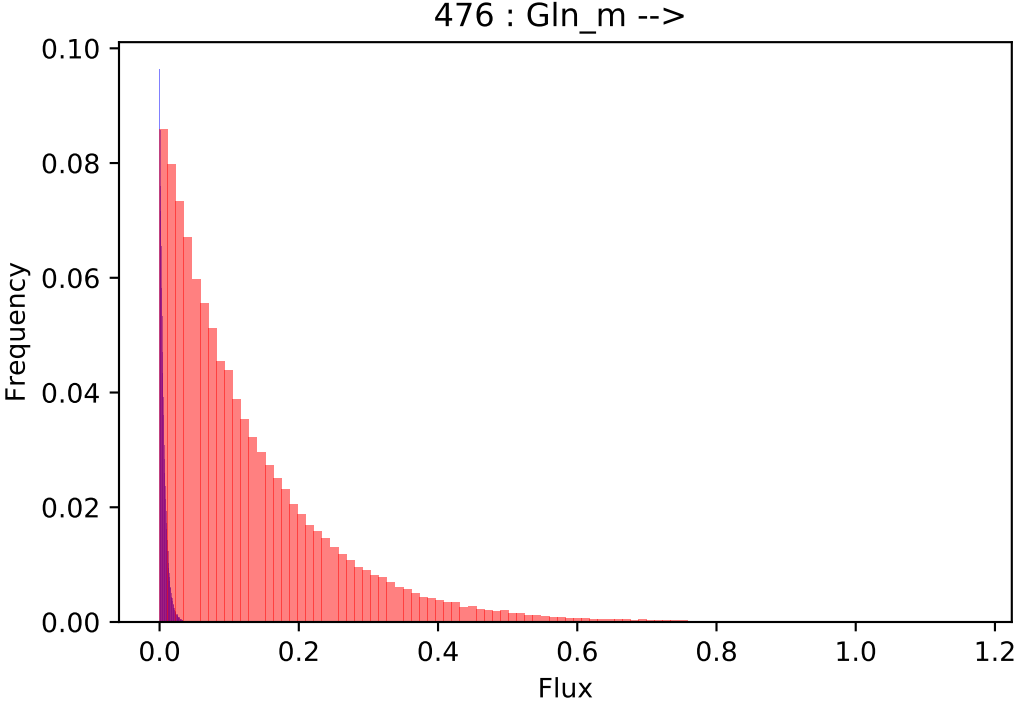

471 : Cys_h -->
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
Flux

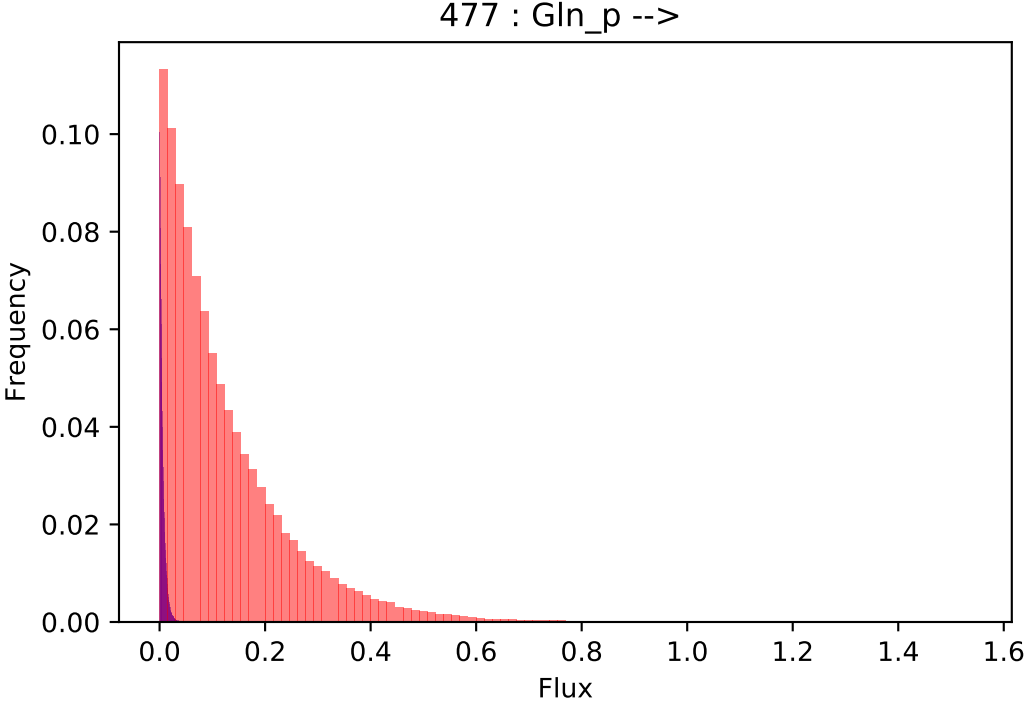

472 : Cys_m -->
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

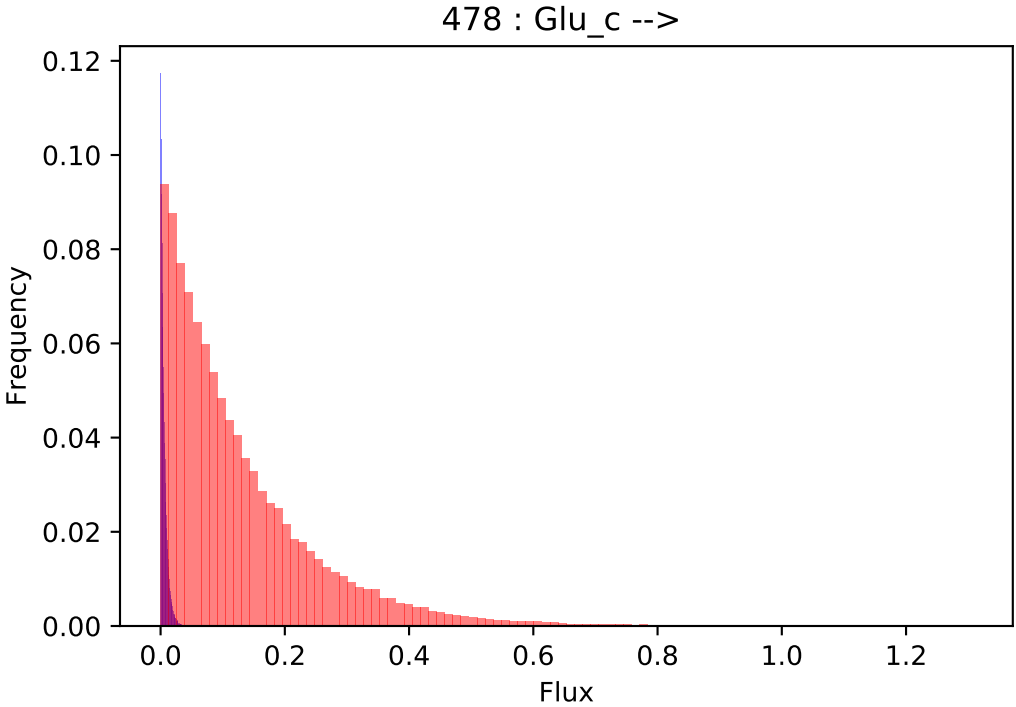

473 : Cys_p -->
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

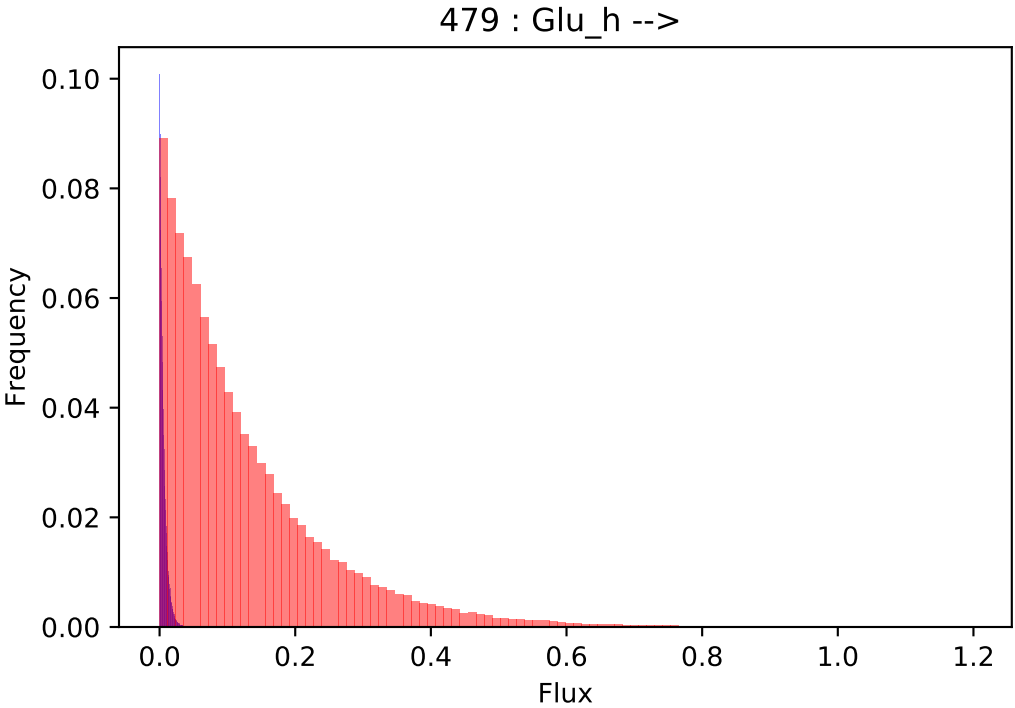

474 : Gln_c -->
Frequency
0.00
0.02
0.04
0.06
0.08
0.10
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
Flux

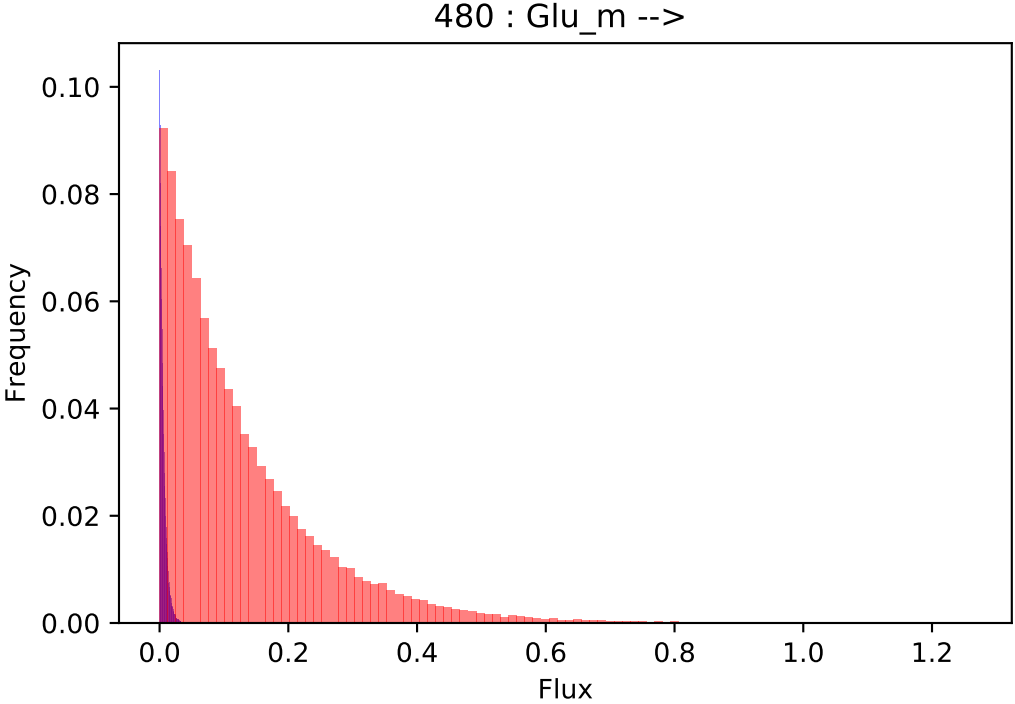

475 : Gln_h -->
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

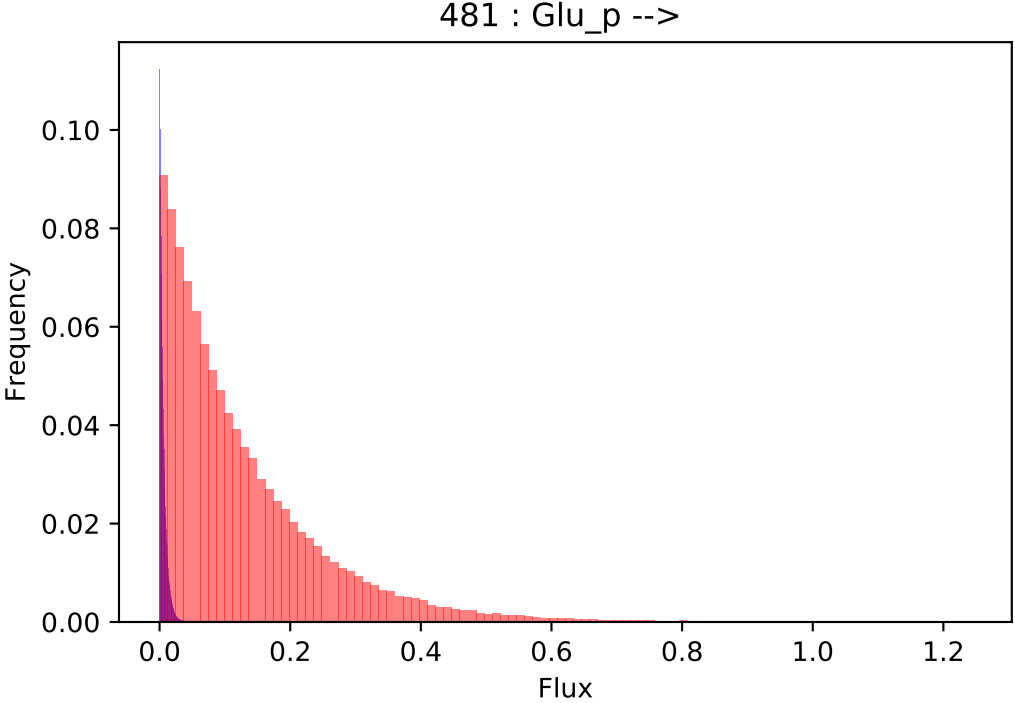

476 : Gln_m -->
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

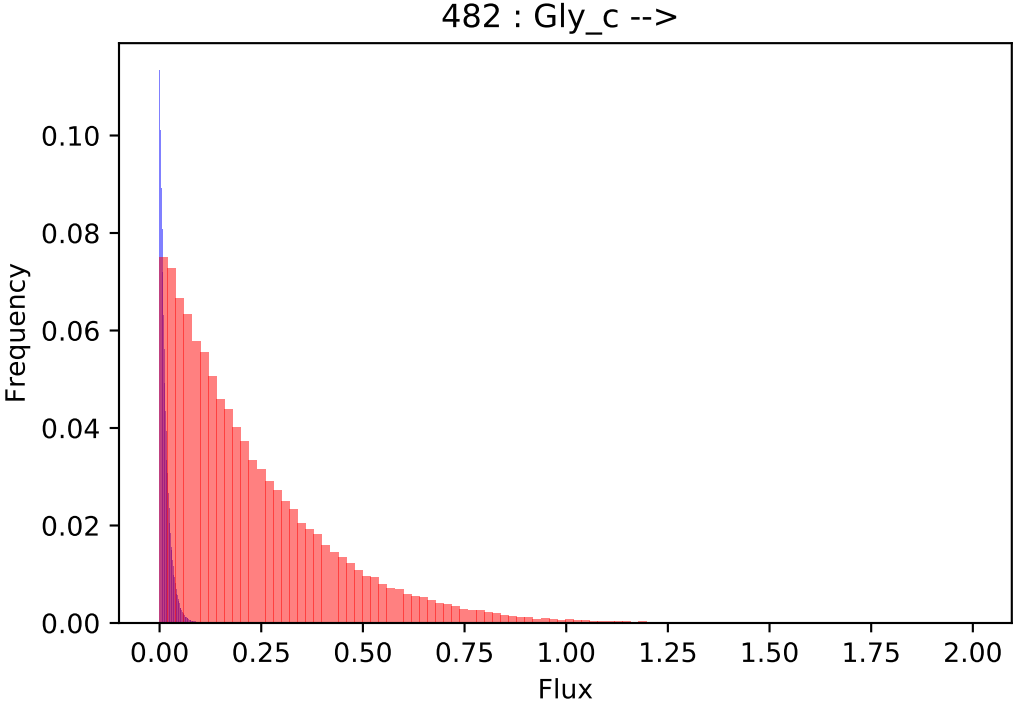

477 : Gln_p -->
Frequency
0.00
0.02
0.04
0.06
0.08
0.10
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
Flux

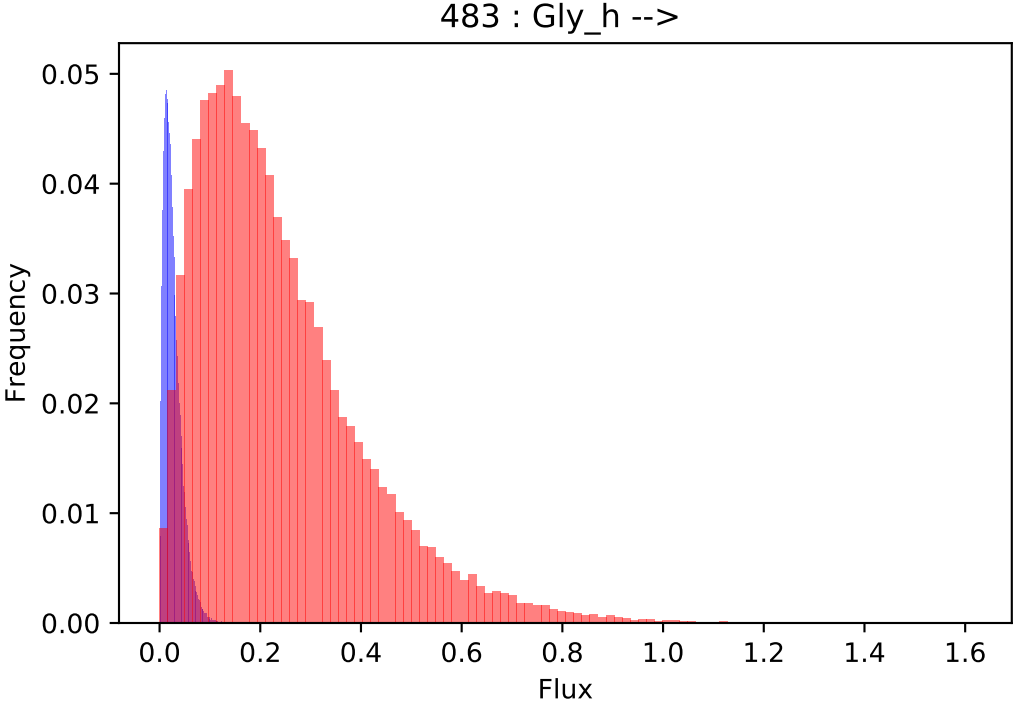

478 : Glu_c -->
Frequency
Flux
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.0
0.2
0.4
0.6
0.8
1.0
1.2

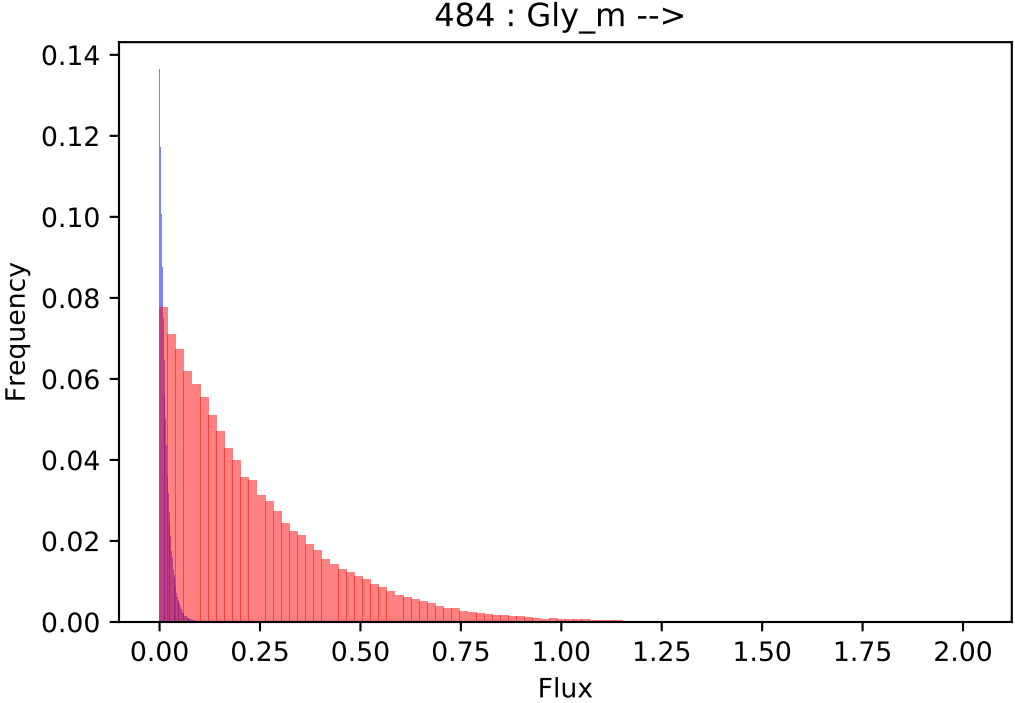

479 : Glu_h -->
Frequency
0.10
0.08
0.06
0.04
0.02
0.00
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

