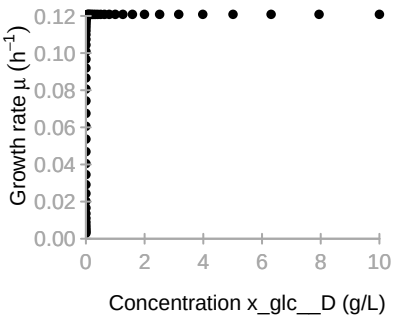
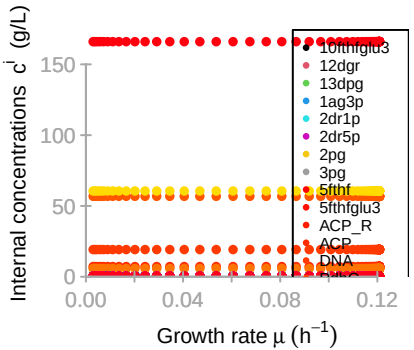
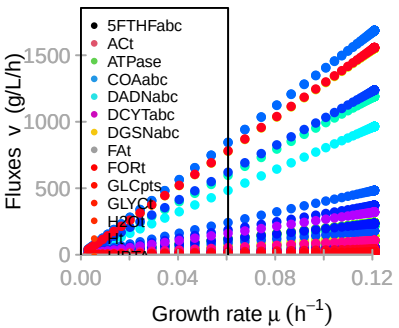
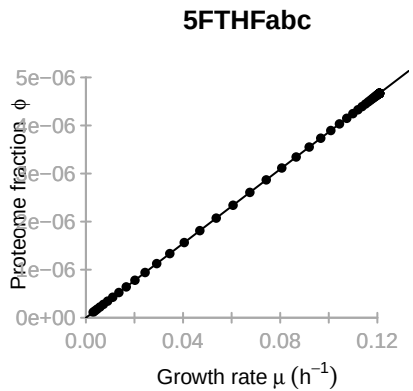
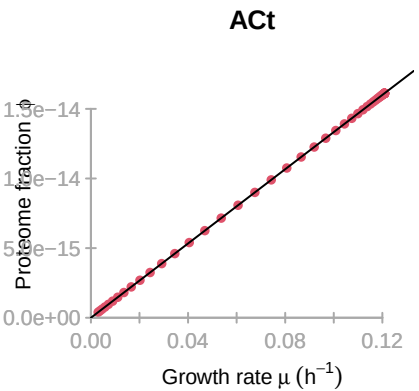
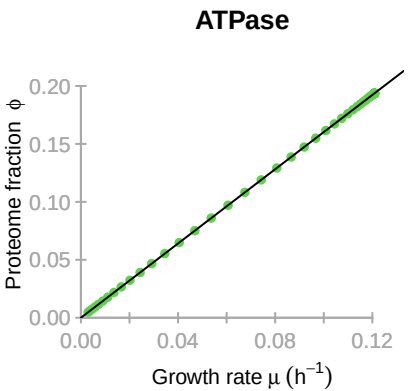

Growth rate μ (h^{-1})
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0
2
4
6
8
10
Concentration x_glc__D (g/L)

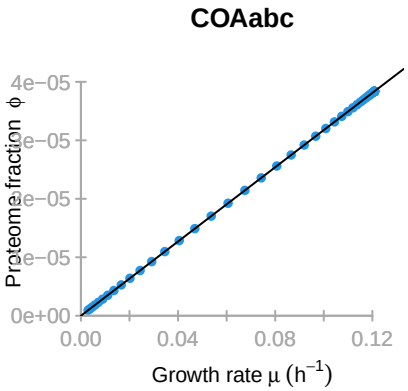

Internal concentrations c^i (g/L)
150
100
50
0
0.00
0.04
0.08
0.12
Growth rate μ (h^{-1})
10fthfglu3
12dgr
13dpg
1ag3p
2dr1p
2dr5p
2pg
3pg
5fthf
5fthfglu3
ACP_R
ACP
DNA

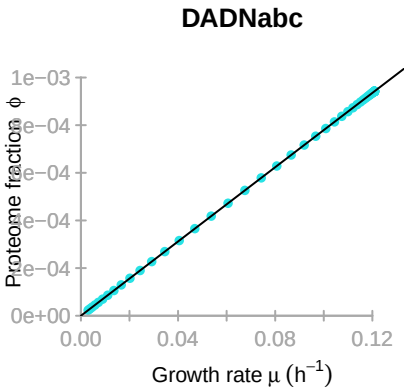

Fluxes v (g/L/h)
1500
1000
500
0
0.00
0.04
0.08
0.12
Growth rate μ (h^{-1})
5FTHFabc
ACt
ATPase
COAabc
DADNabc
DCYTabc
DGSNabc
FAt
FORt
GLCpts
GLYCt
H2Ot

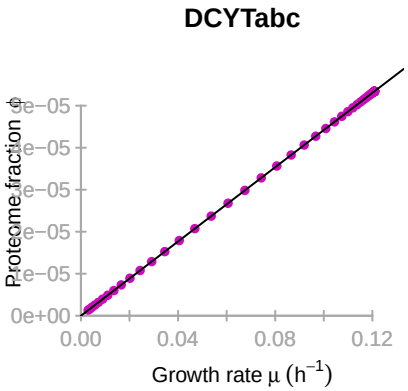

5FTHFabc
Proteome fraction ϕ
5e−06
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h^{-1})

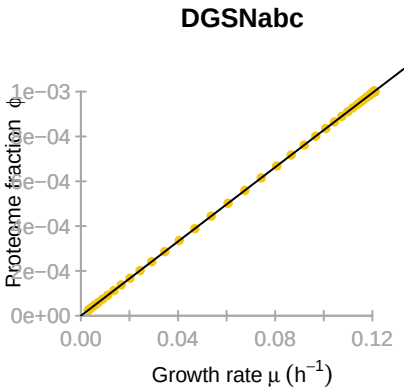

ACt
Proteome fraction ϕ
0.0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h^{-1})

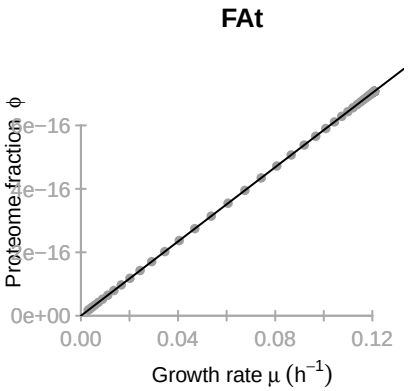

ATPase
Proteome fraction ϕ
0.20
0.15
0.10
0.05
0.00
0.00
0.04
0.08
0.12
Growth rate μ (h^{-1})

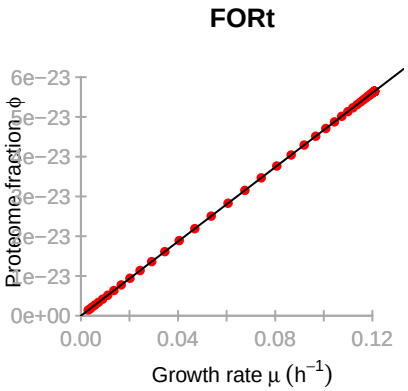

COAabc
Proteome fraction ϕ
4e−05
3e−05
2e−05
1e−05
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