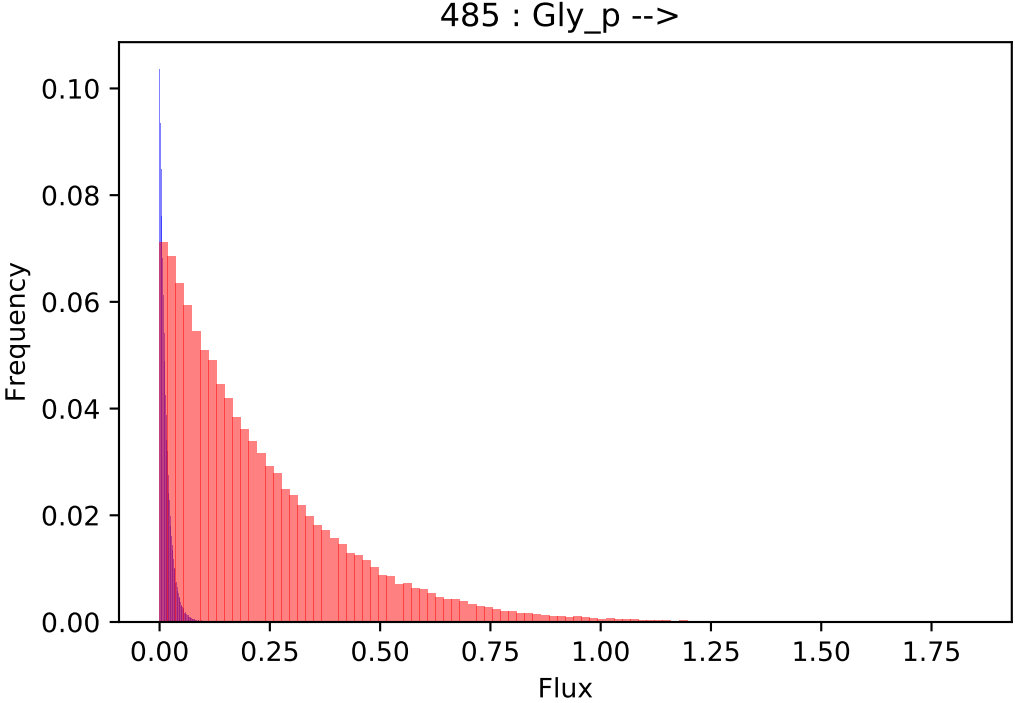

480 : Glu_m -->
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

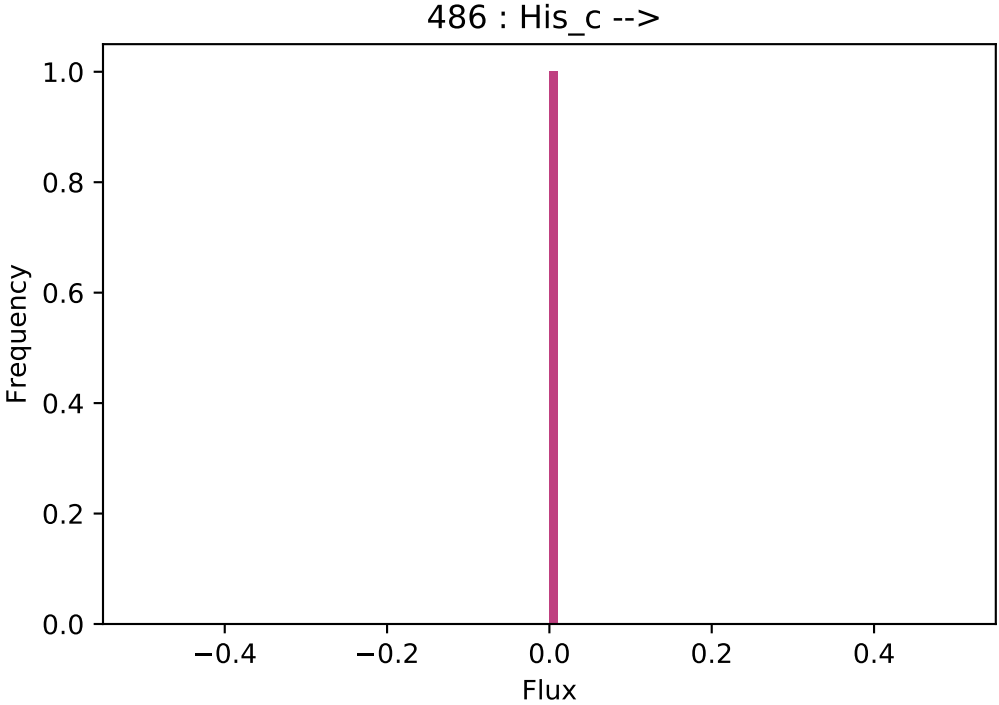

481 : Glu_p -->
Frequency
0.00
0.02
0.04
0.06
0.08
0.10
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

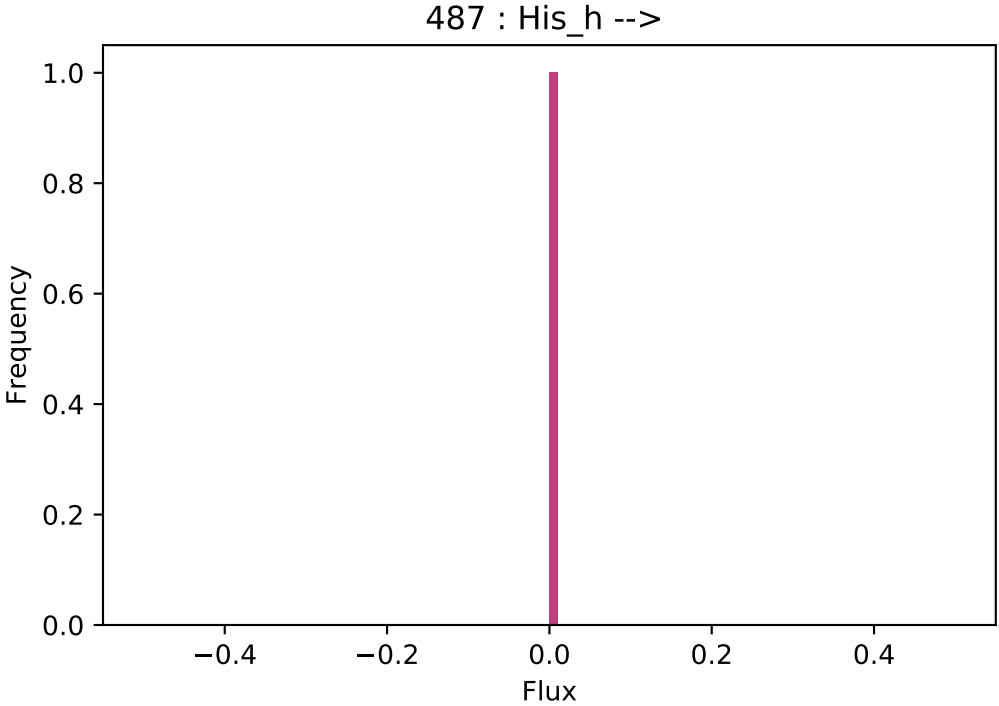

482 : Gly_c -->
Frequency
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
Flux

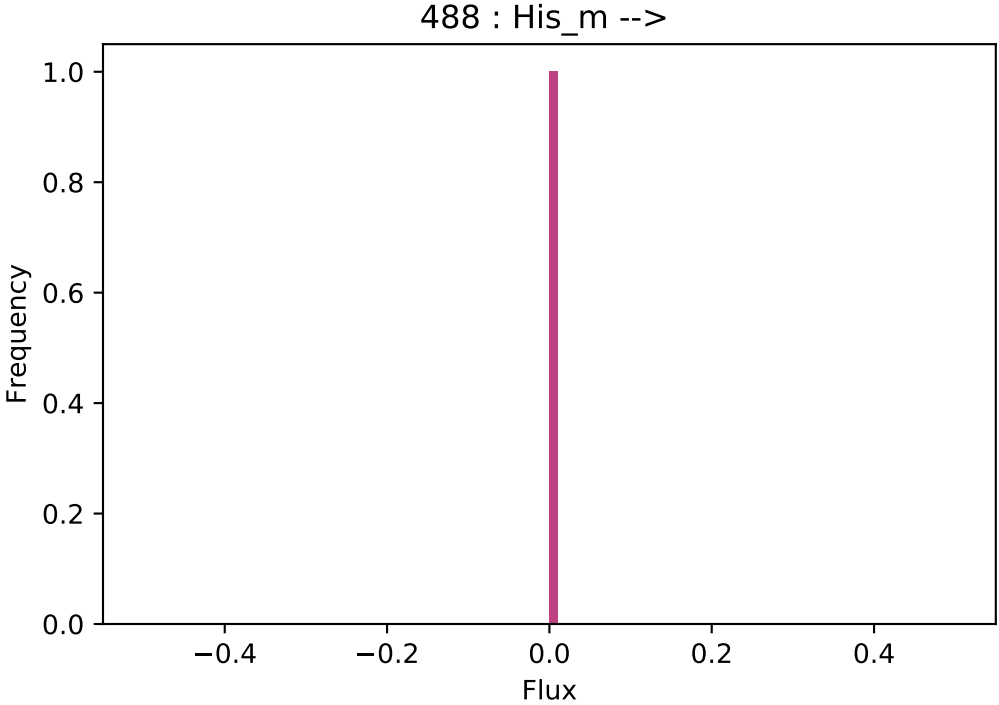

483 : Gly_h -->
Frequency
0.05
0.04
0.03
0.02
0.01
0.00
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
Flux

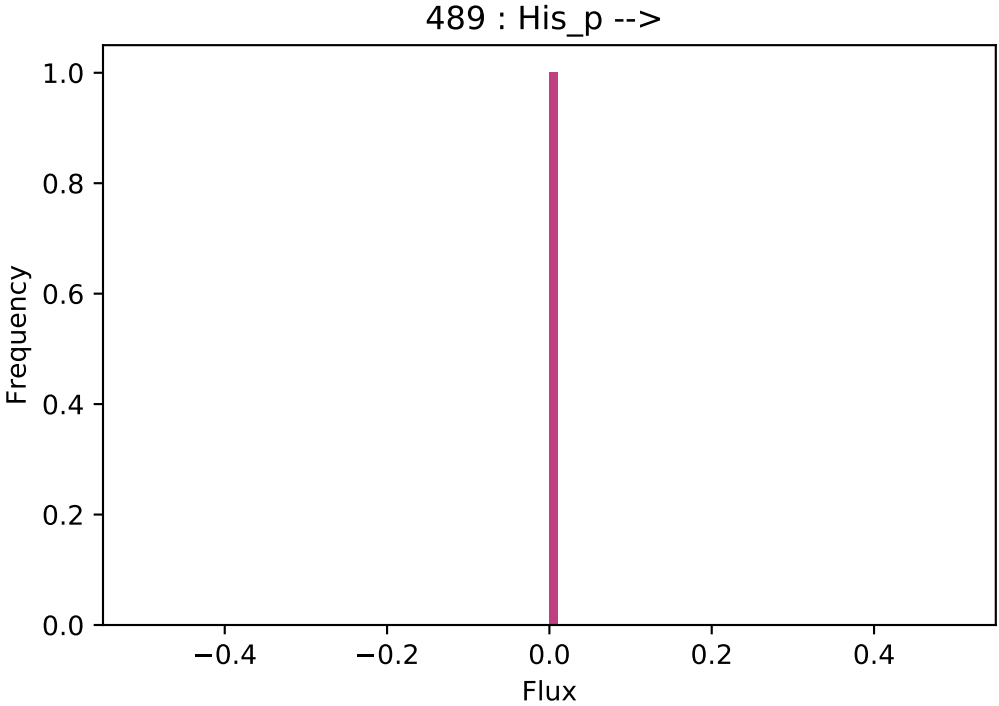

484 : Gly_m -->
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
Flux

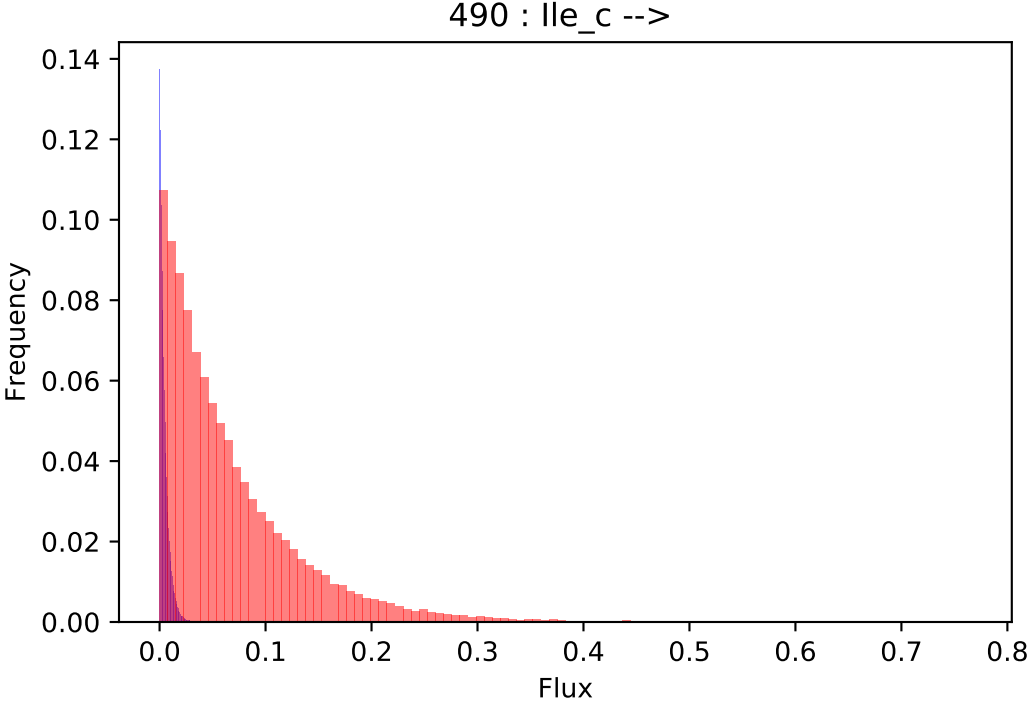

485 : Gly_p -->
Frequency
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
Flux

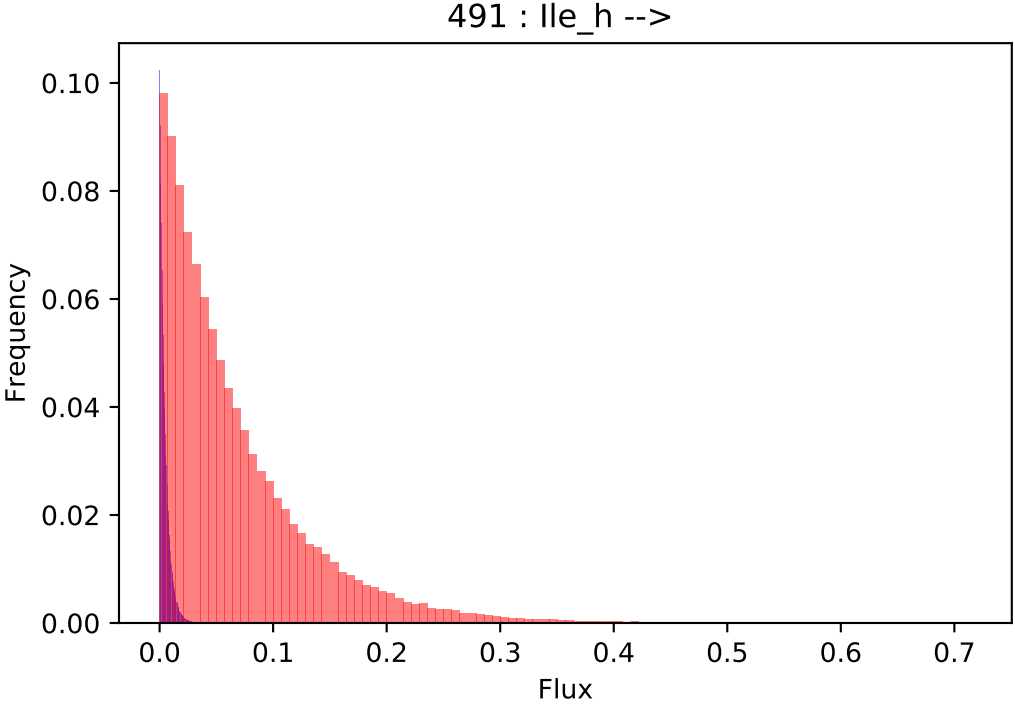

486 : His_c -->
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

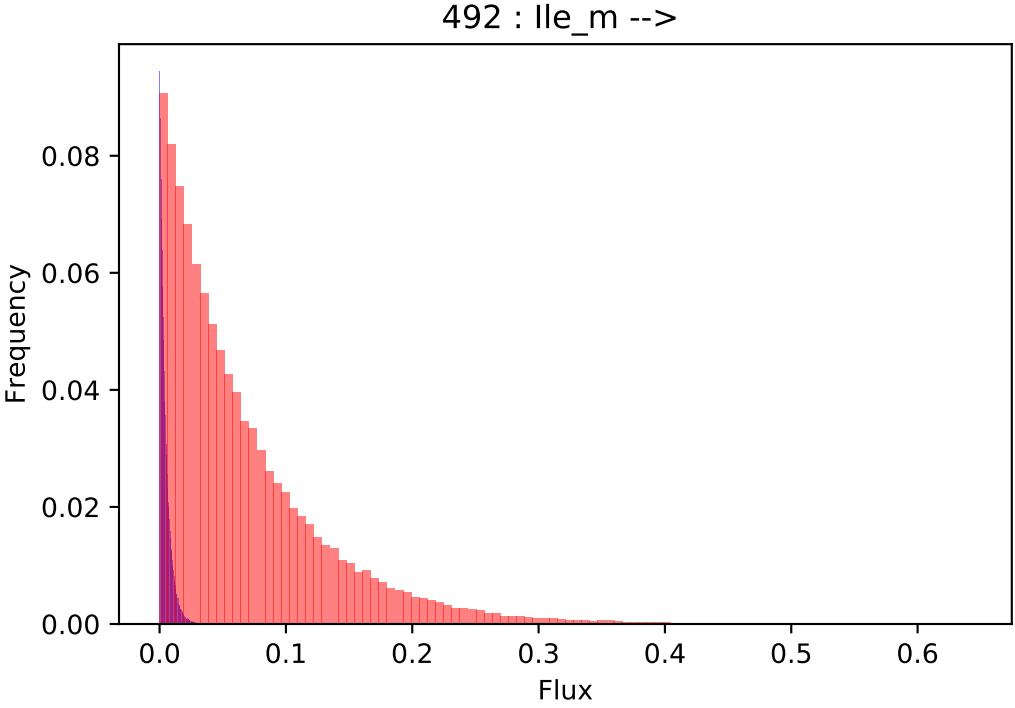

487 : His_h -->
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

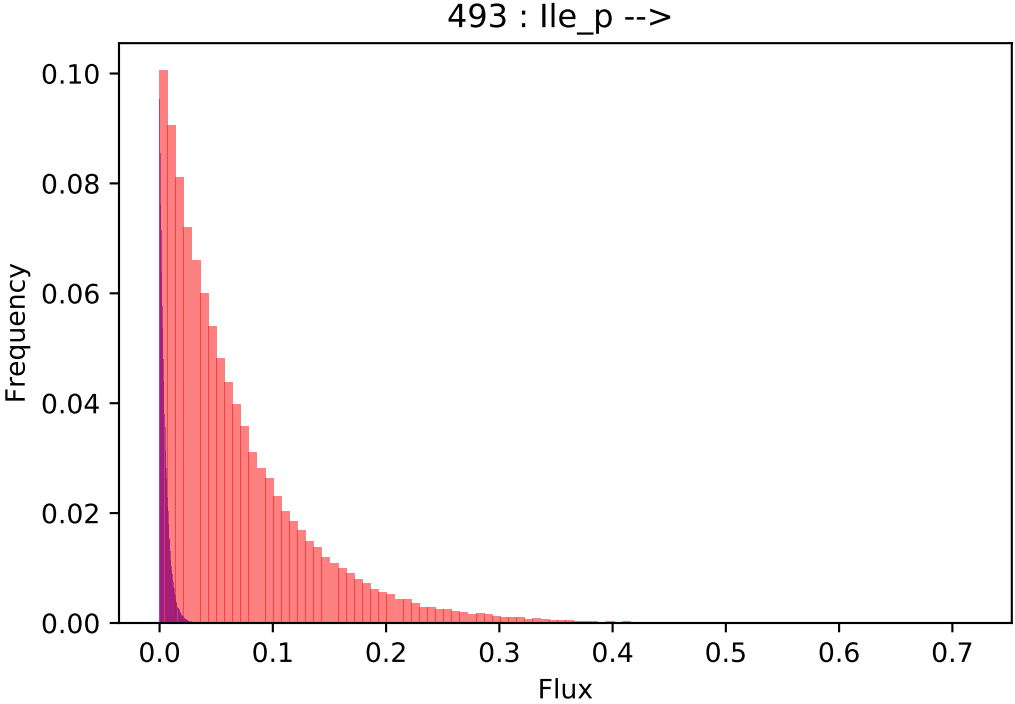

488 : His_m -->
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

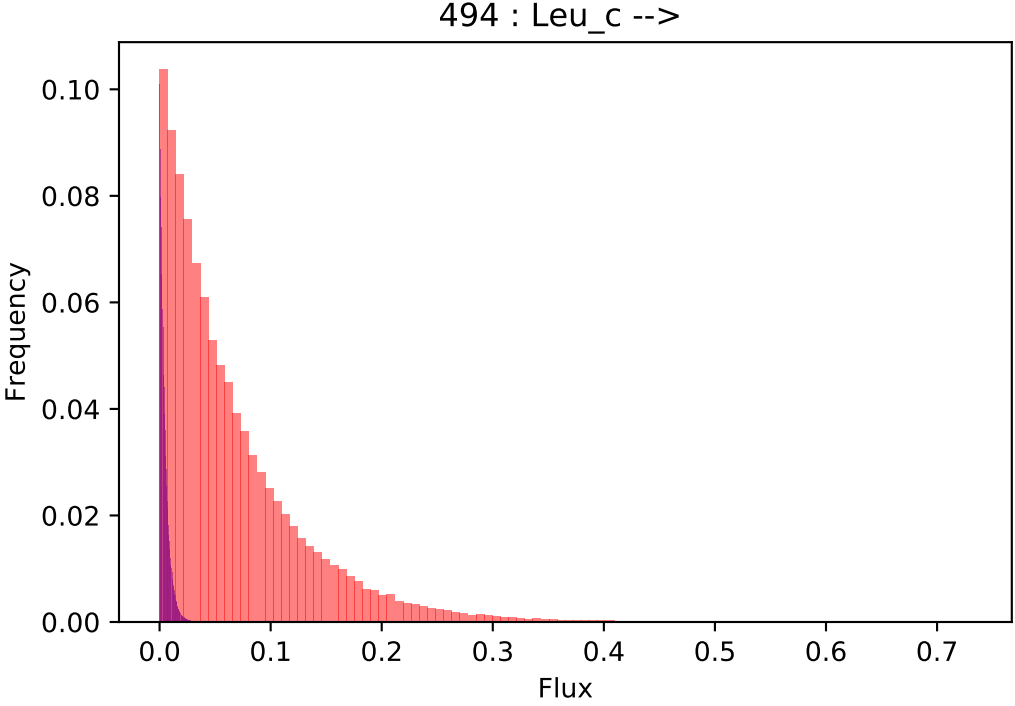

489 : His_p -->
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

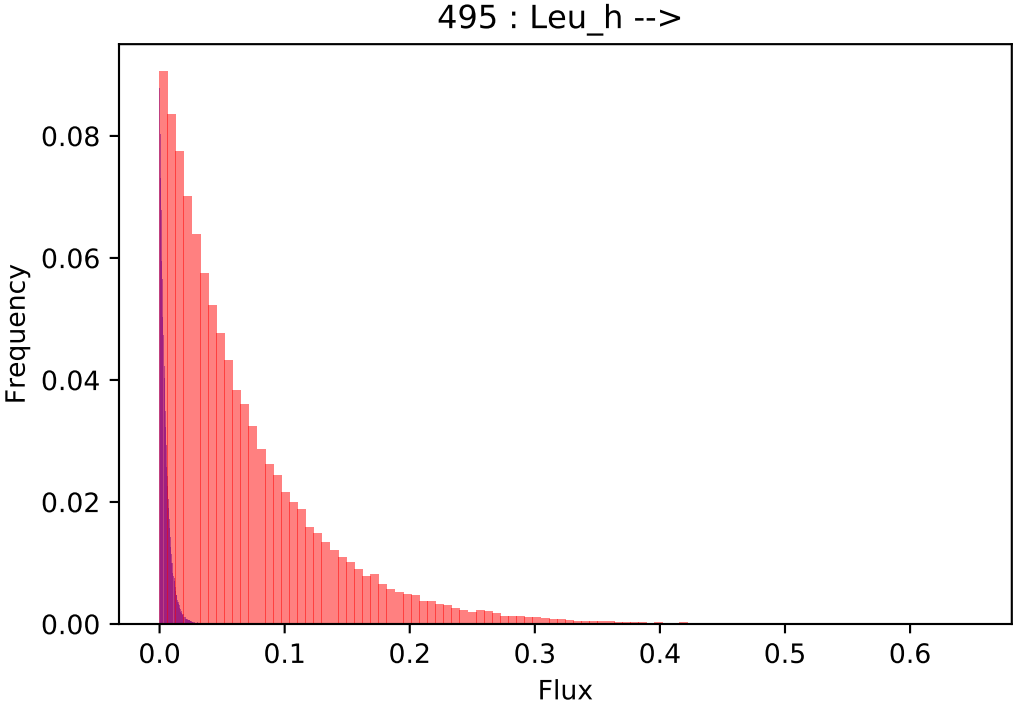

490 : Ile_c -->
Frequency
Flux
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8