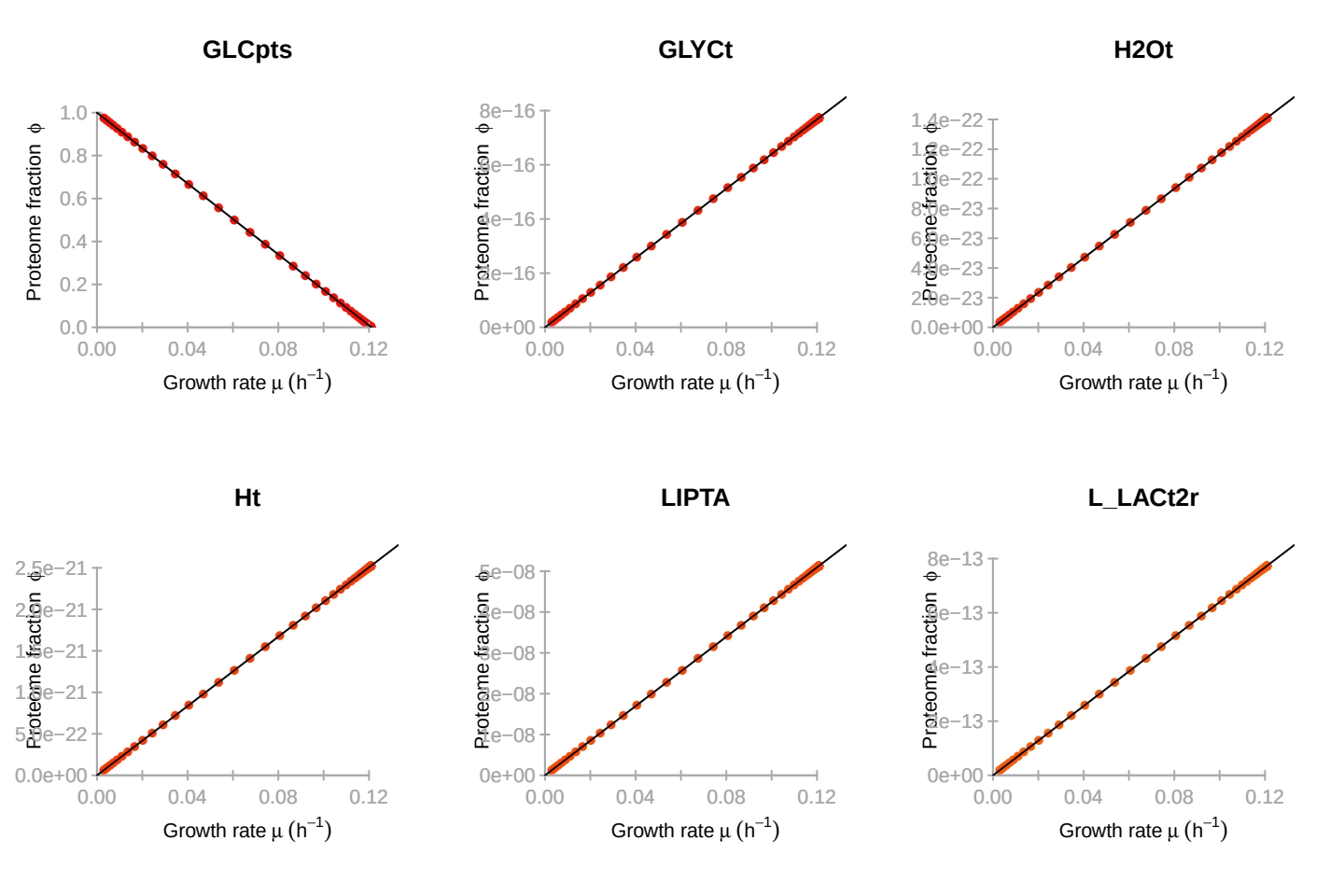

DADNabc
Proteome fraction ϕ
1e−03
8e−04
6e−04
4e−04
2e−04
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

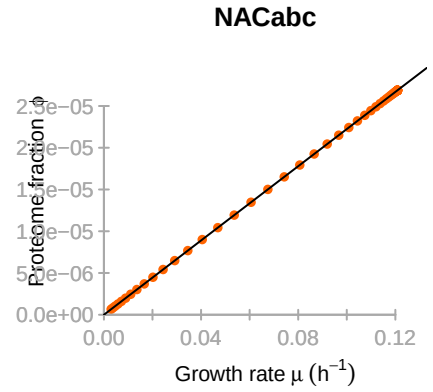

DCYTabc
Proteome fraction ϕ
4e−05
3e−05
2e−05
1e−05
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

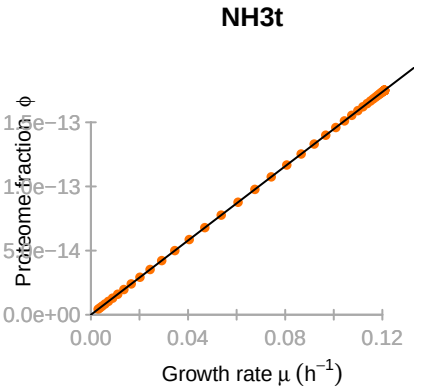

DGSNabc
Proteome fraction ϕ
1e−03
8e−04
6e−04
4e−04
2e−04
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

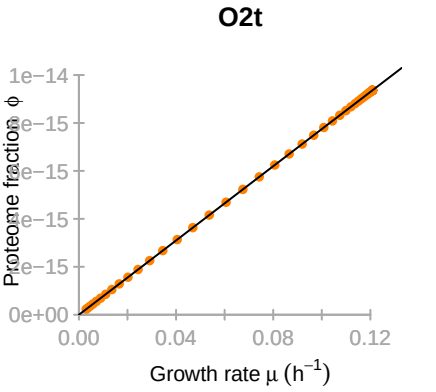

FAt
Proteome fraction ϕ
2e−16
1e−16
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

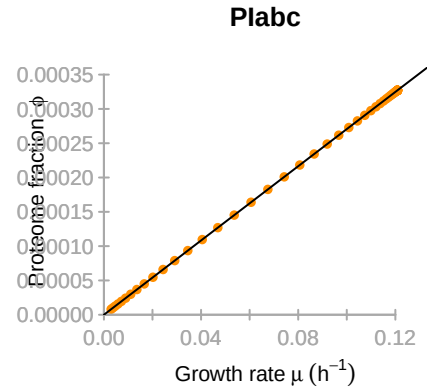

FORt
Proteome fraction ϕ
6e−23
5e−23
4e−23
3e−23
2e−23
1e−23
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

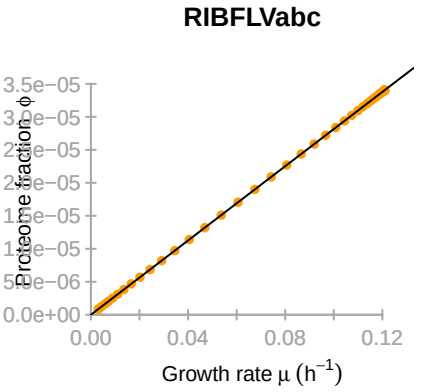

GLCpts
GLYCt
H2Ot
Ht
LIPTA
L_LACt2r
Proteome fraction ϕ
Growth rate μ (h−1)
0.00
0.04
0.08
0.12
0.0
0.2
0.4
0.6
0.8
1.0
0e+00
8e−16
1.4e−22
2.5e−21
5e−08
8e−13