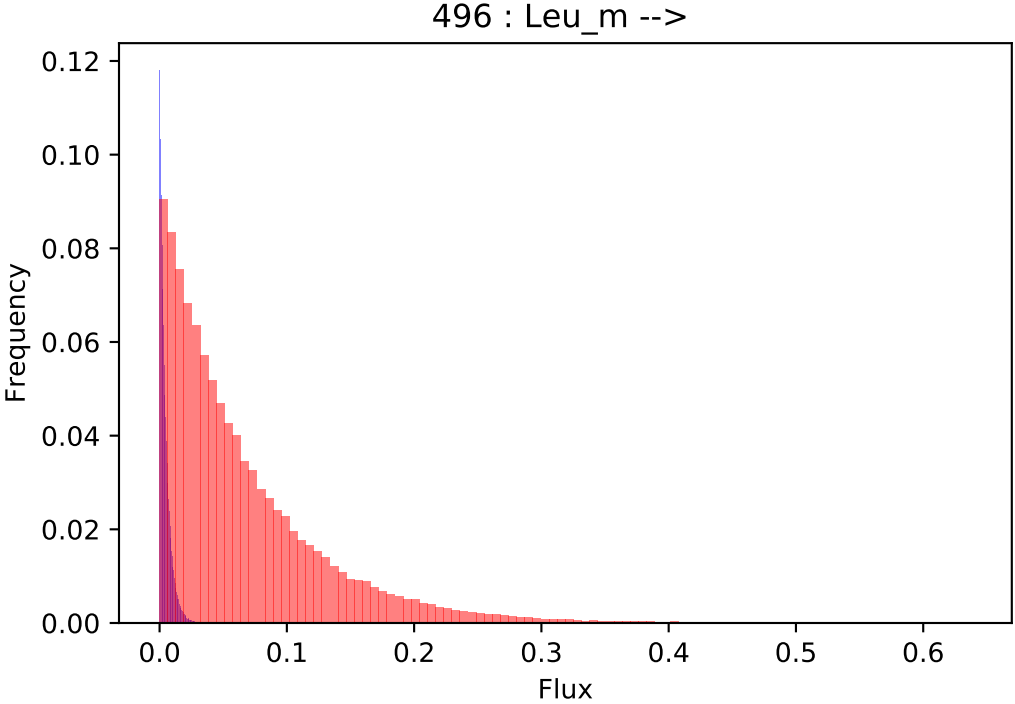

491 : Ile_h -->
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
Flux

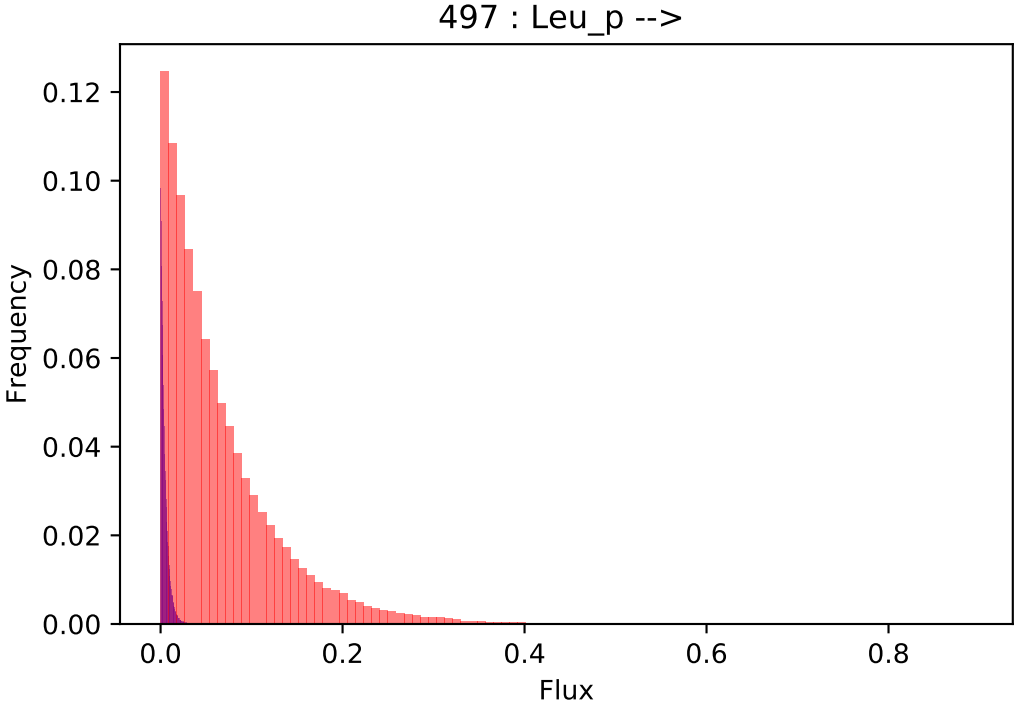

492 : Ile_m -->
Frequency
0.00
0.02
0.04
0.06
0.08
0.0
0.1
0.2
0.3
0.4
0.5
0.6
Flux

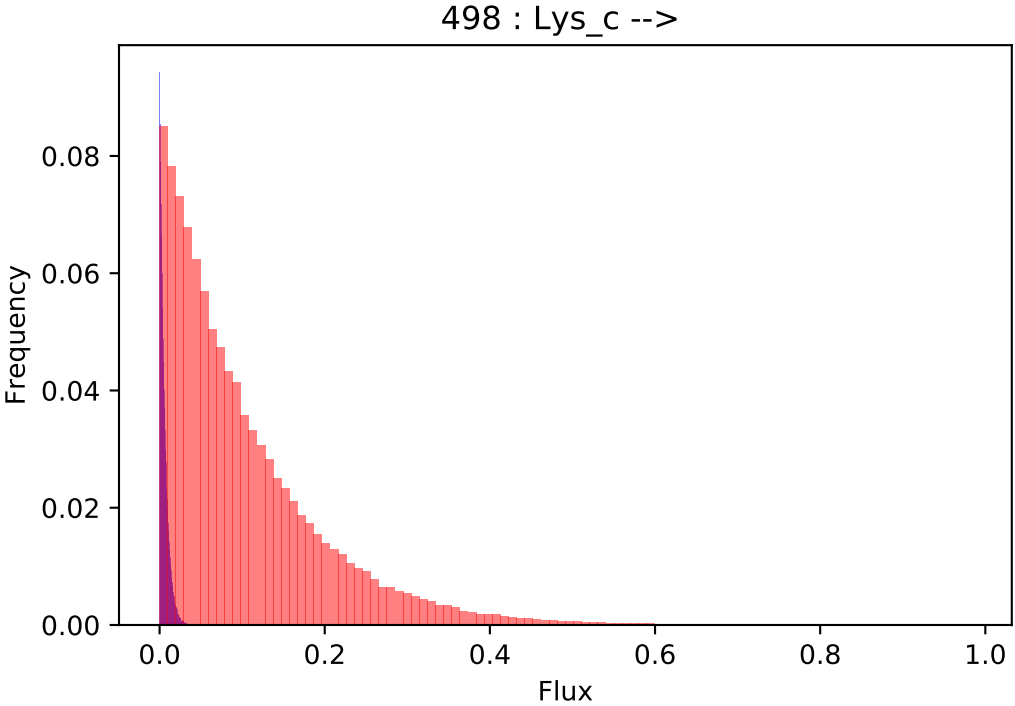

493 : Ile_p -->
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
Flux

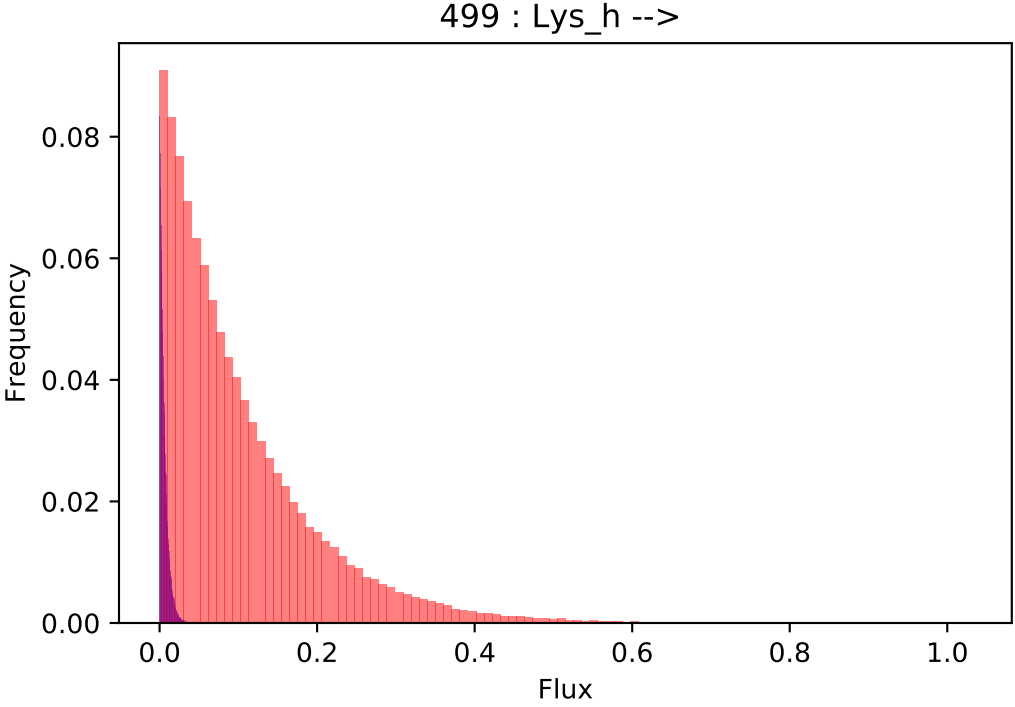

494 : Leu_c -->
Frequency
0.00
0.02
0.04
0.06
0.08
0.10
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
Flux

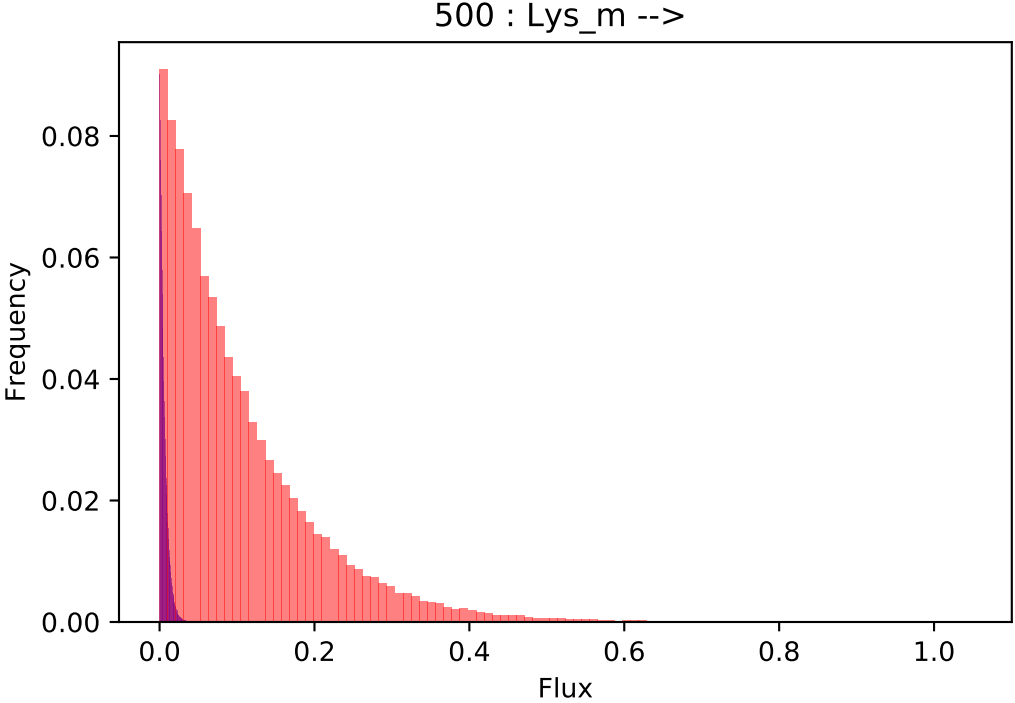

495 : Leu_h -->
Frequency
0.00
0.02
0.04
0.06
0.08
0.0
0.1
0.2
0.3
0.4
0.5
0.6
Flux

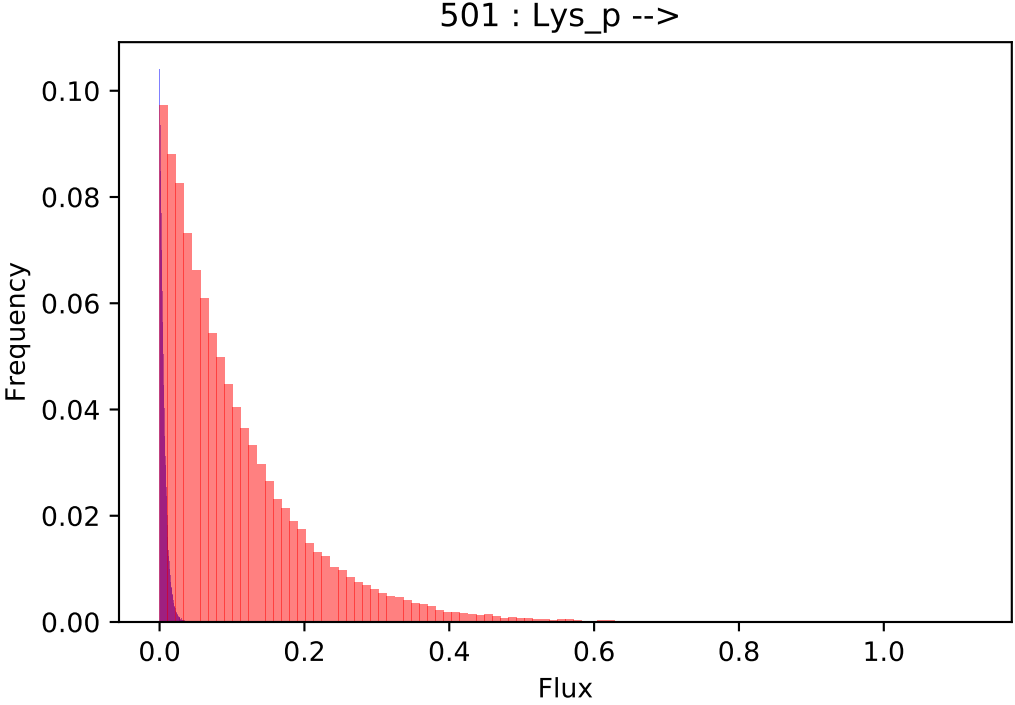

496 : Leu_m -->
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.1
0.2
0.3
0.4
0.5
0.6
Flux

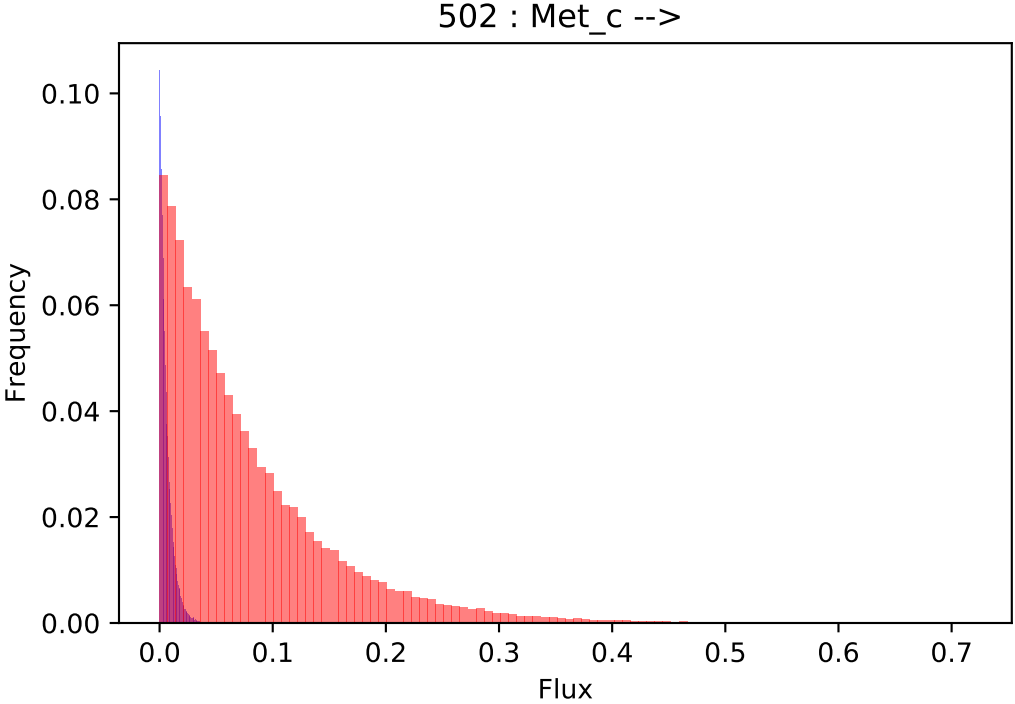

497 : Leu_p -->
Frequency
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.0
0.2
0.4
0.6
0.8
Flux

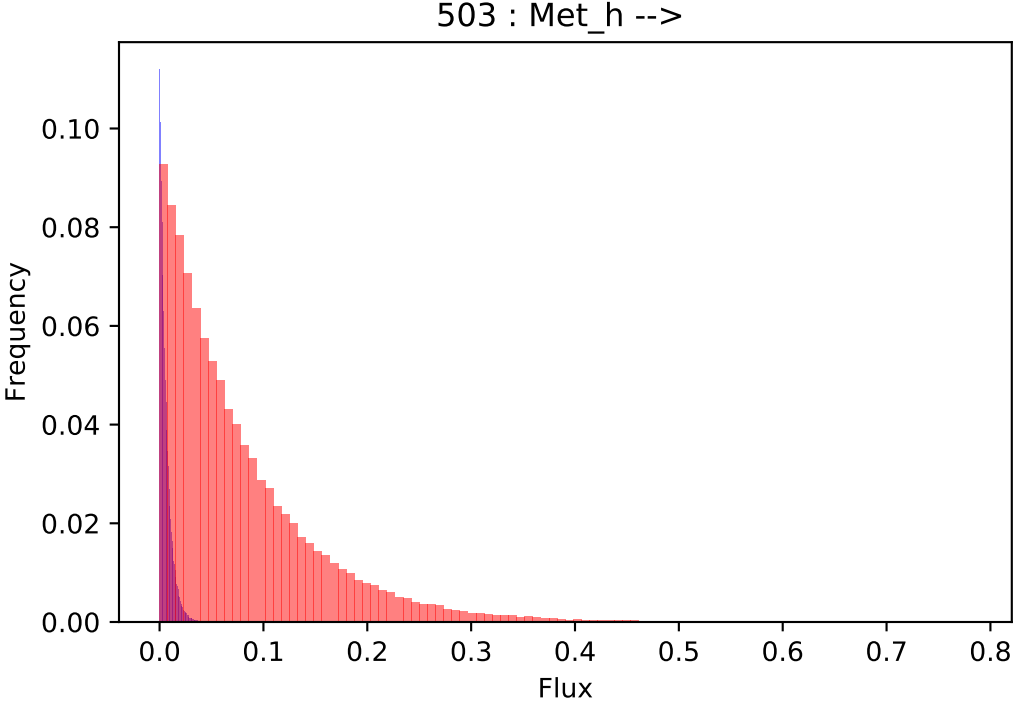

498 : Lys_c -->
Frequency
0.00
0.02
0.04
0.06
0.08
0.0
0.2
0.4
0.6
0.8
1.0
Flux

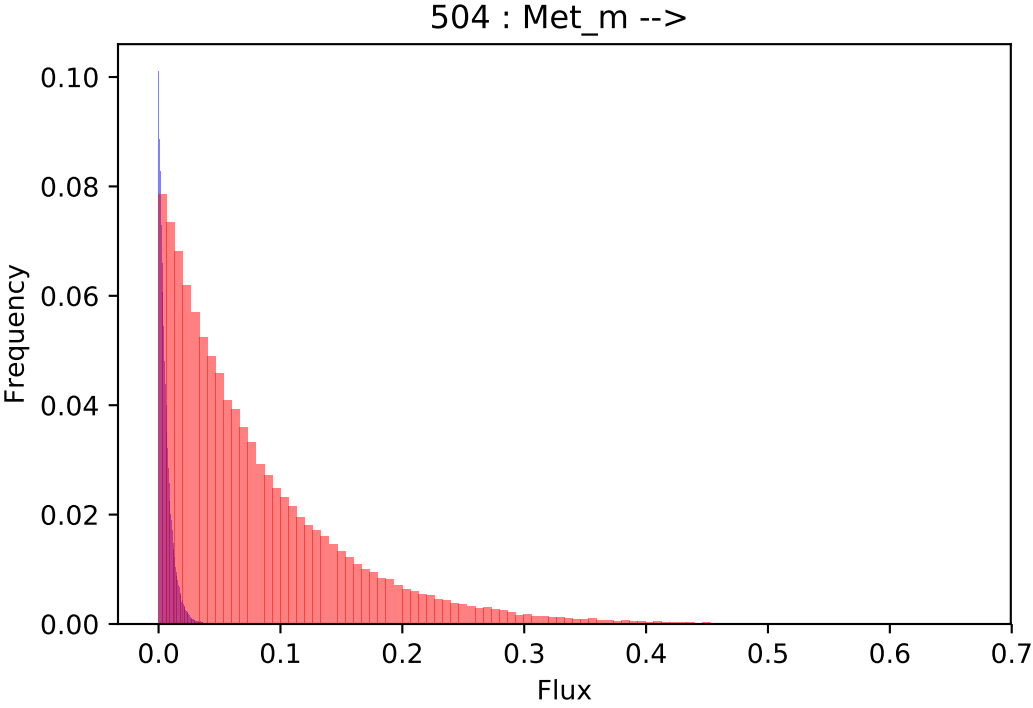

499 : Lys_h -->
Frequency
0.00
0.02
0.04
0.06
0.08
0.0
0.2
0.4
0.6
0.8
1.0
Flux


500 : Lys_m -->
Frequency
0.00
0.02
0.04
0.06
0.08
0.0
0.2
0.4
0.6
0.8
1.0
Flux


501 : Lys_p -->
Frequency
0.10
0.08
0.06
0.04
0.02
0.00
0.0
0.2
0.4
0.6
0.8
1.0
Flux


502 : Met_c -->
Frequency
0.10
0.08
0.06
0.04
0.02
0.00
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
Flux


503 : Met_h -->
Frequency
0.00
0.02
0.04
0.06
0.08
0.10
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
Flux


504 : Met_m -->
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
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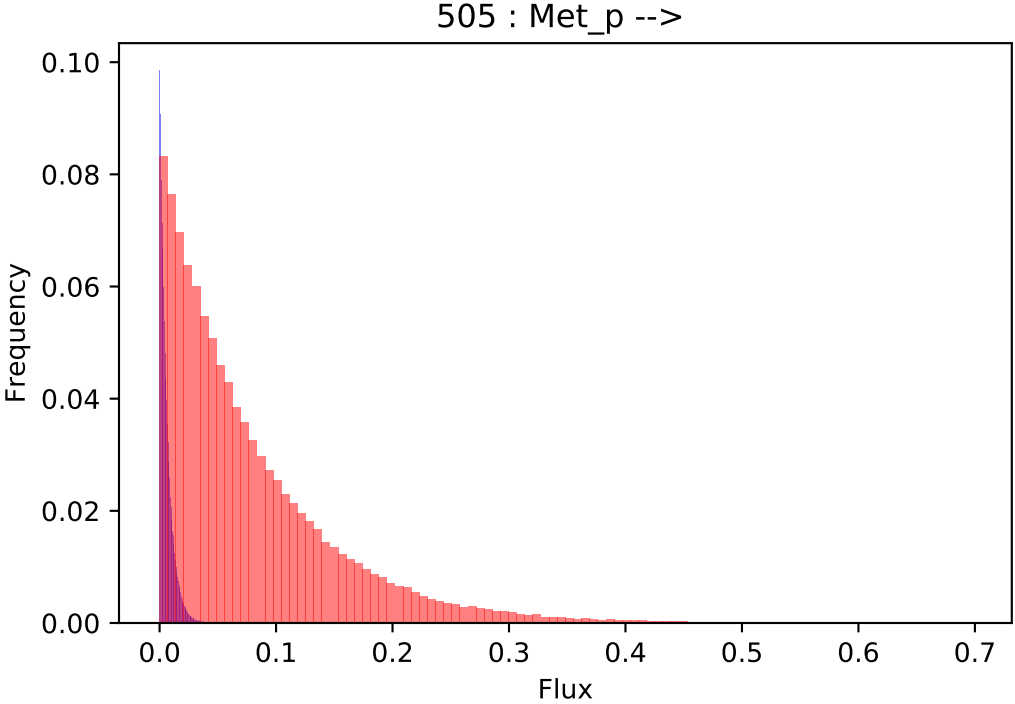
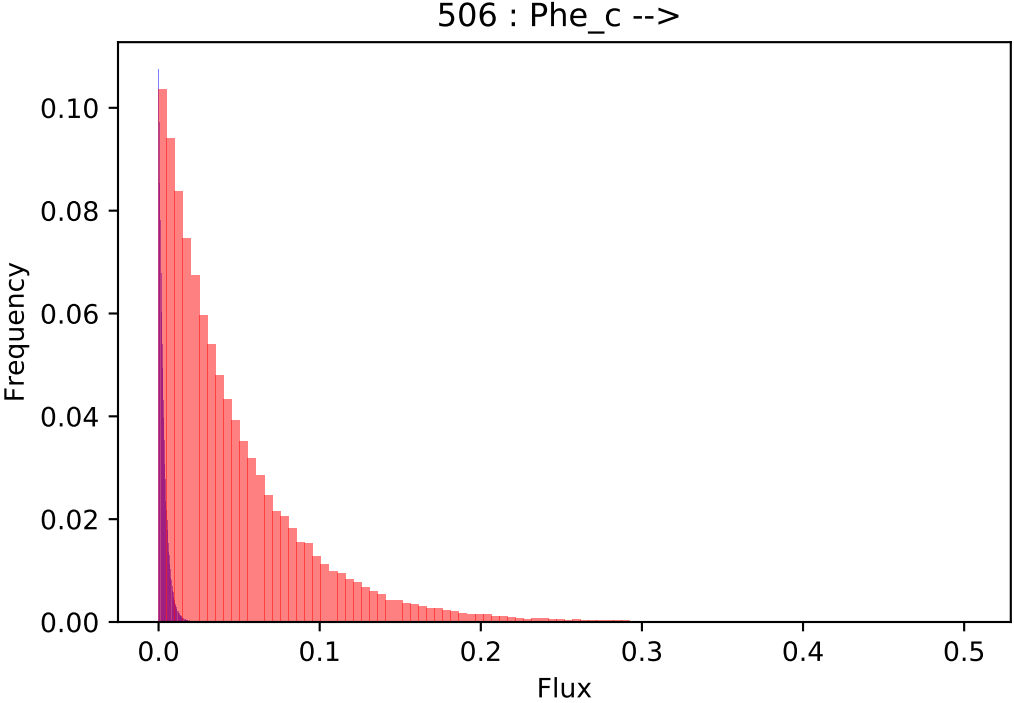
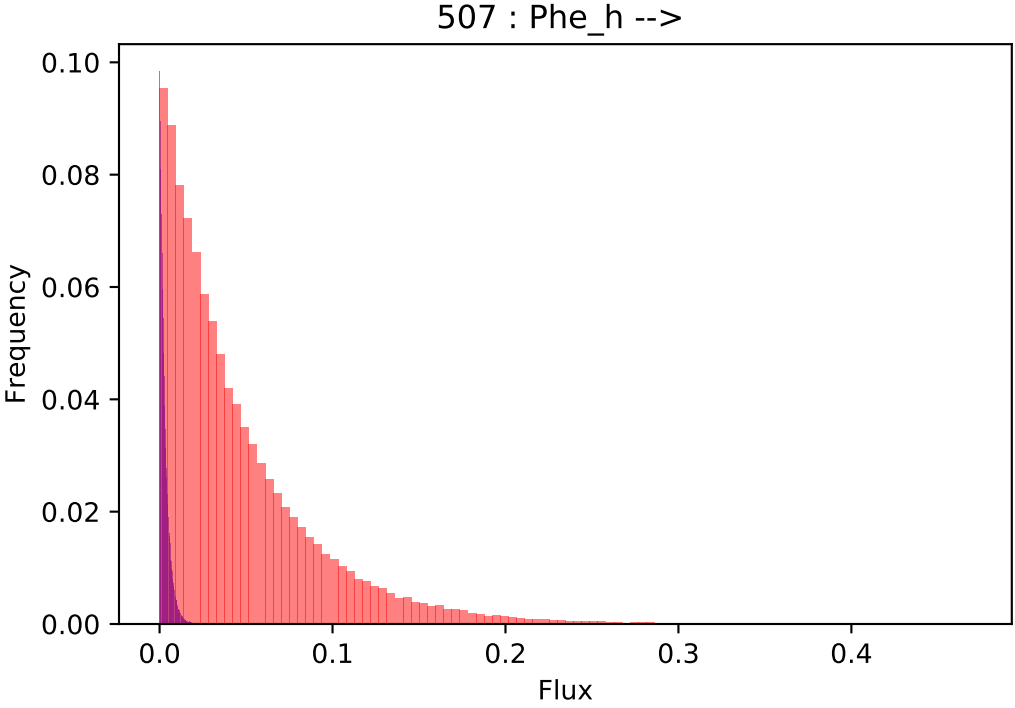
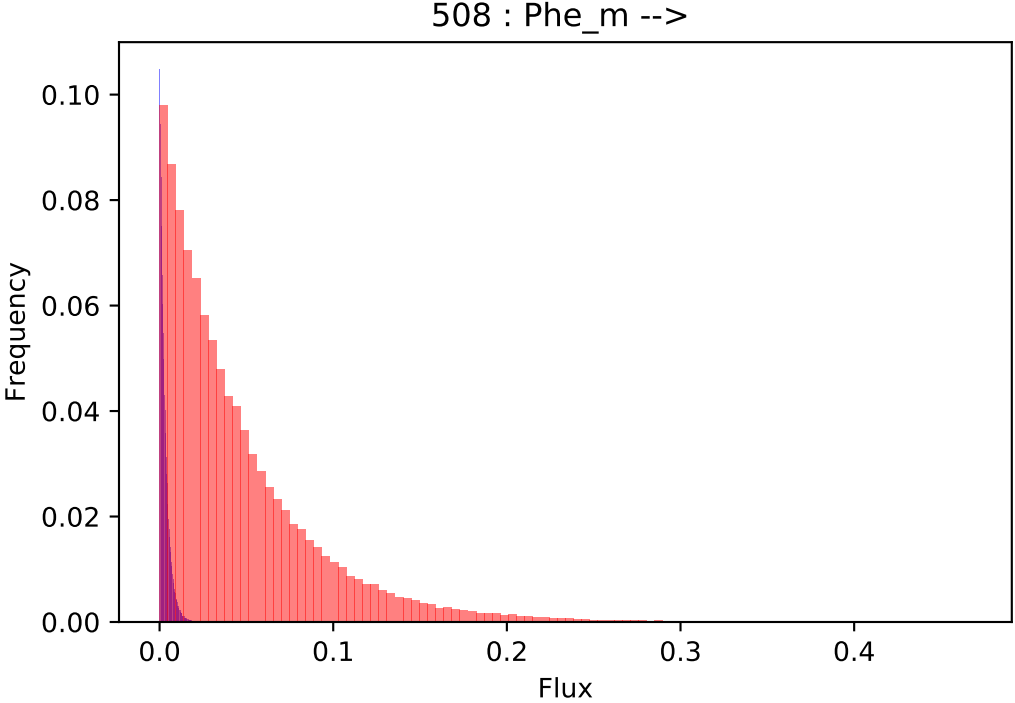
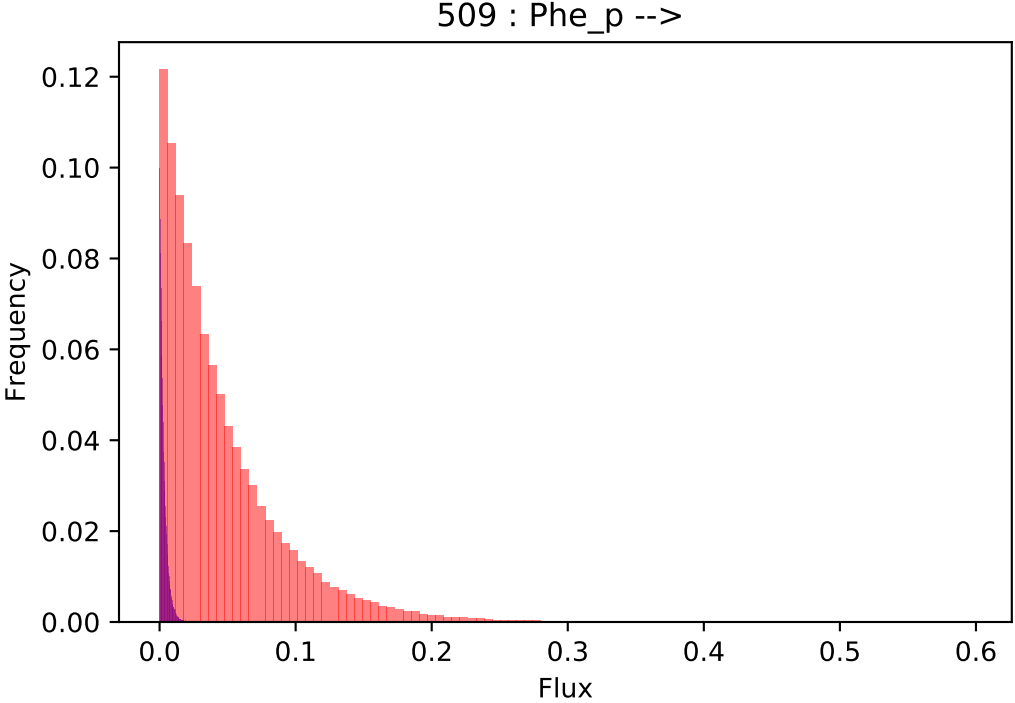
0.2
0.3
0.4
0.5
0.6
0.7
Flux

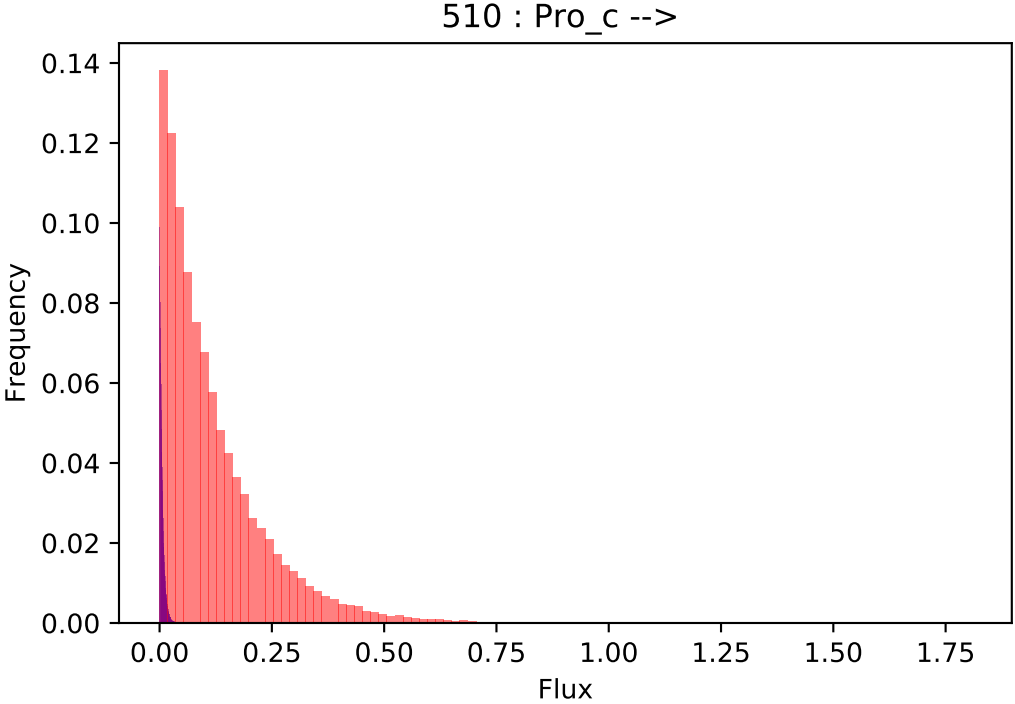

505 : Met_p -->
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
Flux

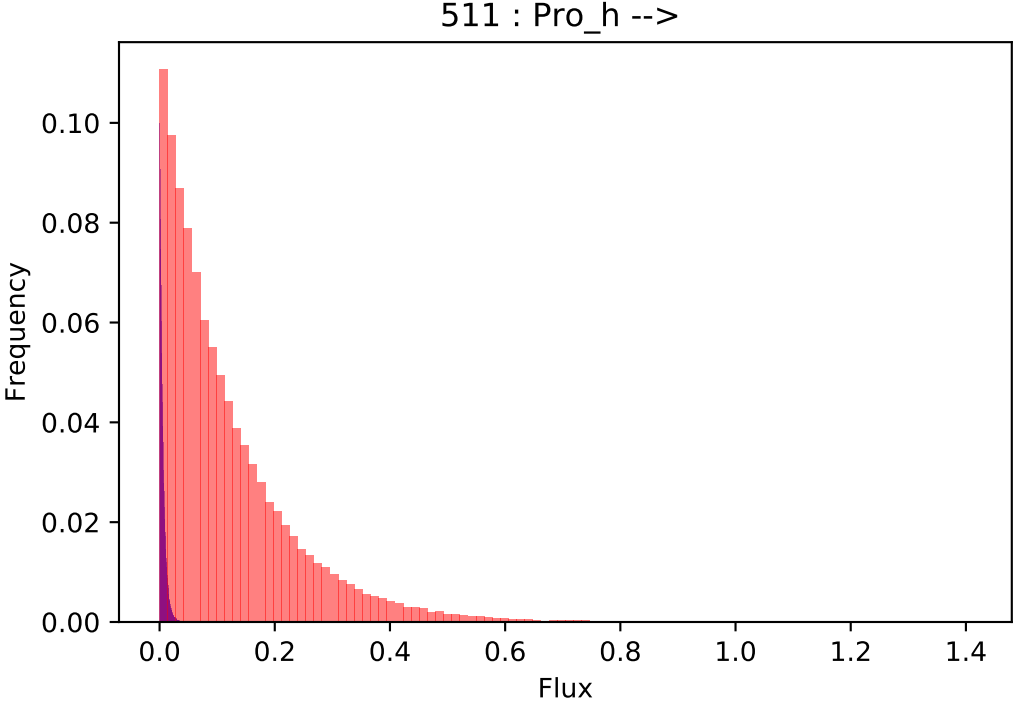

506 : Phe_c -->
Frequency
0.00
0.02
0.04
0.06
0.08
0.10
0.0
0.1
0.2
0.3
0.4
0.5
Flux

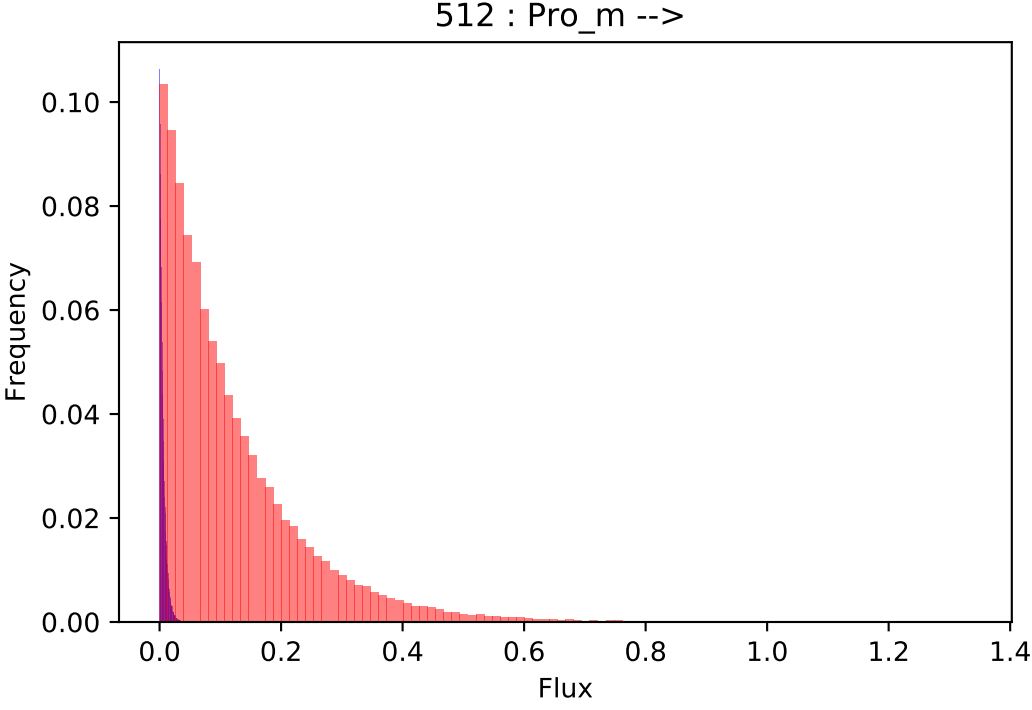

507 : Phe_h -->
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.1
0.2
0.3
0.4
Flux

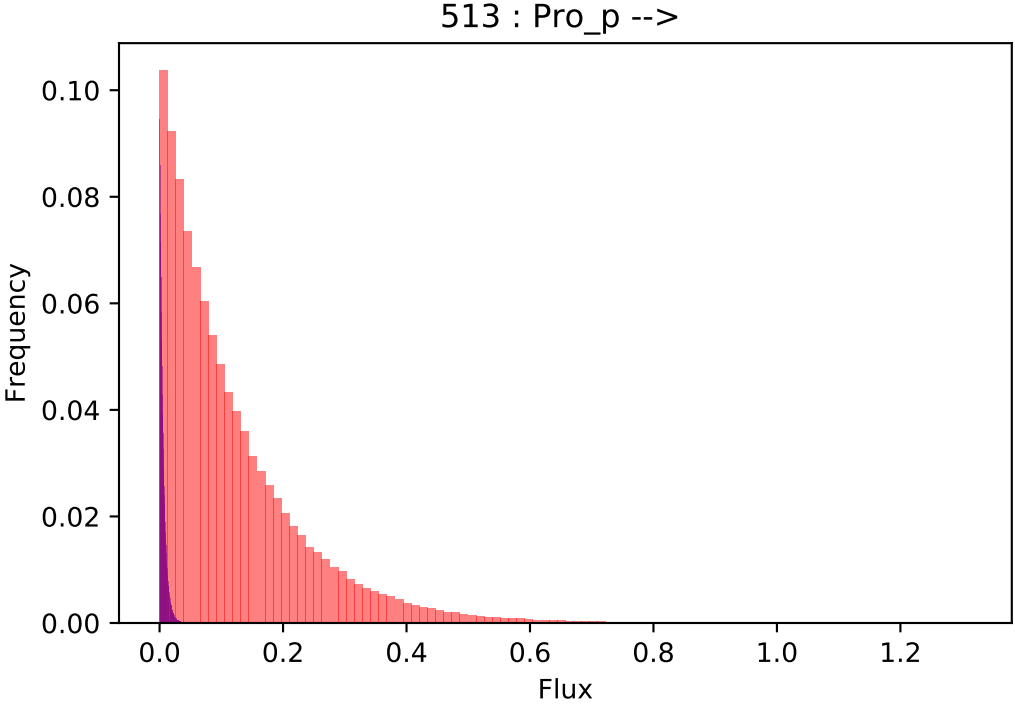

508 : Phe_m -->
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.1
0.2
0.3
0.4
Flux

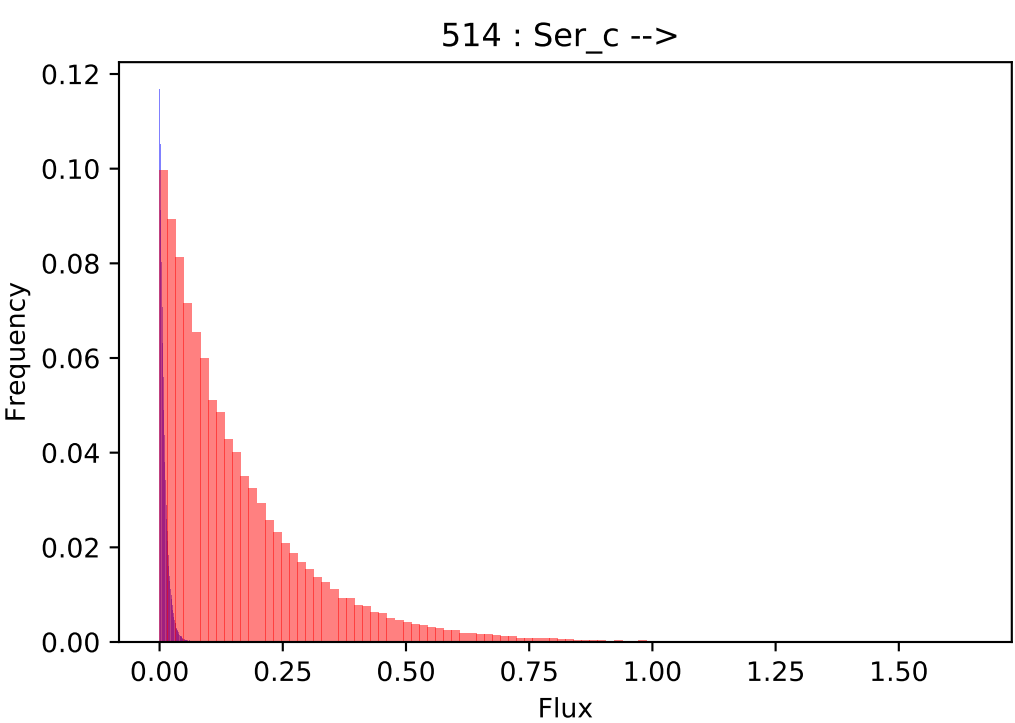

509 : Phe_p -->
Frequency
Flux
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.0
0.1
0.2
0.3
0.4
0.5
0.6