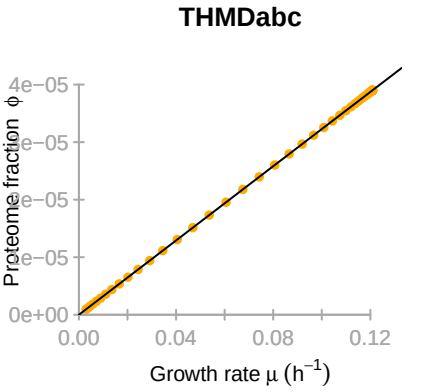

NACabc
Proteome fraction ϕ
0.0e+00
5.0e−06
1.0e−05
1.5e−05
2.0e−05
2.5e−05
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

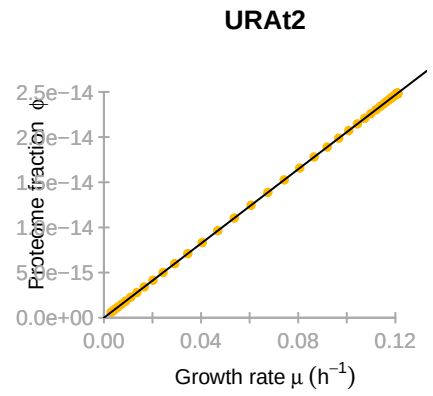

NH3t
Proteome fraction ϕ
0.0e+00
5.0e−14
1.0e−13
1.5e−13
2.0e−13
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

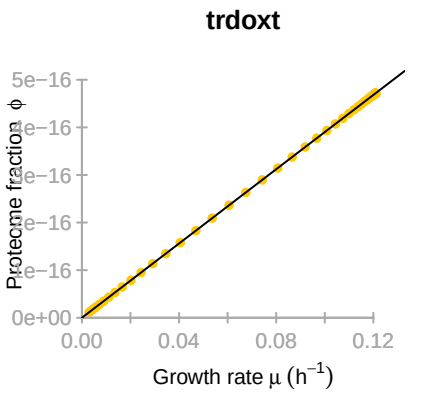

O2t
Proteome fraction ϕ
0e+00
5e−15
1e−14
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

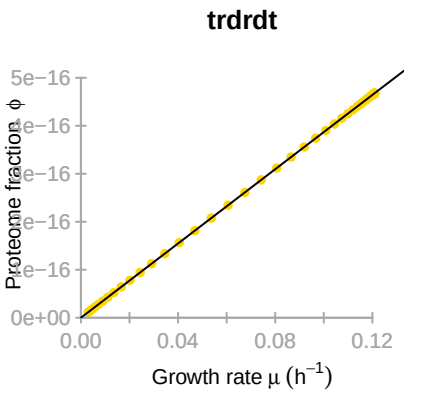

Plabc
Proteome fraction ϕ
0.00000
0.00005
0.00010
0.00015
0.00020
0.00025
0.00030
0.00035
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

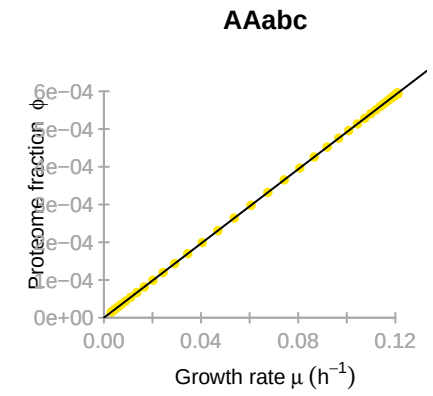

RIBFLVabc
Proteome fraction ϕ
0.0e+00
5.0e−06
1.0e−05
1.5e−05
2.0e−05
2.5e−05
3.0e−05
3.5e−05
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

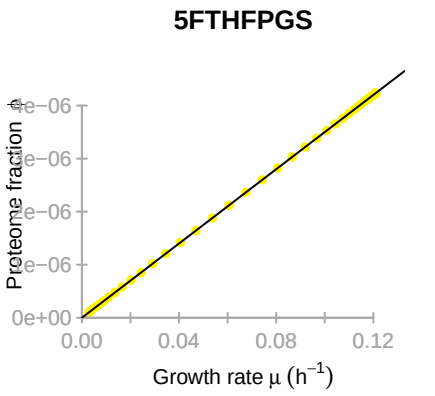

THMDabc
Proteome fraction ϕ
0e+00
1e−05
2e−05
3e−05
4e−05
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

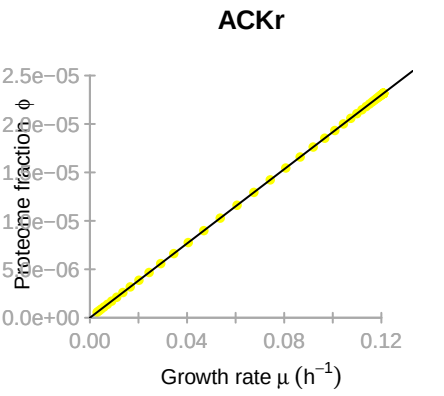

URAt2
Proteome fraction ϕ
2.5e−14
2e−14
1.5e−14
1e−14
5e−15
0.0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

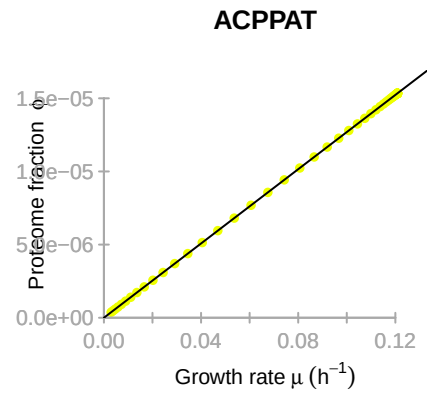

trdoxt
Proteome fraction ϕ
5e−16
4e−16
3e−16
2e−16
1e−16
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

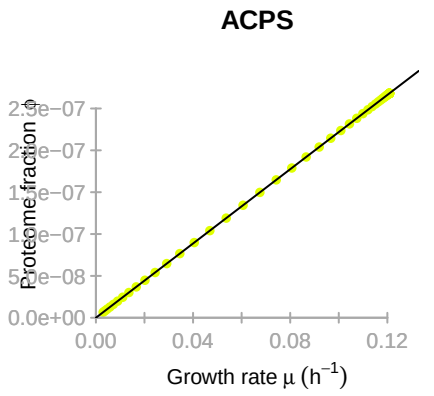

trdrdt
Proteome fraction ϕ
5e−16
4e−16
3e−16
2e−16
1e−16
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

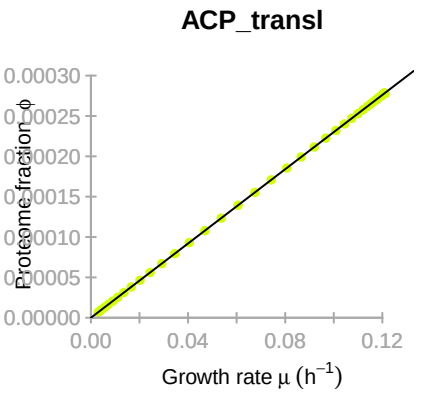

AAabc
Proteome fraction ϕ
6e−04
5e−04
4e−04
3e−04
2e−04
1e−04
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