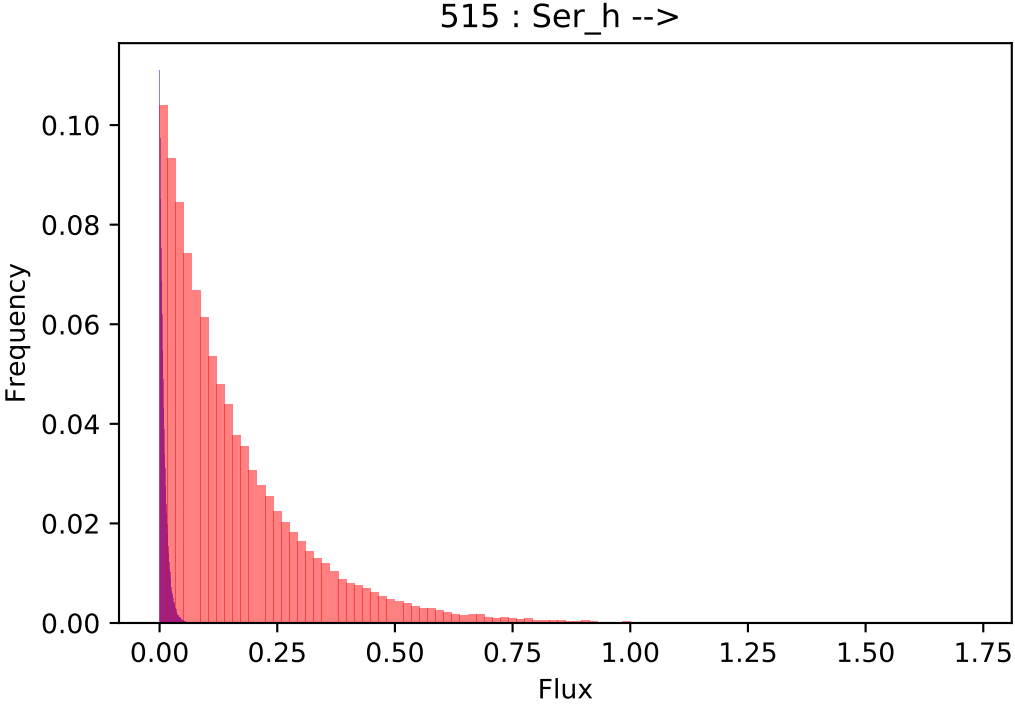

510 : Pro_c -->
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
Flux

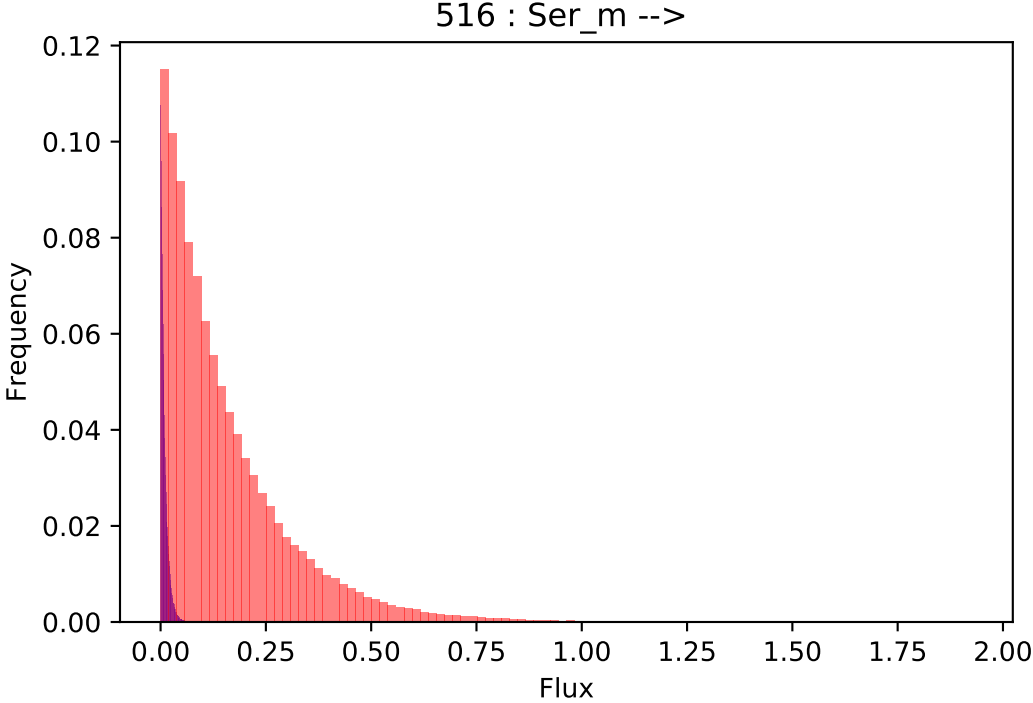

511 : Pro_h -->
Frequency
0.00
0.02
0.04
0.06
0.08
0.10
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
Flux

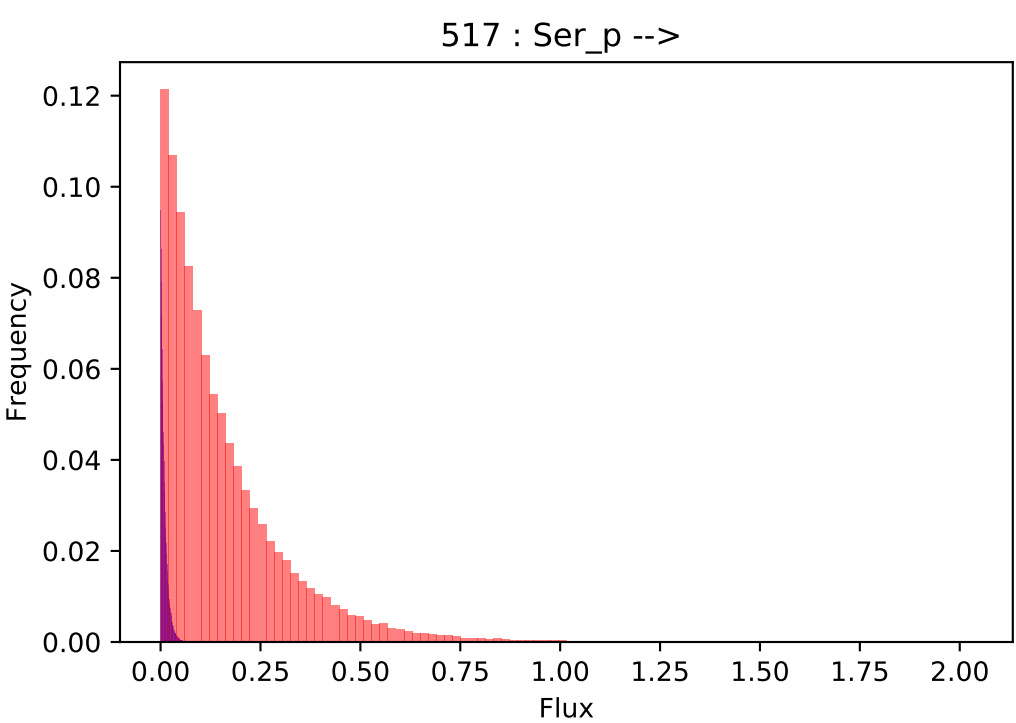

512 : Pro_m -->
Frequency
0.00
0.02
0.04
0.06
0.08
0.10
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
Flux

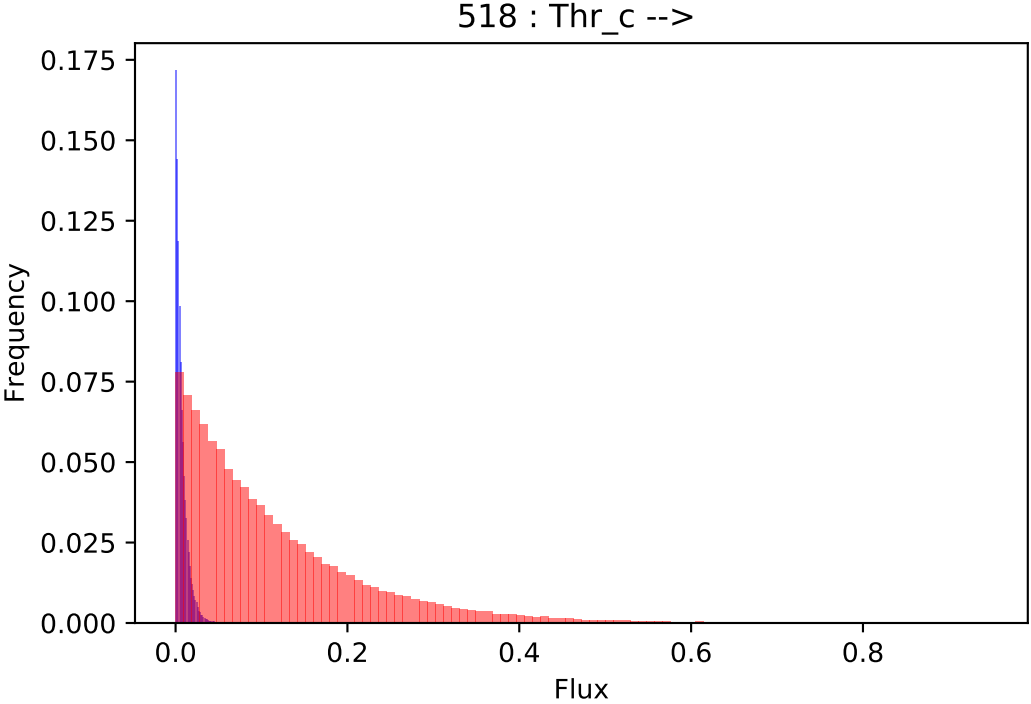

513 : Pro_p -->
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

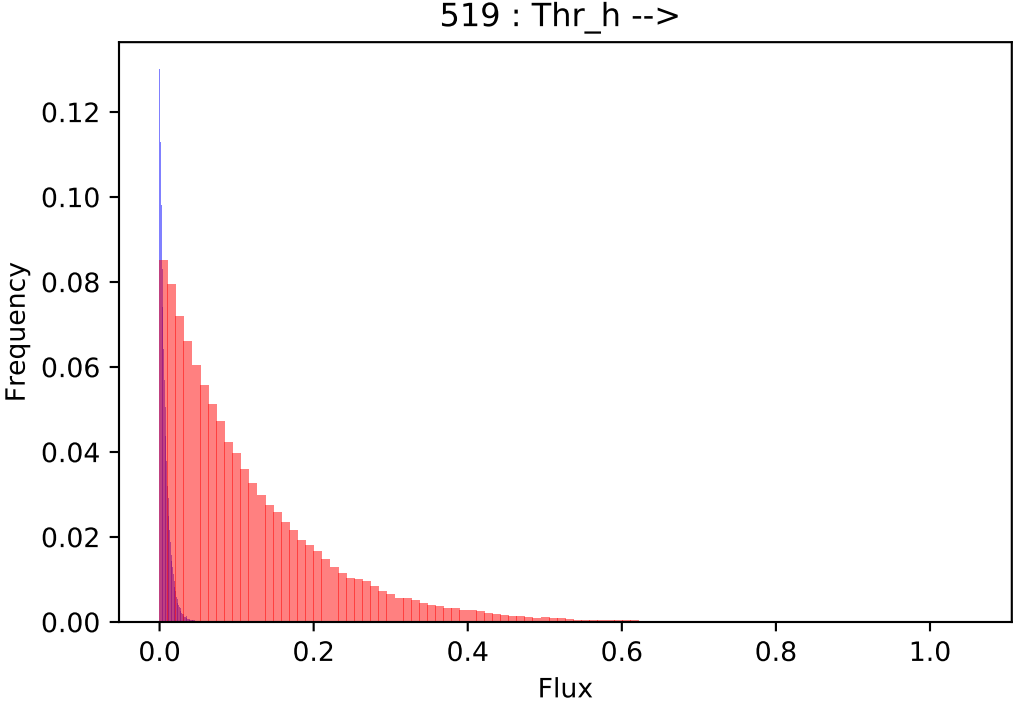

514 : Ser_c -->
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.00
0.25
0.50
0.75
1.00
1.25
1.50
Flux

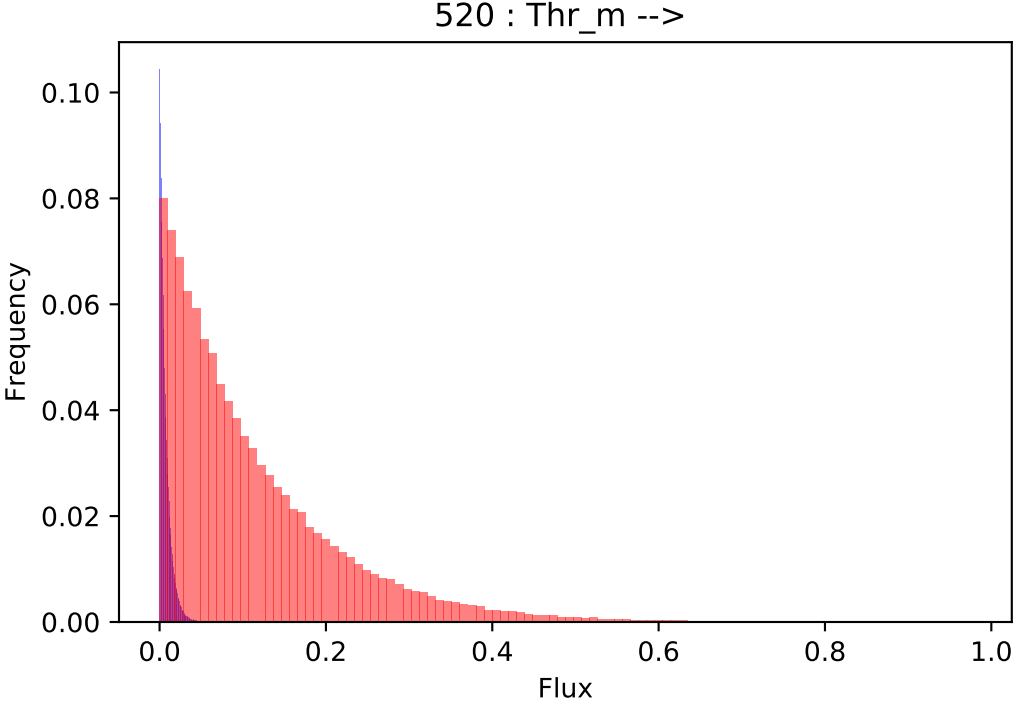

515 : Ser_h -->
Frequency
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
Flux

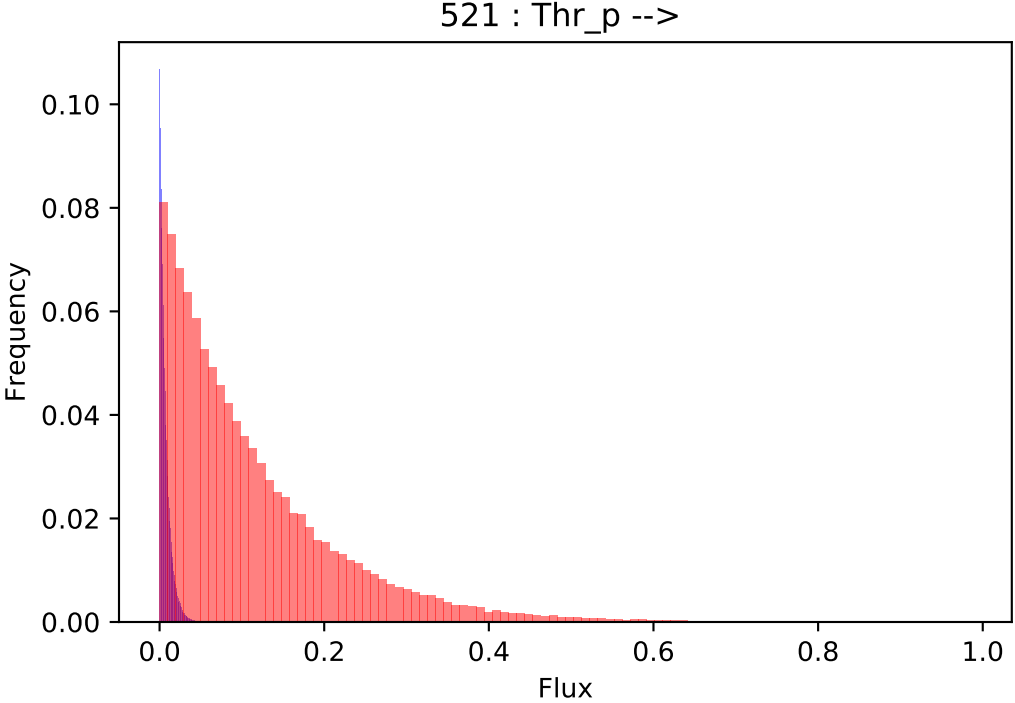

516 : Ser_m -->
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
Flux

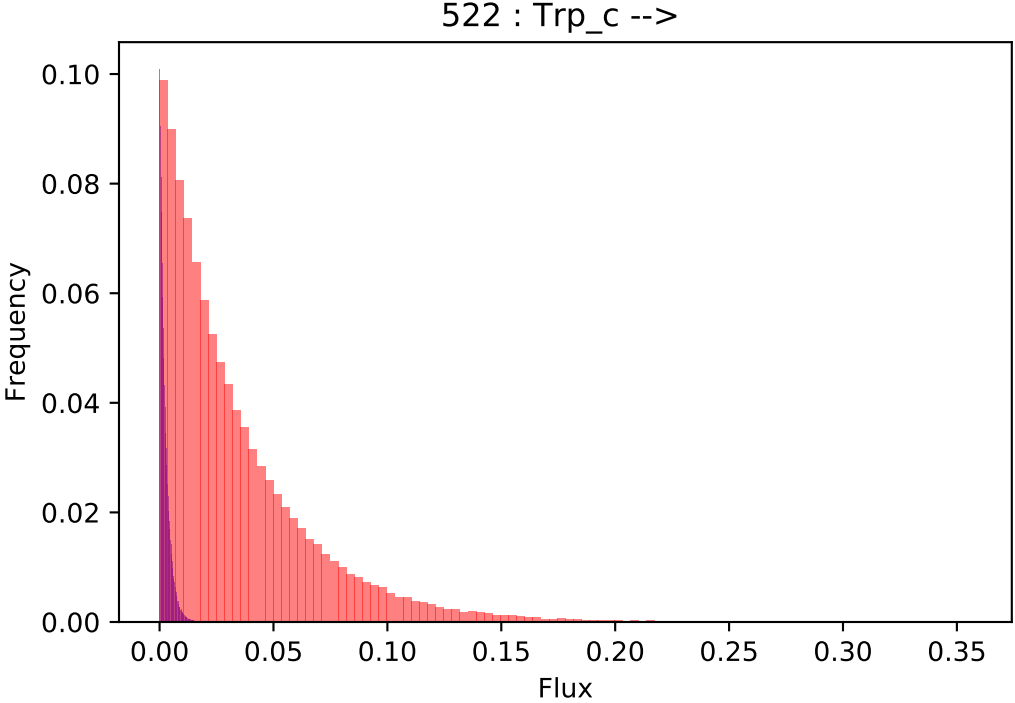

517 : Ser_p -->
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
Flux

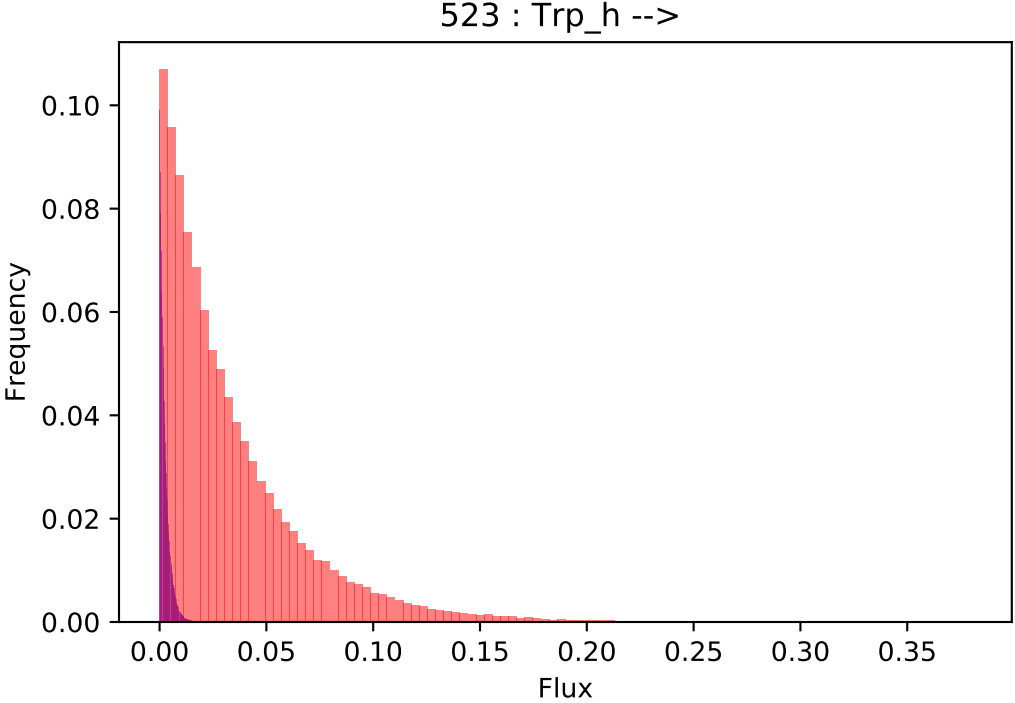

518 : Thr_c -->
0.175
0.150
0.125
0.100
0.075
0.050
0.025
0.000
Frequency
0.0
0.2
0.4
0.6
0.8
Flux