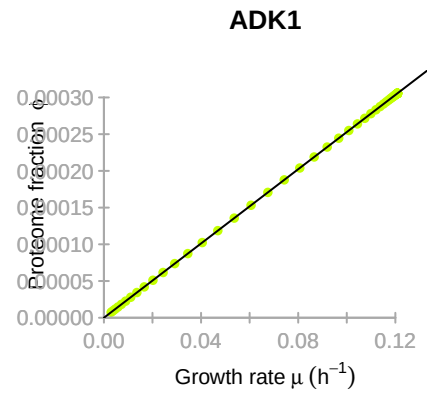

5FTHFPGS
Proteome fraction ϕ
4e−06
3e−06
2e−06
1e−06
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

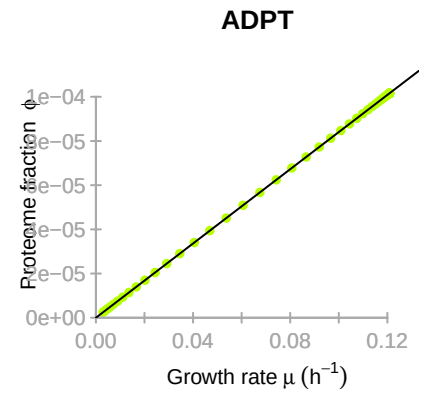

ACKr
Proteome fraction ϕ
2.5e−05
2e−05
1.5e−05
1e−05
5e−06
0.0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

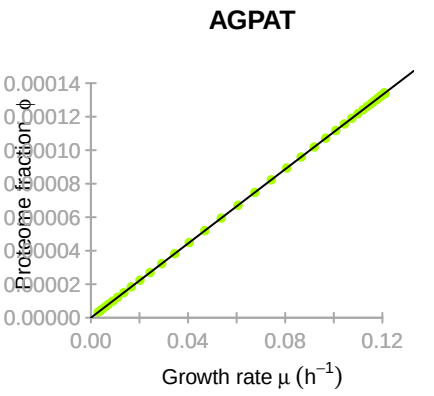

ACPPAT
Proteome fraction ϕ
1.5e−05
1e−05
5e−06
0.0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

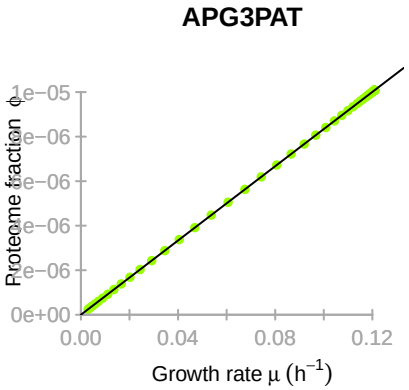

ACPS
Proteome fraction ϕ
2.5e−07
2e−07
1.5e−07
1e−07
5e−08
0.0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

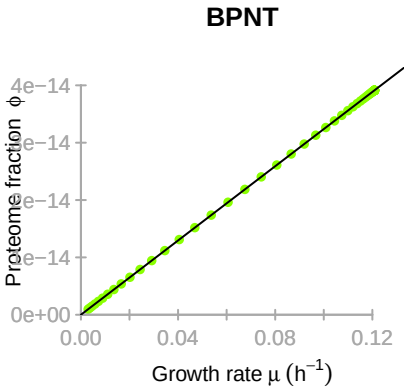

ACP_transl
Proteome fraction ϕ
0.00030
0.00025
0.00020
0.00015
0.00010
0.00005
0.00000
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

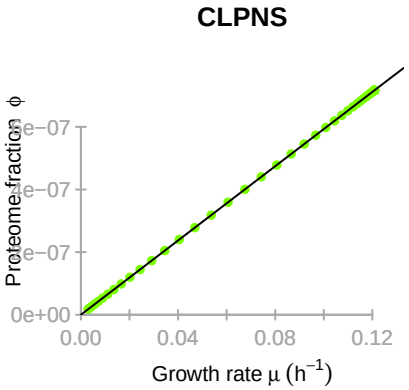

ADK1
Proteome fraction ϕ
0.00030
0.00025
0.00020
0.00015
0.00010
0.00005
0.00000
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

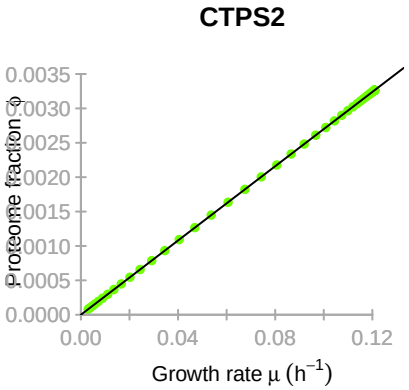

ADPT
Proteome fraction ϕ
1e−04
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

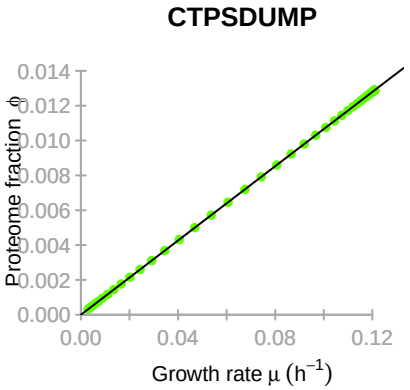

AGPAT
Proteome fraction ϕ
0.00014
0.00012
0.00010
0.00008
0.00006
0.00004
0.00002
0.00000
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

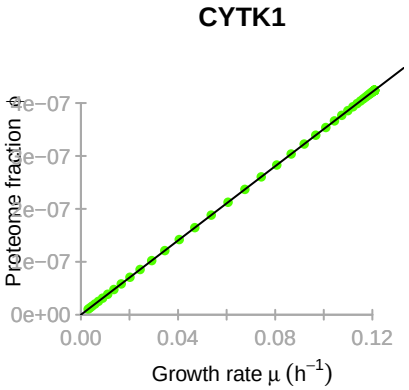

APG3PAT
Proteome fraction ϕ
1e−05
8e−06
6e−06
4e−06
2e−06
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

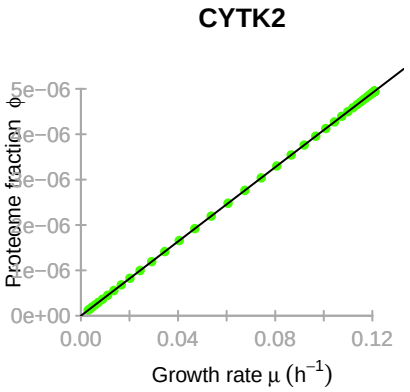

BPNT
Proteome fraction ϕ
4e−14
3e−14
2e−14
1e−14
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

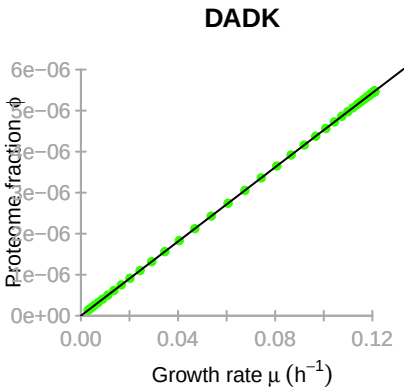

CLPNS
Proteome fraction ϕ
1e−07
8e−08
6e−08
4e−08
2e−08
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

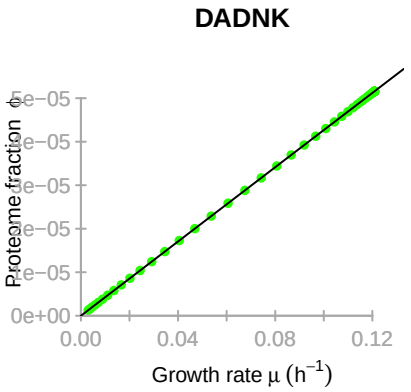

CTPS2
Proteome fraction ϕ
0.0035
0.0030
0.0025
0.0020
0.0015
0.0010
0.0005
0.0000
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

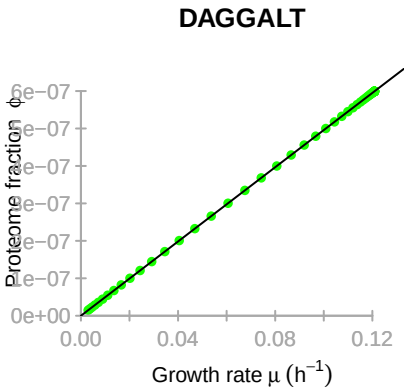

CTPSDUMP
Proteome fraction ϕ
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

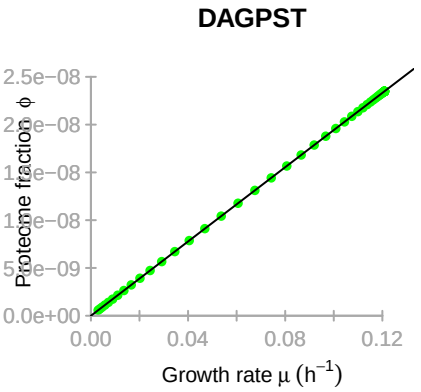

CYTK1
Proteome fraction ϕ
1e−07
8e−08
6e−08
4e−08
2e−08
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

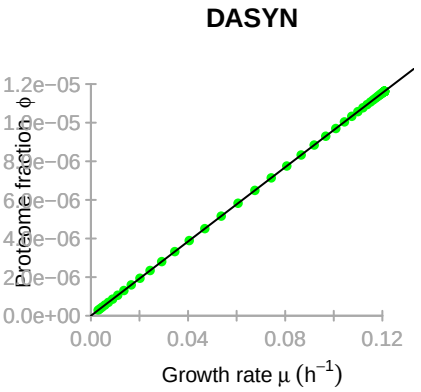

CYTK2
Proteome fraction ϕ
0e+00
2e−06
4e−06
5e−06
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

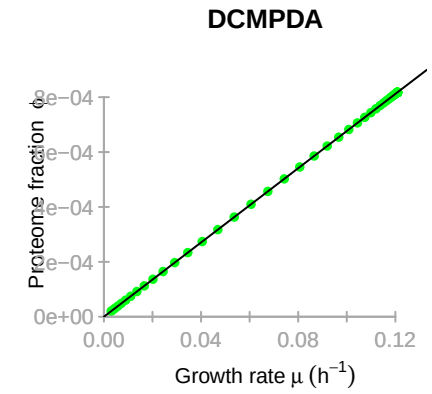

DADK
Proteome fraction ϕ
0e+00
6e−06
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

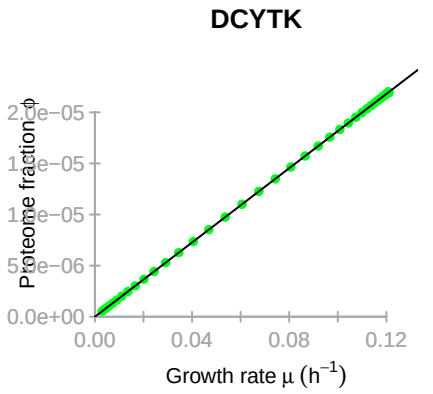

DADNK
Proteome fraction ϕ
0e+00
5e−05
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

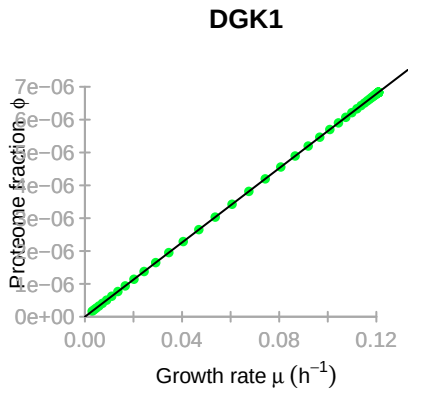

DAGGALT
Proteome fraction ϕ
0e+00
6e−07
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

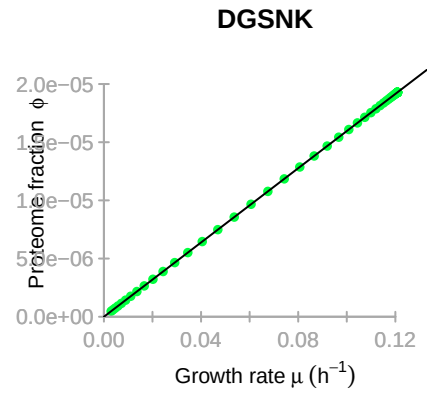

DAGPST
Proteome fraction ϕ
0.0e+00
2.5e−08
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

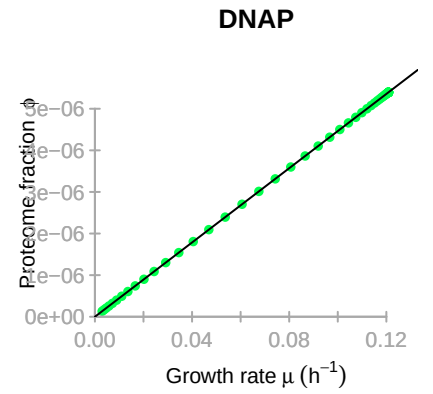

DASYN
Proteome fraction ϕ
0.0e+00
1.2e−05
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

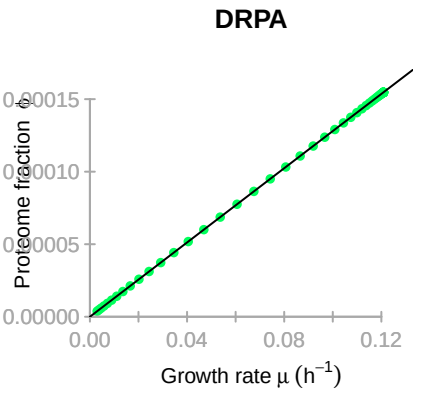

DCMPDA
Proteome fraction ϕ
0e+00
2e−04
4e−04
6e−04
8e−04
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

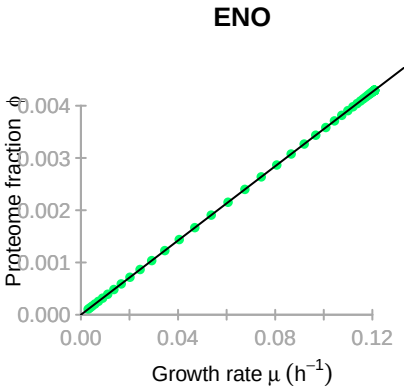

DCYTK
Proteome fraction ϕ
0.0e+00
5e−06
1e−05
1.5e−05
2.0e−05
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