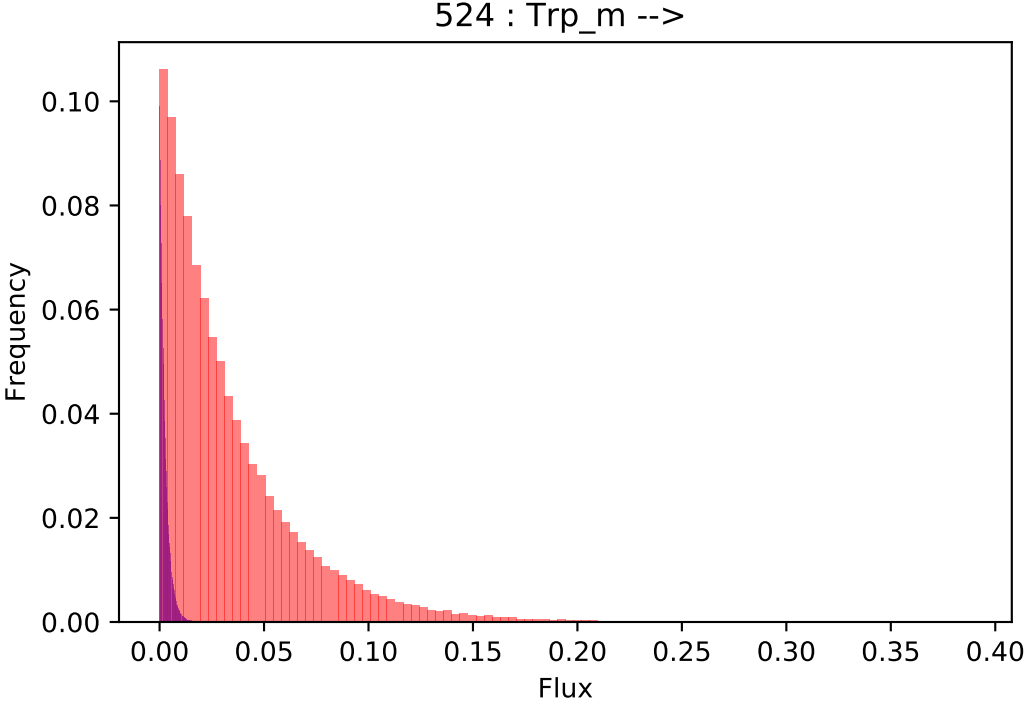

519 : Thr_h -->
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.2
0.4
0.6
0.8
1.0
Flux

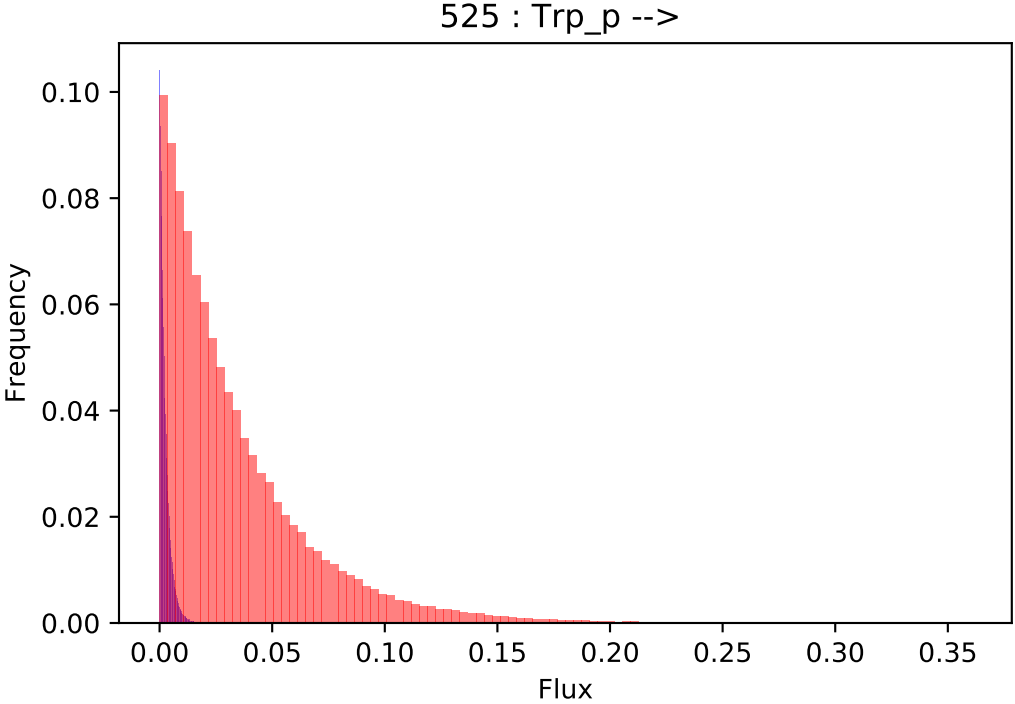

520 : Thr_m -->
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.2
0.4
0.6
0.8
1.0
Flux

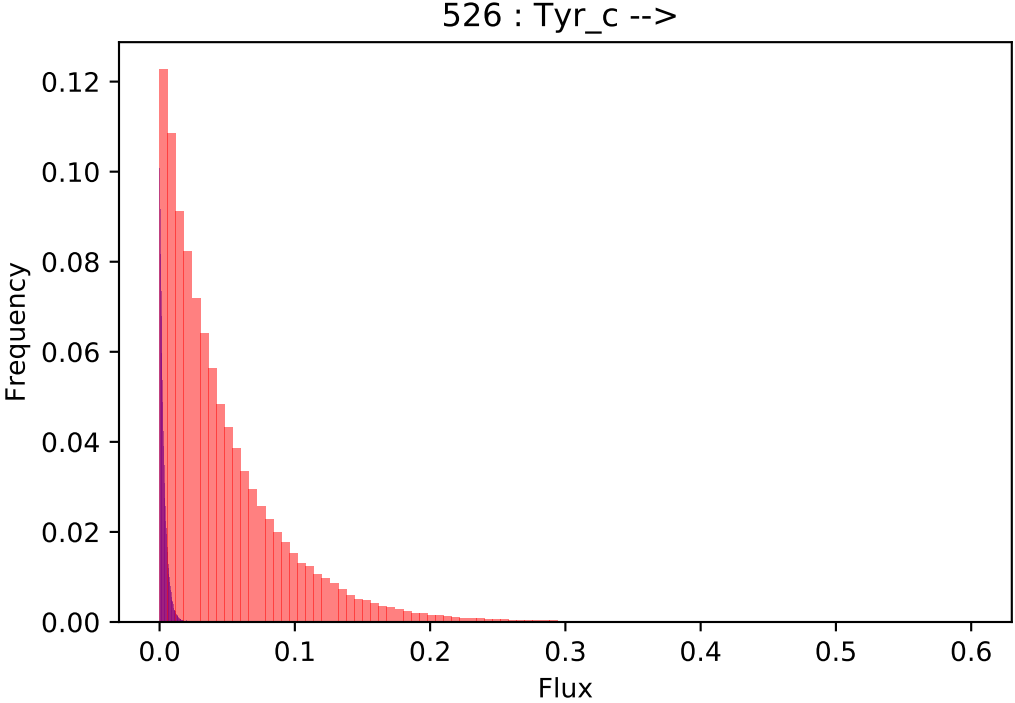

521 : Thr_p -->
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.2
0.4
0.6
0.8
1.0
Flux

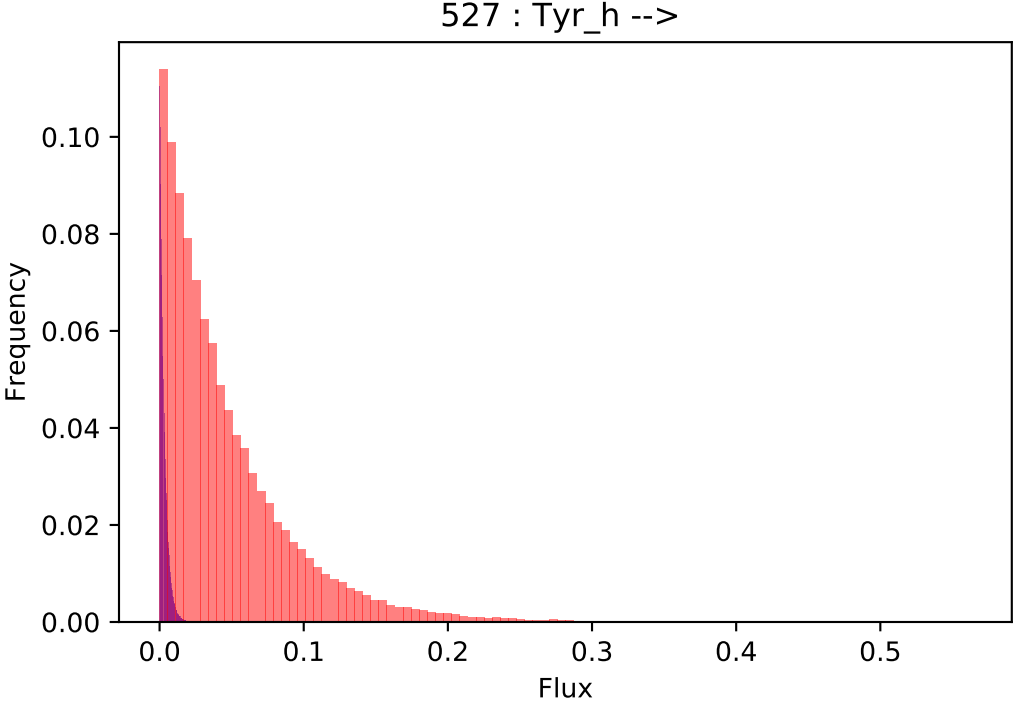

522 : Trp_c -->
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
Flux

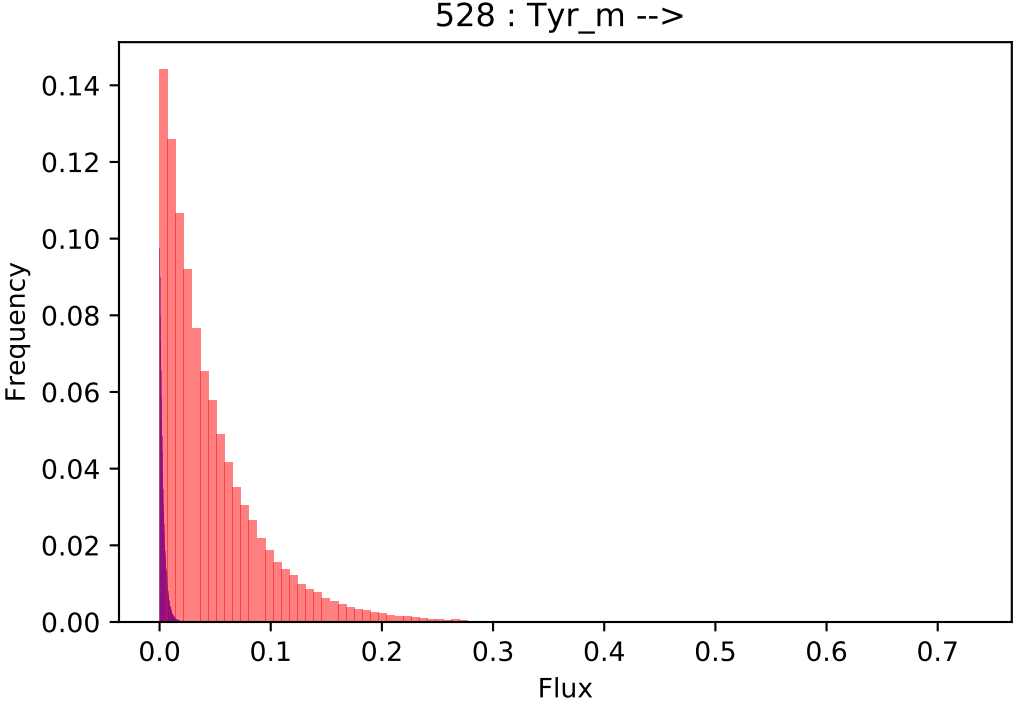

523 : Trp_h -->
Frequency
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
Flux

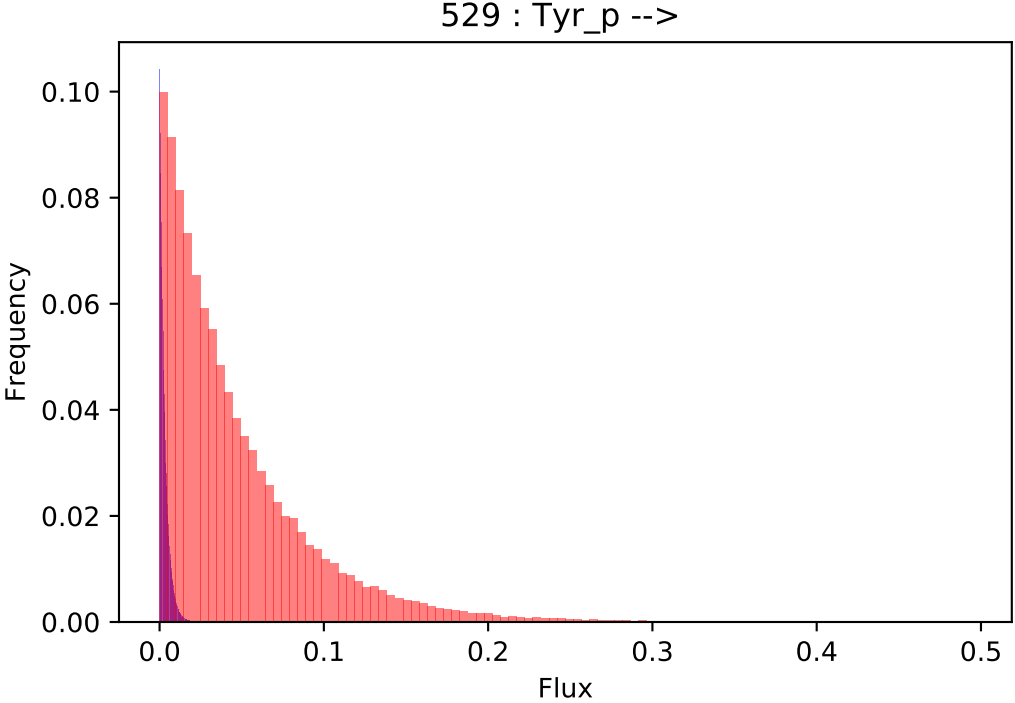

524 : Trp_m -->
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.40
Flux

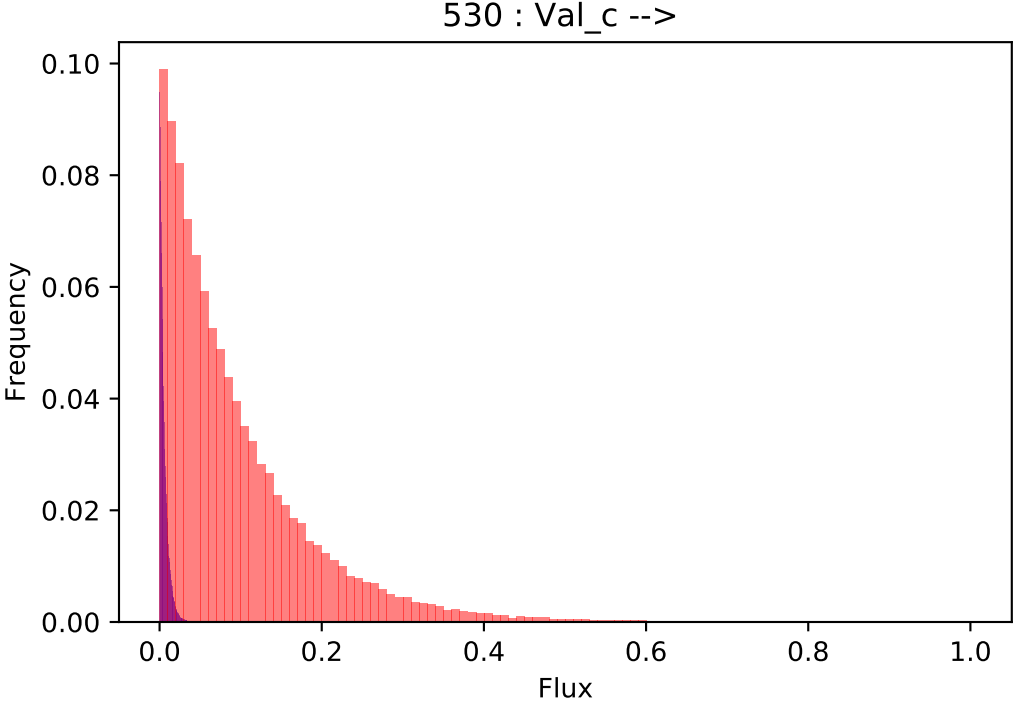

525 : Trp_p -->
Frequency
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
Flux

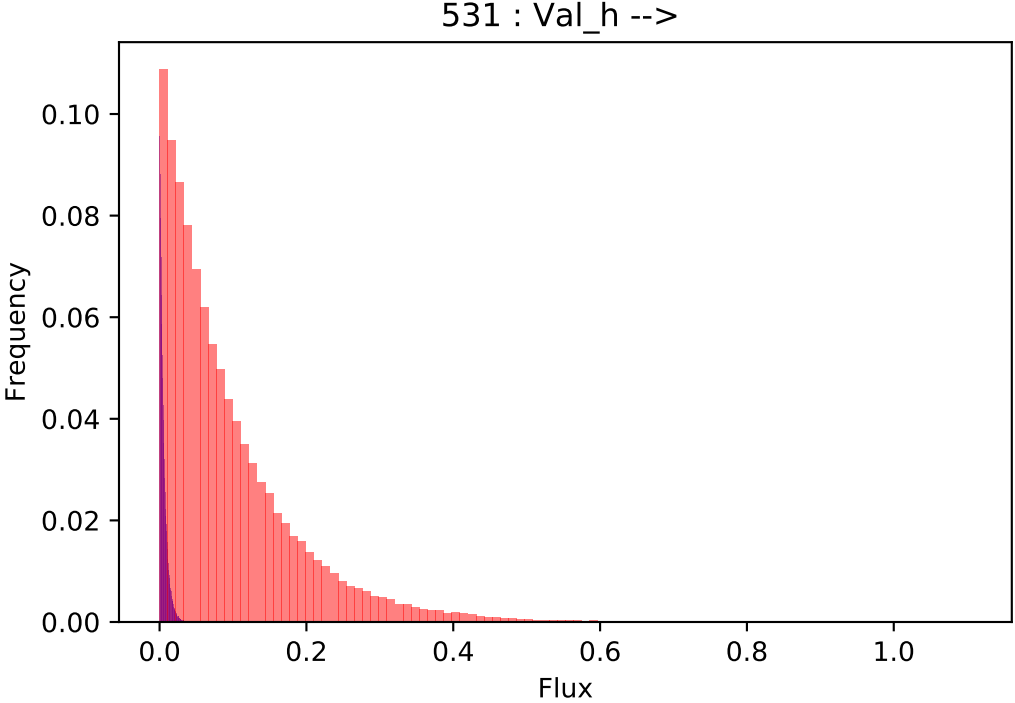

526 : Tyr_c -->
Frequency
Flux
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.0
0.1
0.2
0.3
0.4
0.5
0.6

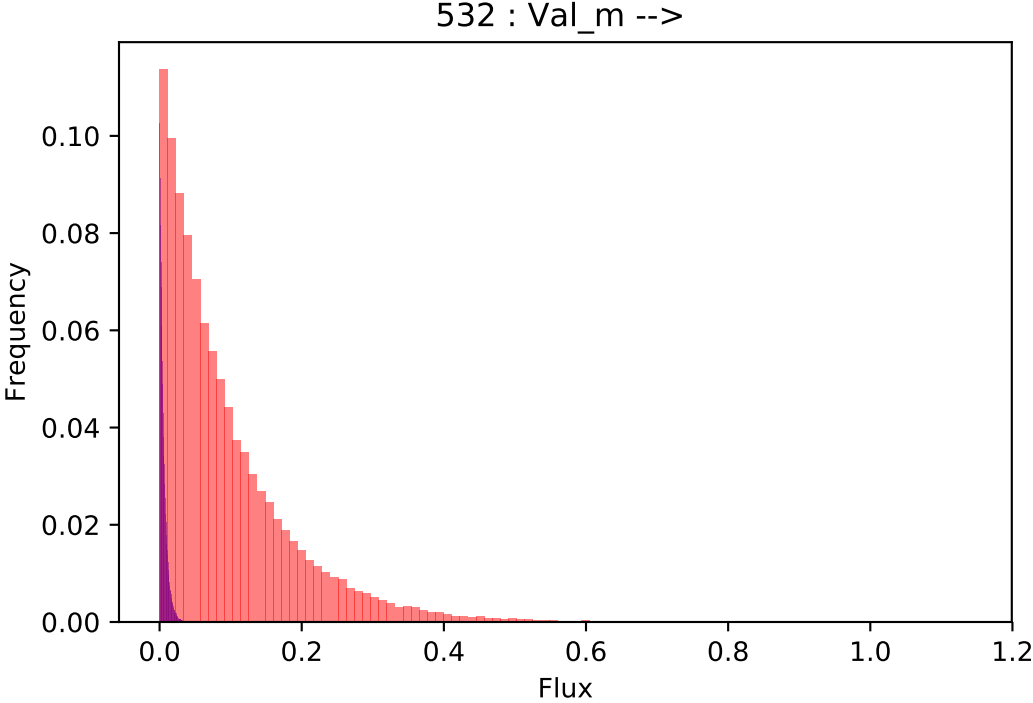

527 : Tyr_h -->
Frequency
0.00
0.02
0.04
0.06
0.08
0.10
0.0
0.1
0.2
0.3
0.4
0.5
Flux

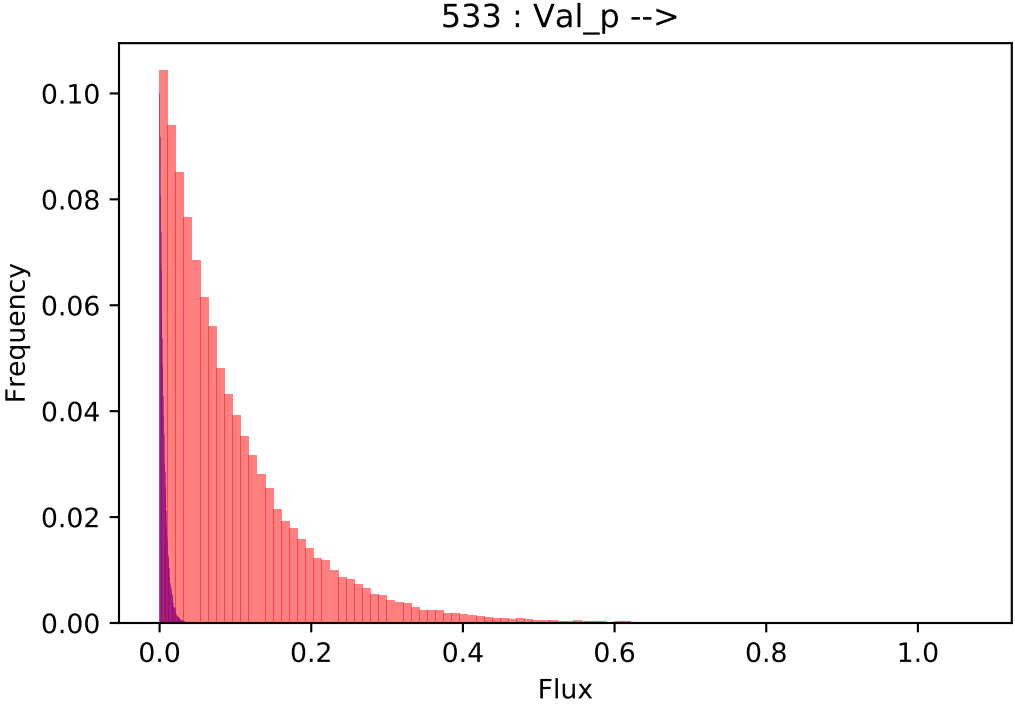

528 : Tyr_m -->
Frequency
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
Flux

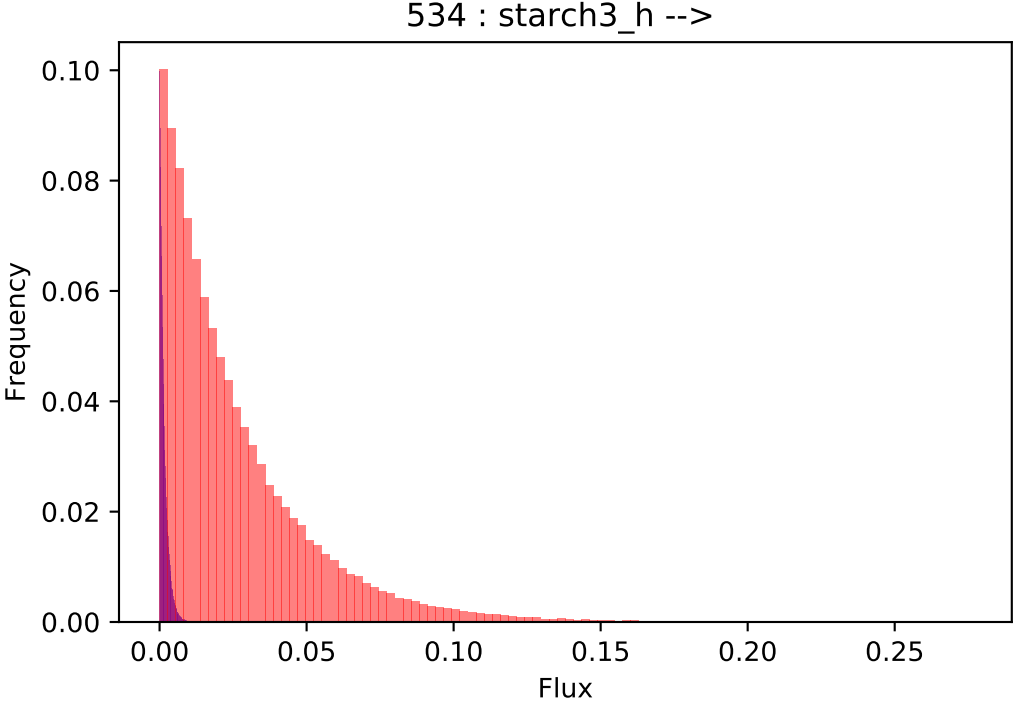

529 : Tyr_p -->
Frequency
0.10
0.08
0.06
0.04
0.02
0.00
0.0
0.1
0.2
0.3
0.4
0.5
Flux

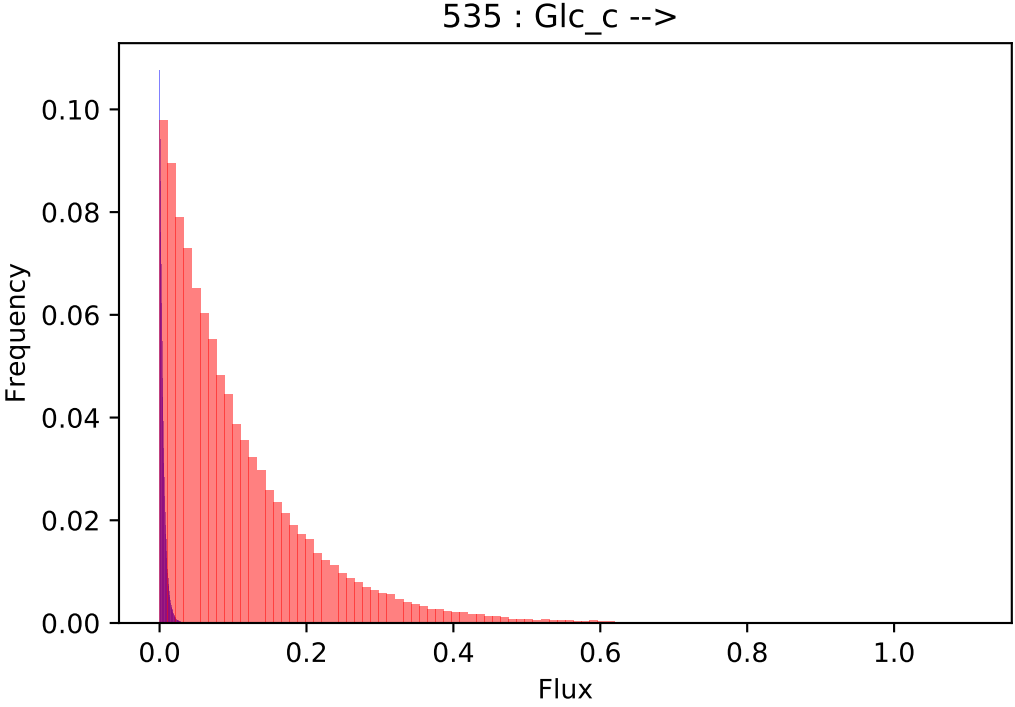

530 : Val_c -->
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.2
0.4
0.6
0.8
1.0
Flux

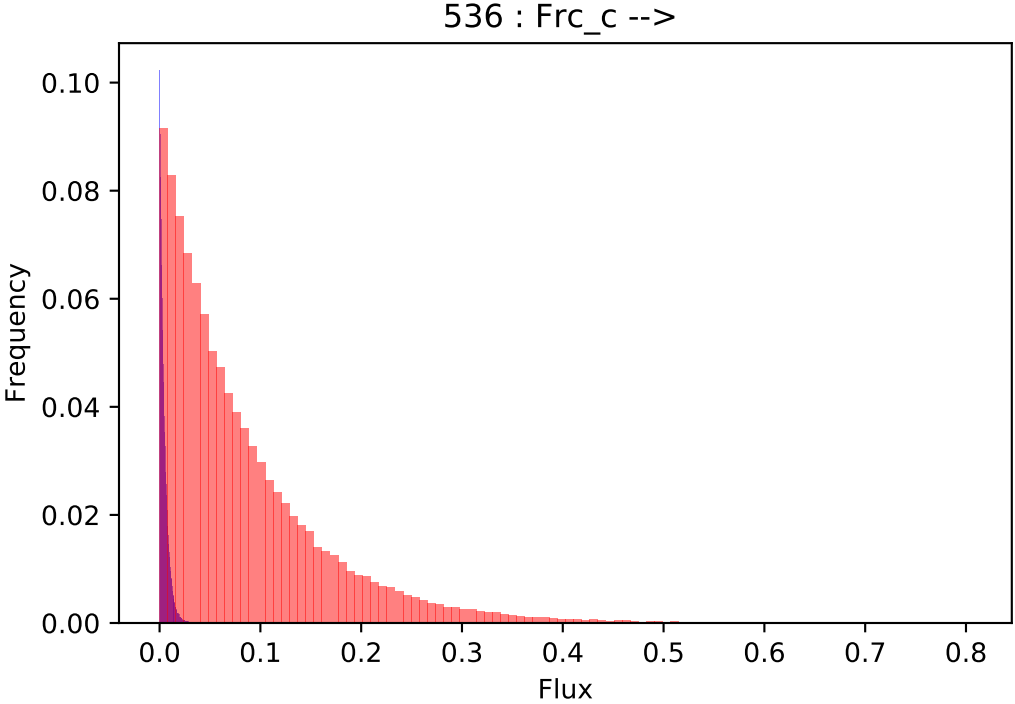

531 : Val_h -->
Frequency
0.00
0.02
0.04
0.06
0.08
0.10
0.0
0.2
0.4
0.6
0.8
1.0
Flux

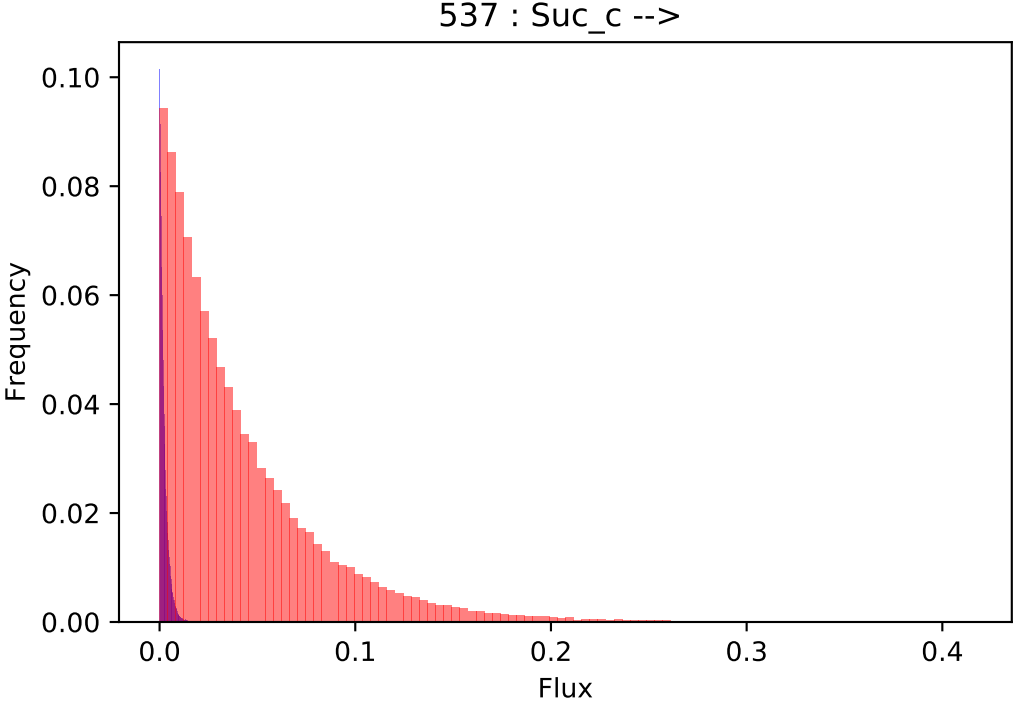

532 : Val_m -->
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Flux

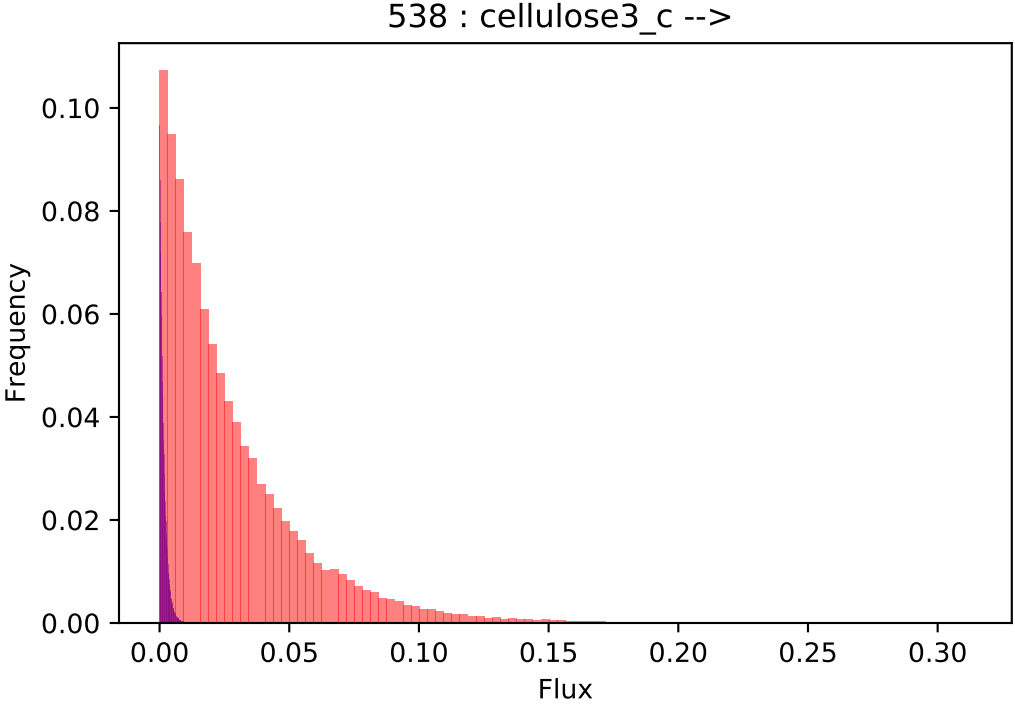

533 : Val_p -->
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.2
0.4
0.6
0.8
1.0
Flux

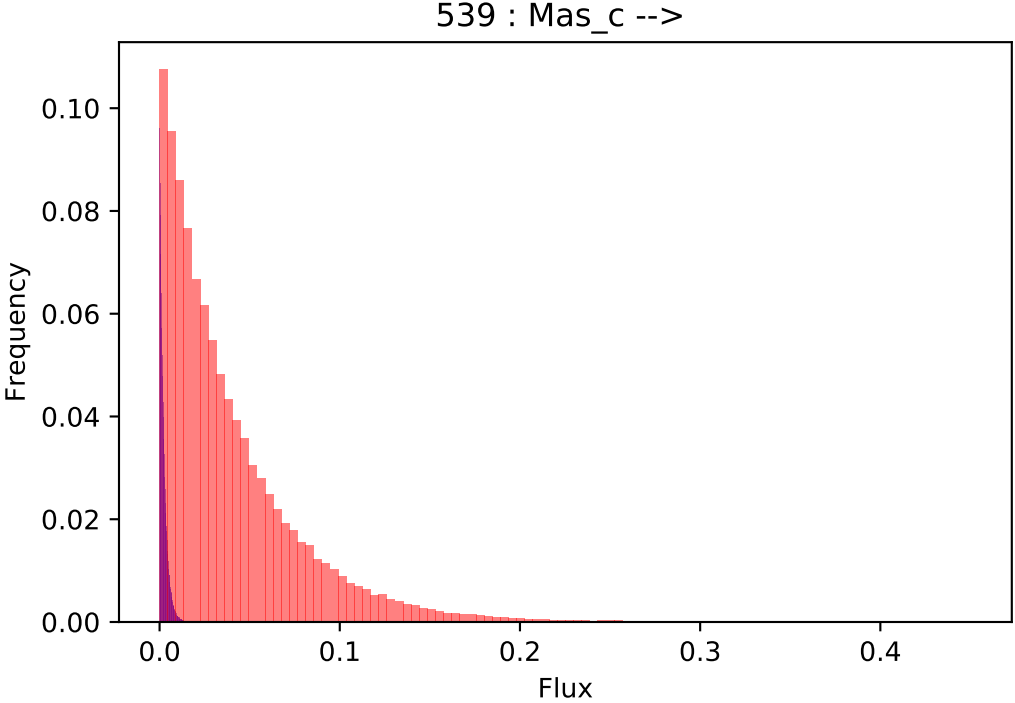

534 : starch3_h -->
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.00
0.05
0.10
0.15
0.20
0.25
Flux

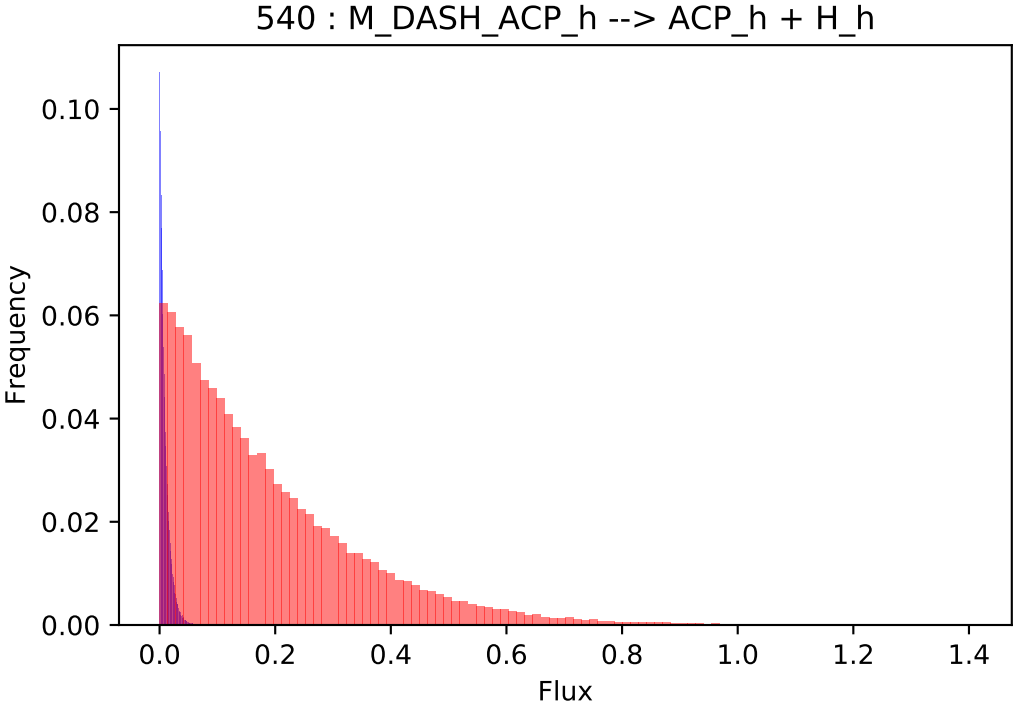

535 : Glc_c -->
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.2
0.4
0.6
0.8
1.0
Flux

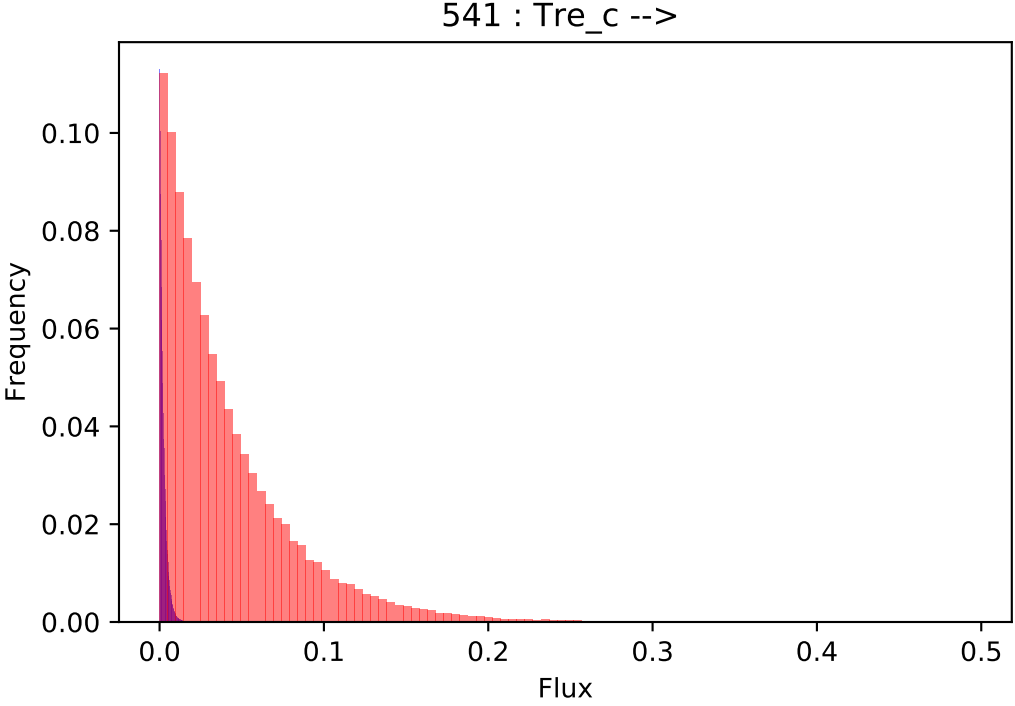

536 : Frc_c -->
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
Flux

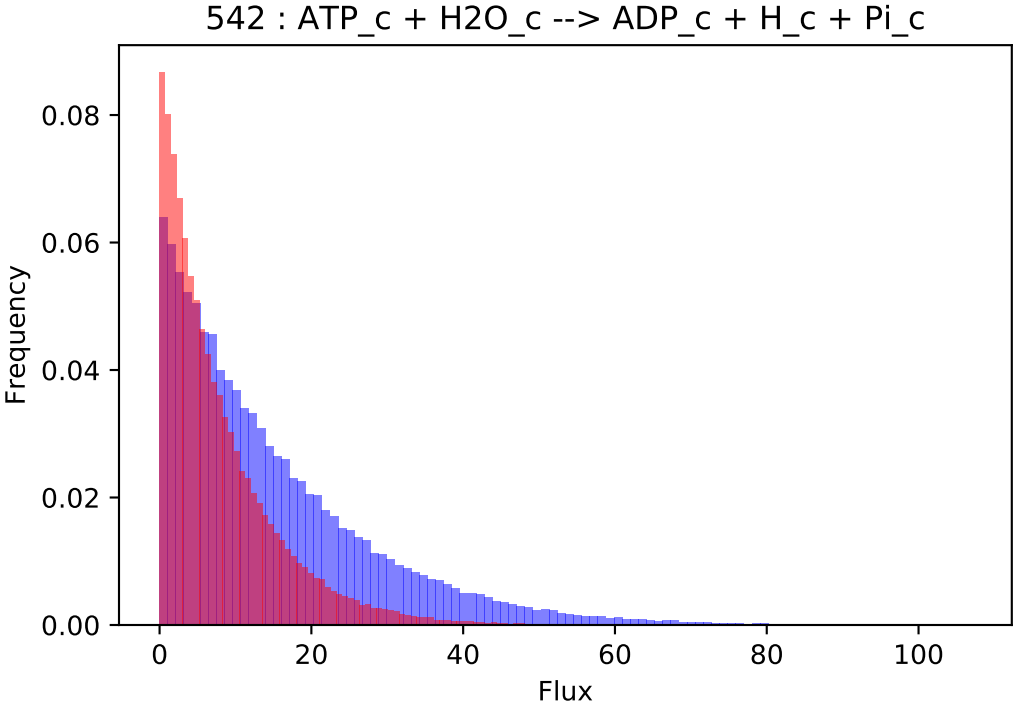

537 : Suc_c -->
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.1
0.2
0.3
0.4
Flux

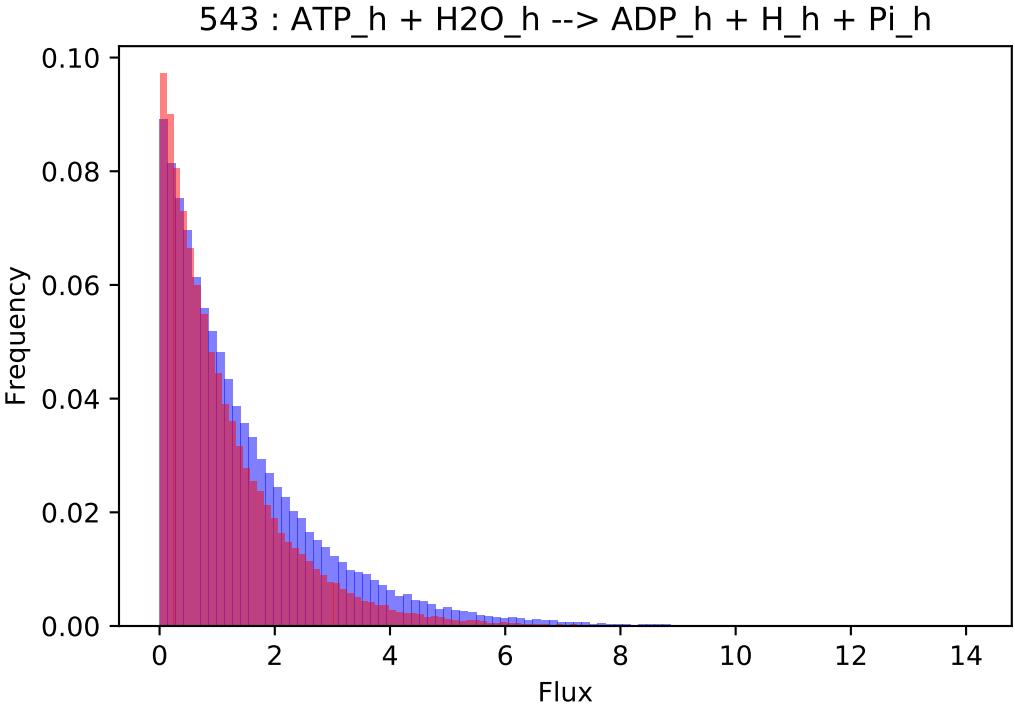

538 : cellulose3_c -->
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.00
0.05
0.10
0.15
0.20
0.25
0.30
Flux