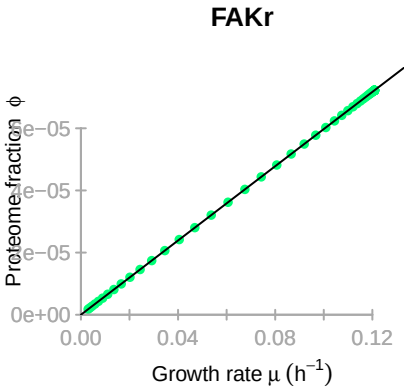

DGK1
Proteome fraction ϕ
0e+00
1e−06
2e−06
3e−06
4e−06
5e−06
6e−06
7e−06
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

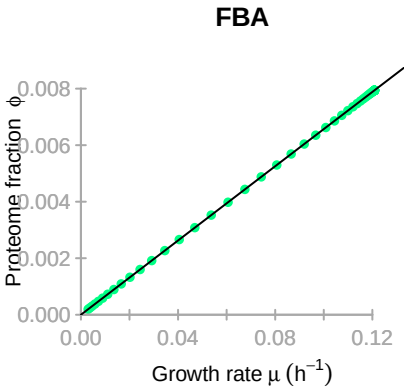

DGSNK
Proteome fraction ϕ
0.0e+00
5e−06
1e−05
1.5e−05
2.0e−05
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

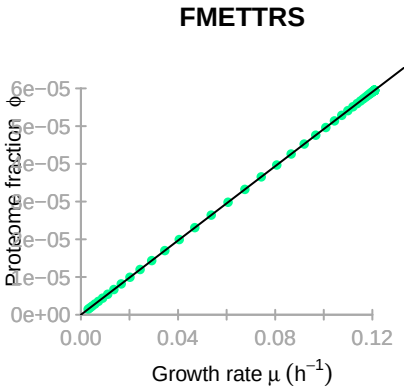

DNAP
Proteome fraction ϕ
0e+00
1e−06
2e−06
3e−06
4e−06
5e−06
6e−06
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

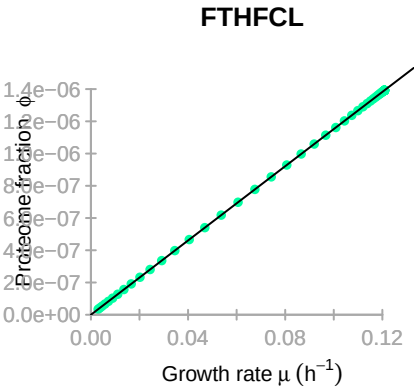

DRPA
Proteome fraction ϕ
0.00000
0.00005
0.00010
0.00015
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

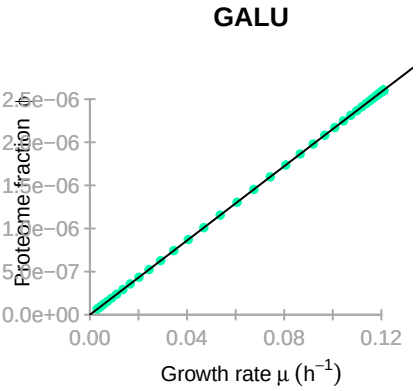

ENO
Proteome fraction ϕ
0.000
0.001
0.002
0.003
0.004
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

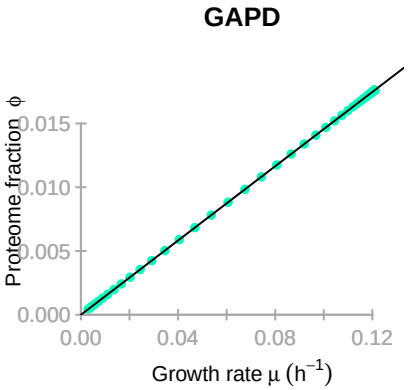

FAKr
Proteome fraction ϕ
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

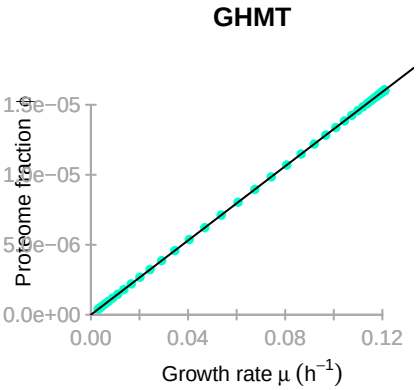

FBA
Proteome fraction ϕ
0.000
0.002
0.004
0.006
0.008
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

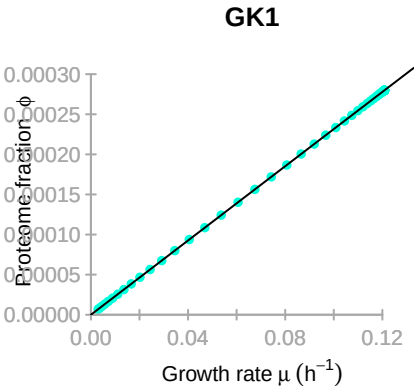

FMETTRS
Proteome fraction ϕ
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

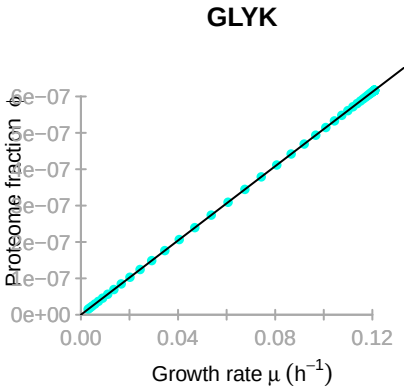

FTHFCL
Proteome fraction ϕ
0.0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

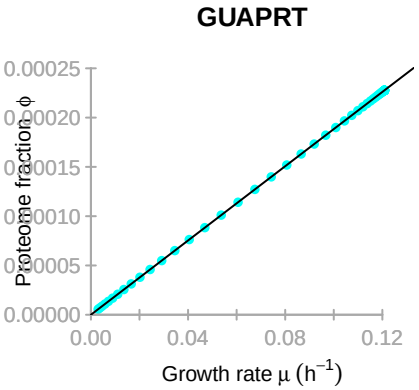

GALU
Proteome fraction ϕ
0.0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

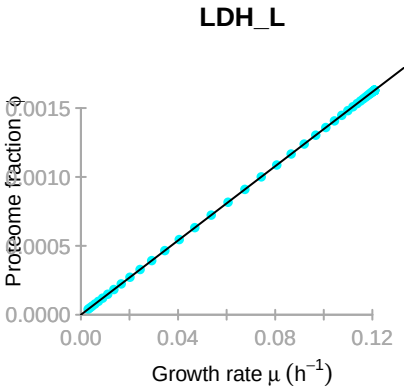

GAPD
Proteome fraction ϕ
0.015
0.010
0.005
0.000
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

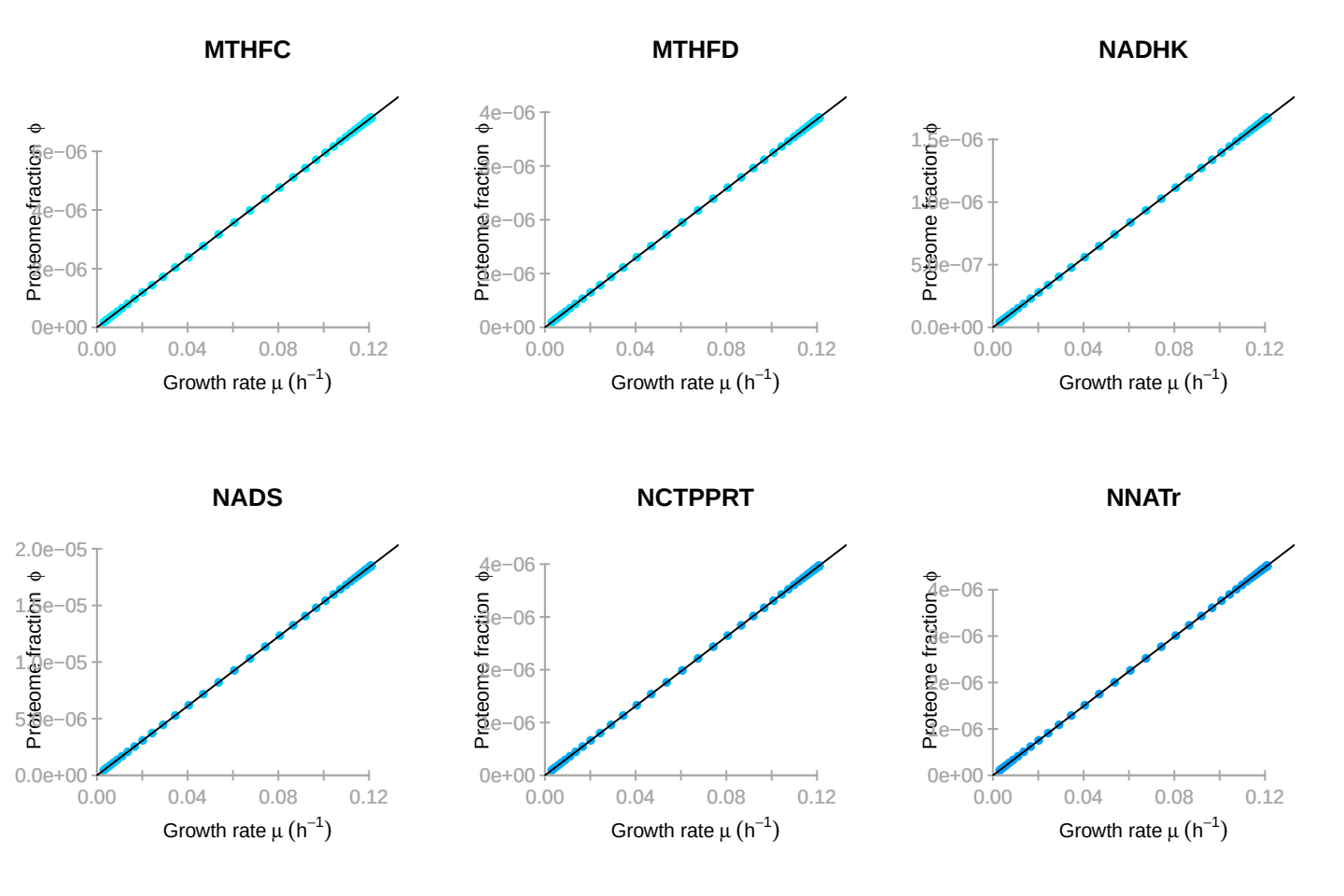

GHMT
Proteome fraction ϕ
1.5e−05
1.0e−05
5.0e−06
0.0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

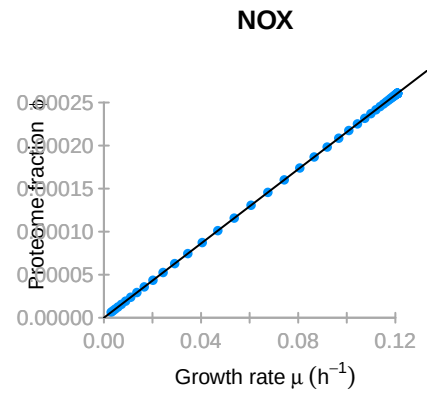

GK1
Proteome fraction ϕ
0.00030
0.00025
0.00020
0.00015
0.00010
0.00005
0.00000
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

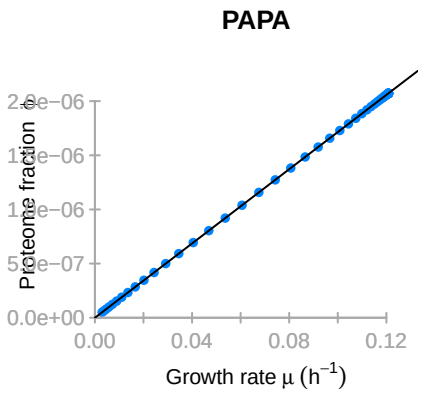

GLYK
Proteome fraction ϕ
6e−07
5e−07
4e−07
3e−07
2e−07
1e−07
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

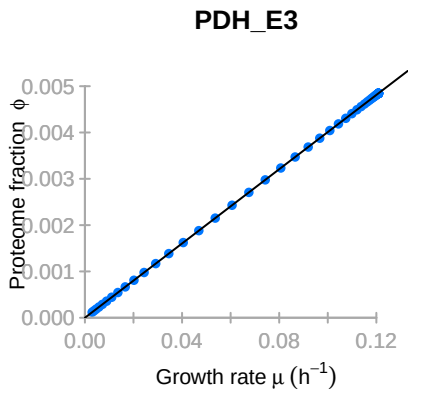

GUAPRT
Proteome fraction ϕ
0.00025
0.00020
0.00015
0.00010
0.00005
0.00000
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

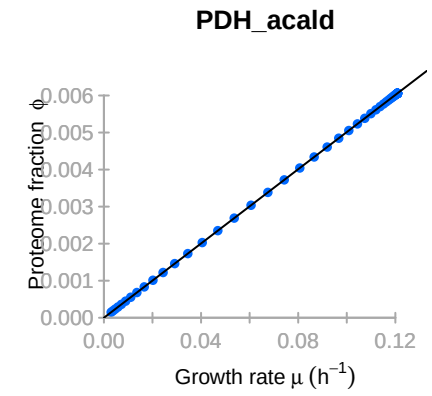

LDH_L
Proteome fraction ϕ
0.0015
0.0010
0.0005
0.0000
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

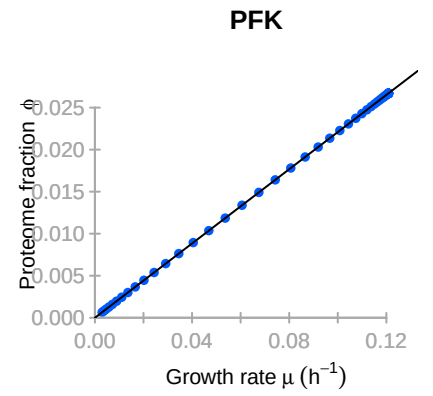

MTHFC
MTHFD
NADHK
NADS
NCTPPRT
NNATr
Proteome fraction ϕ
Growth rate μ (h^{-1})
0.00
0.04
0.08
0.12
0e+00
4e−06
5e−07
1e−06
1.5e−06
2e−06
2.5e−06
3e−06
3.5e−06
0.0e+00
2.0e−05
5e−06
1e−05
1.5e−05