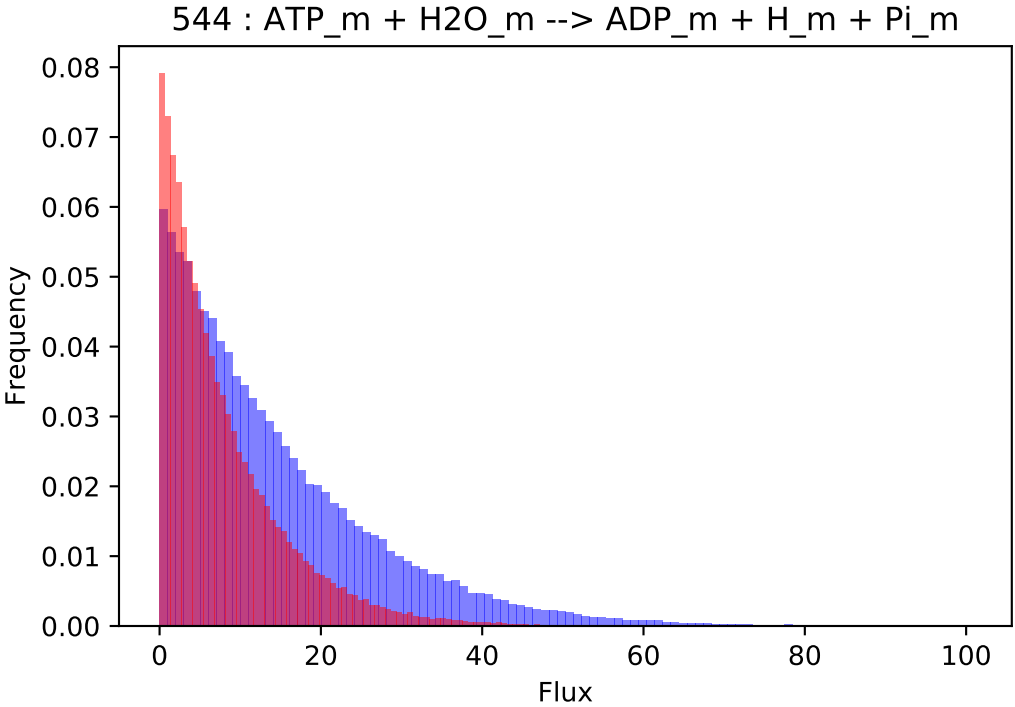

539 : Mas_c -->
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0.0
0.1
0.2
0.3
0.4
Flux

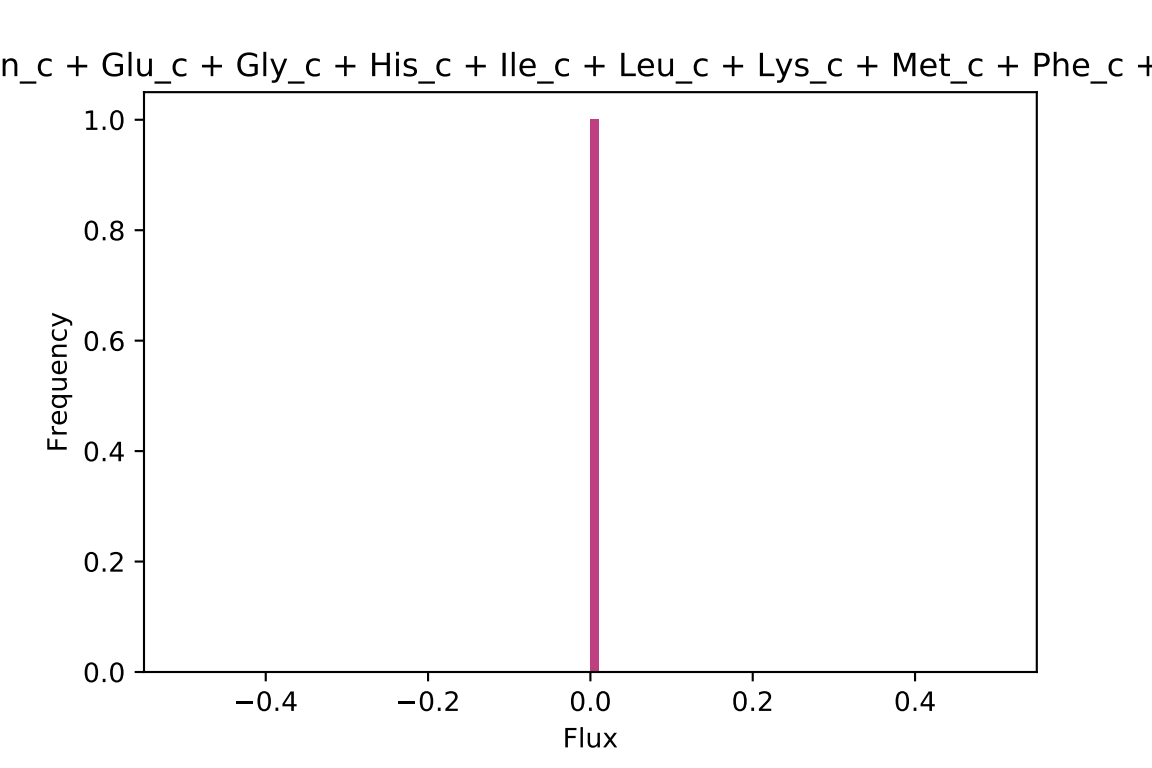

540 : M_DASH_ACP_h --> ACP_h + H_h
Frequency
0.00
0.02
0.04
0.06
0.08
0.10
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
Flux

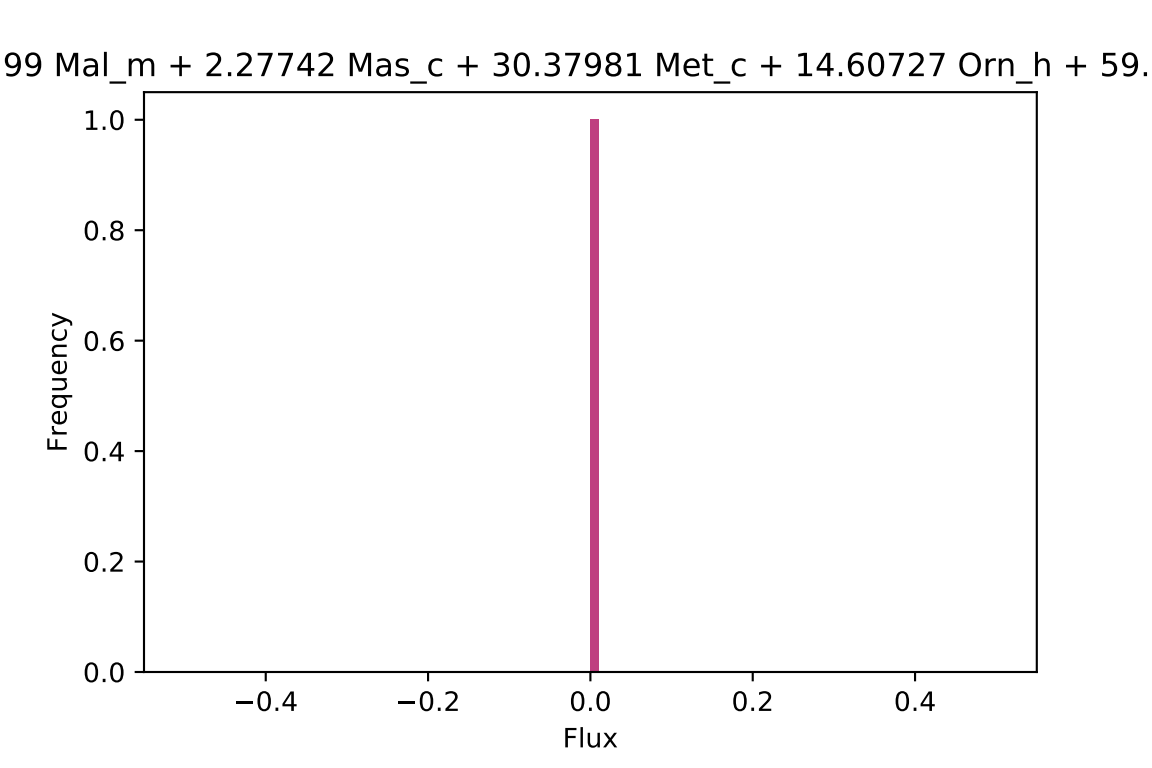

541 : Tre_c -->
Frequency
0.00
0.02
0.04
0.06
0.08
0.10
0.0
0.1
0.2
0.3
0.4
0.5
Flux

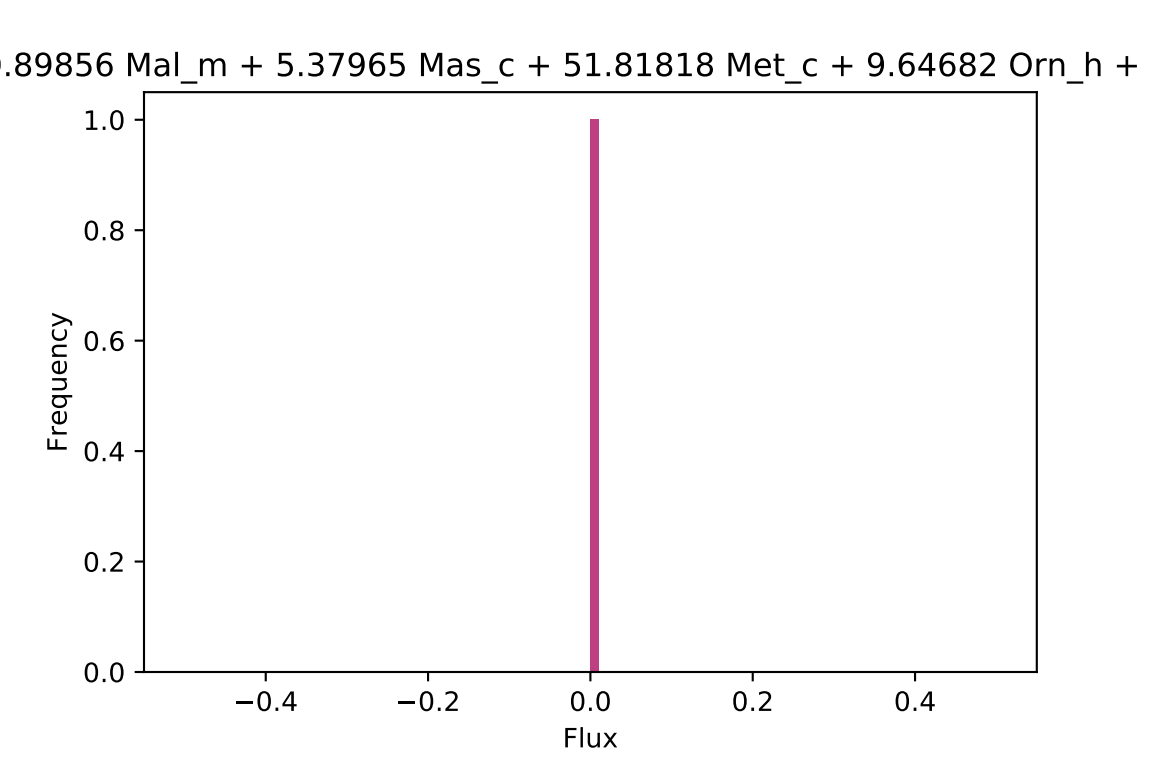

542 : ATP_c + H2O_c --> ADP_c + H_c + Pi_c
Frequency
0.00
0.02
0.04
0.06
0.08
0
20
40
60
80
100
Flux

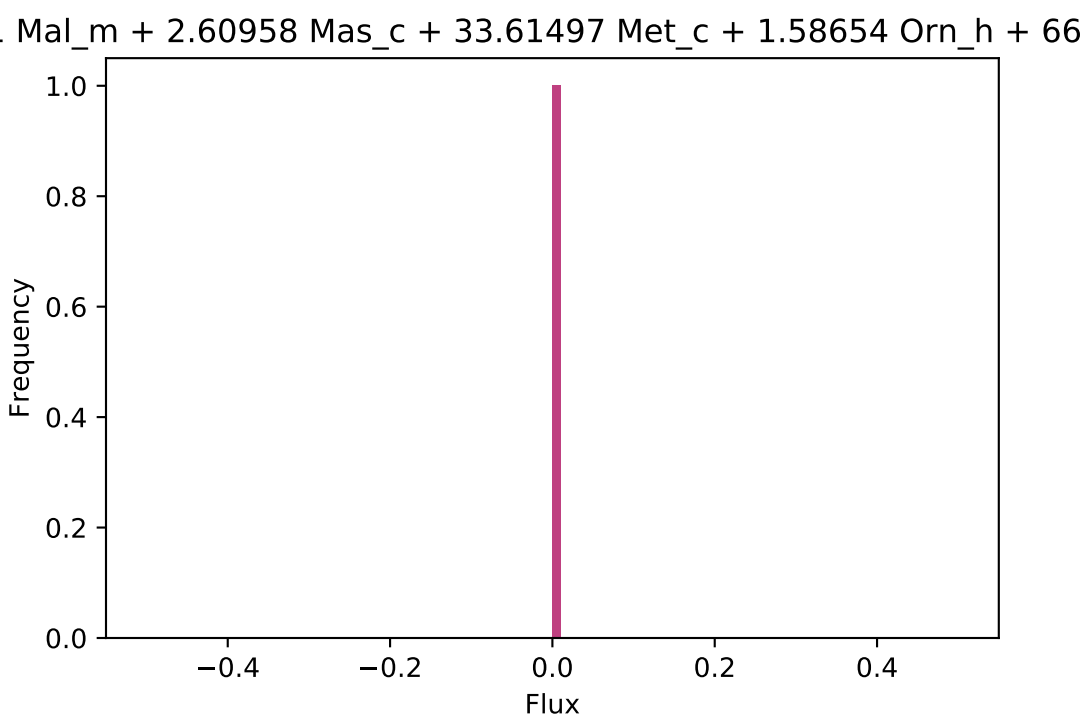

543 : ATP_h + H2O_h --> ADP_h + H_h + Pi_h
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
0
2
4
6
8
10
12
14
Flux

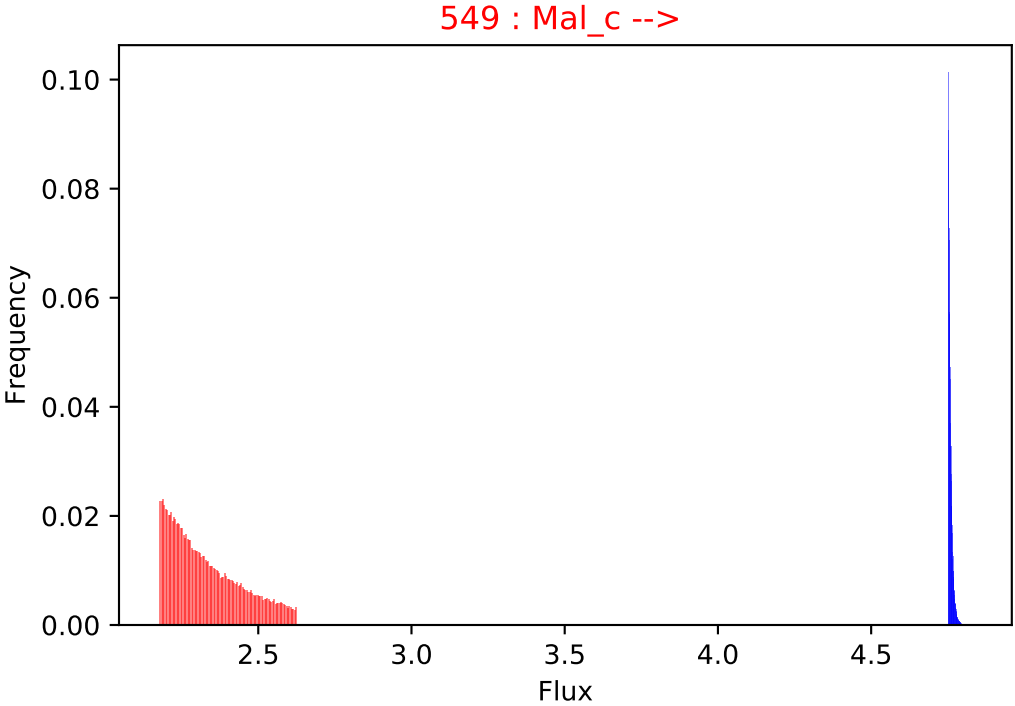

544 : ATP_m + H2O_m --> ADP_m + H_m + Pi_m
Frequency
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0
20
40
60
80
100
Flux

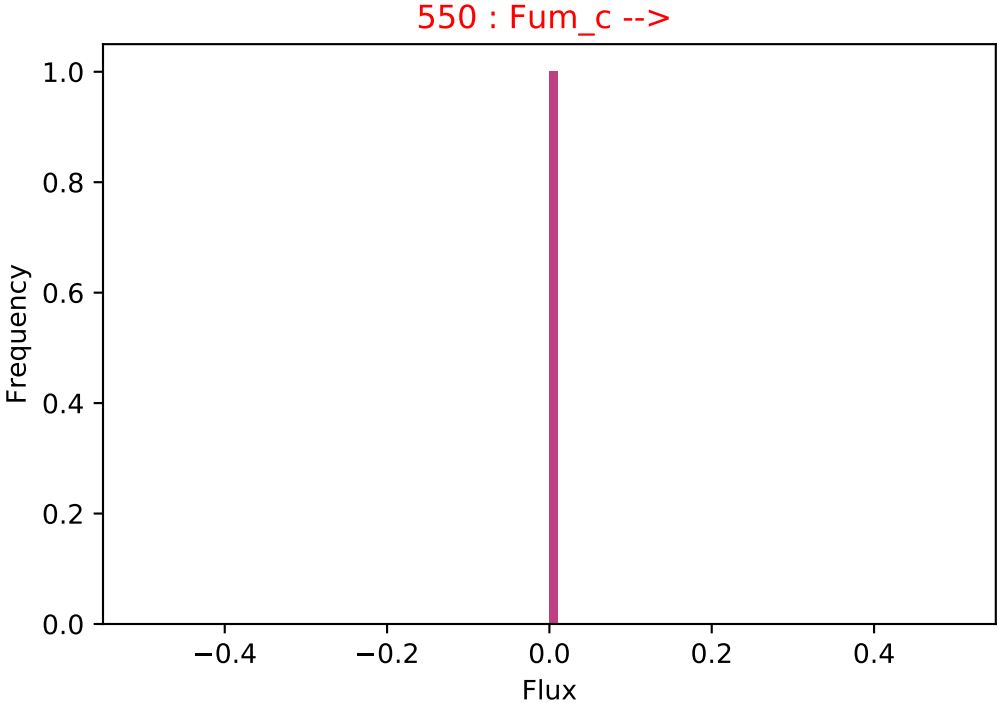

n_c + Glu_c + Gly_c + His_c + Ile_c + Leu_c + Lys_c + Met_c + Phe_c +
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux

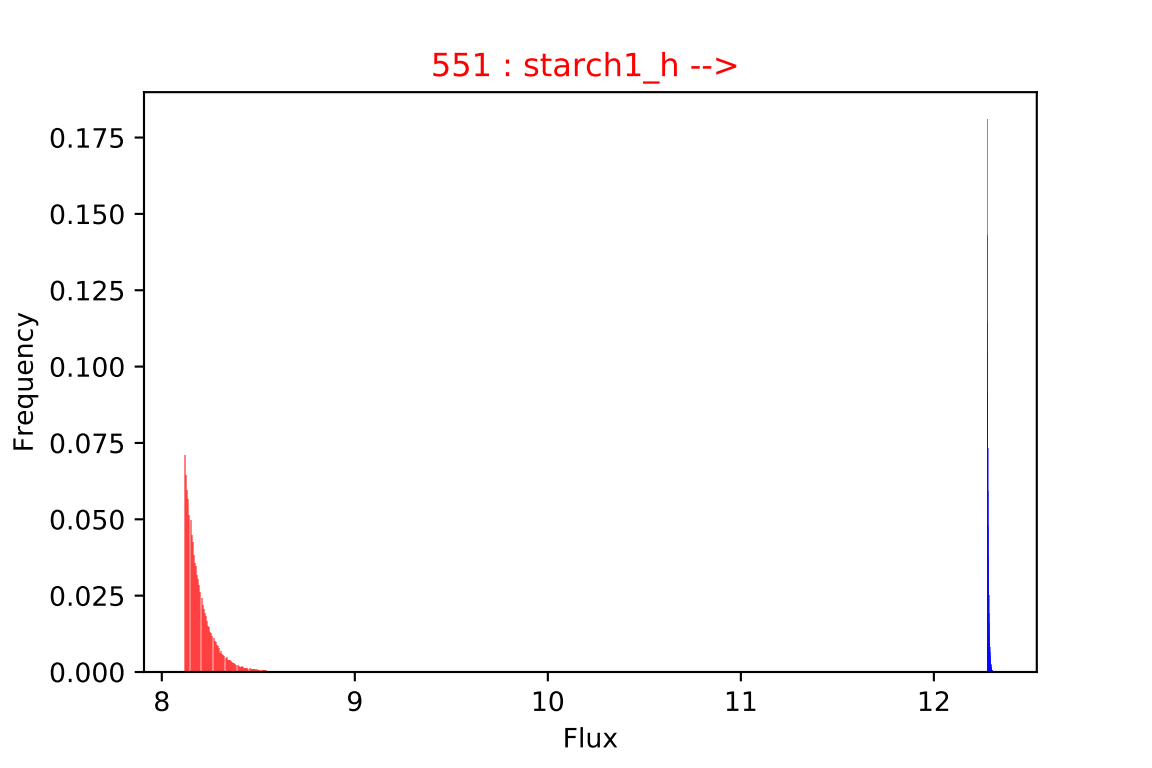

99 Mal_m + 2.27742 Mas_c + 30.37981 Met_c + 14.60727 Orn_h + 59.
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


.89856 Mal_m + 5.37965 Mas_c + 51.81818 Met_c + 9.64682 Orn_h +
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


41 Mal_m + 2.60958 Mas_c + 33.61497 Met_c + 1.58654 Orn_h + 66.6
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


549 : Mal_c -->
0.10
0.08
0.06
0.04
0.02
0.00
Frequency
2.5
3.0
3.5
4.0
4.5
Flux


550 : Fum_c -->
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
−0.4
−0.2
0.0
0.2
0.4
Flux


551 : starch1_h -->
0.175
0.150
0.125
0.100
0.075
0.050
0.025
0.000
Frequency
8
9
10
11
12
Flux