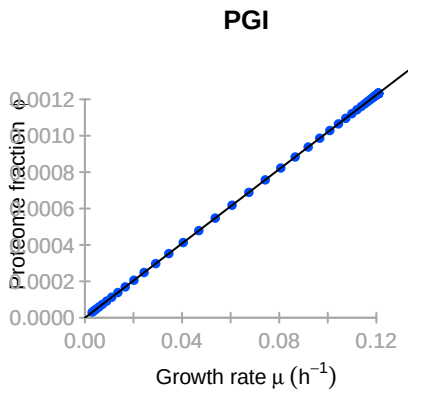

NOX
Proteome fraction ϕ
0.00025
0.00020
0.00015
0.00010
0.00005
0.00000
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

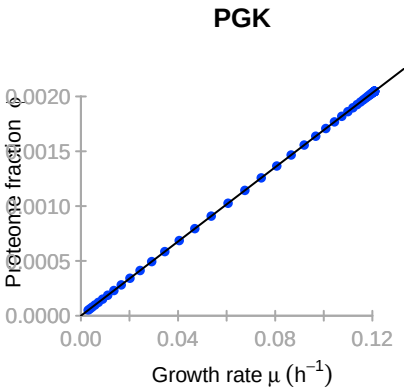

PAPA
Proteome fraction ϕ
2.0e−06
1.5e−06
1.0e−06
5.0e−07
0.0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

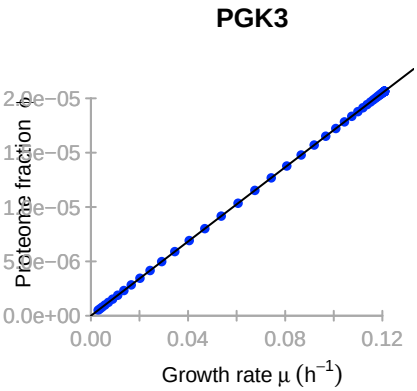

PDH_E3
Proteome fraction ϕ
0.005
0.004
0.003
0.002
0.001
0.000
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

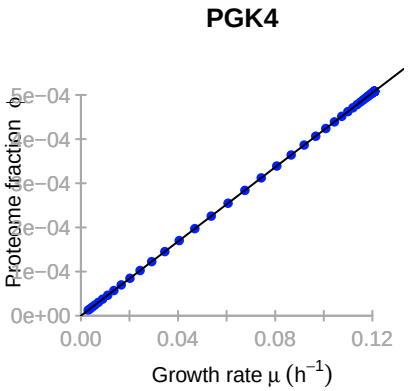

PDH_acald
Proteome fraction ϕ
0.006
0.005
0.004
0.003
0.002
0.001
0.000
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

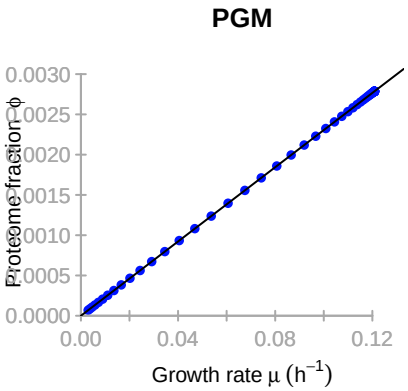

PFK
Proteome fraction ϕ
0.025
0.020
0.015
0.010
0.005
0.000
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

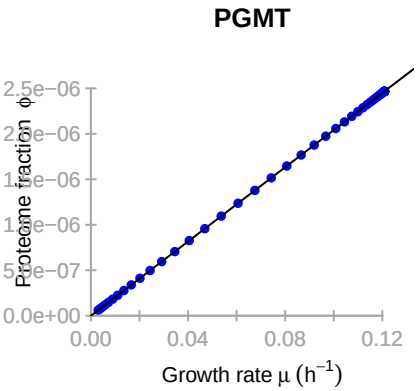

PGI
Proteome fraction ϕ
0.0012
0.0010
0.0008
0.0006
0.0004
0.0002
0.0000
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

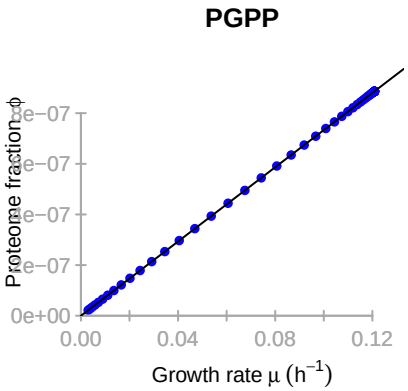

PGK
Proteome fraction ϕ
0.0020
0.0015
0.0010
0.0005
0.0000
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

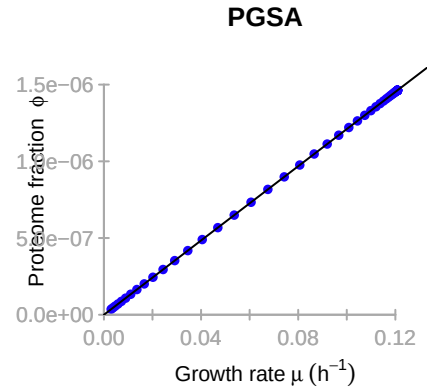

PGK3
Proteome fraction ϕ
2e−05
1.5e−05
1e−05
5e−06
0.0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

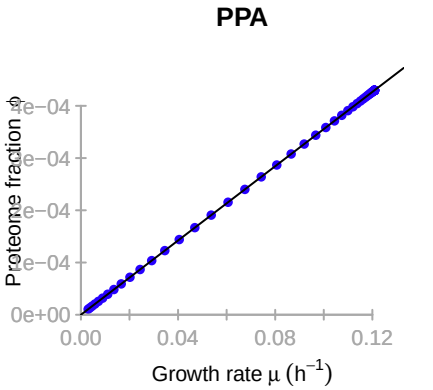

PGK4
Proteome fraction ϕ
5e−04
4e−04
3e−04
2e−04
1e−04
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

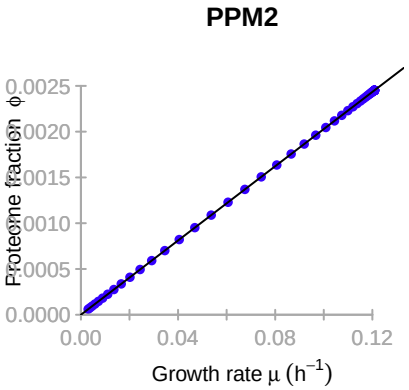

PGM
Proteome fraction ϕ
0.0030
0.0025
0.0020
0.0015
0.0010
0.0005
0.0000
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

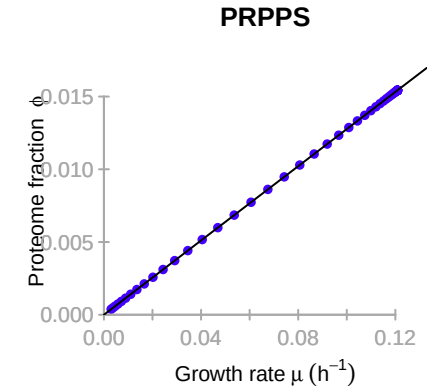

PGMT
Proteome fraction ϕ
2.5e−06
2e−06
1.5e−06
1e−06
5e−07
0.0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

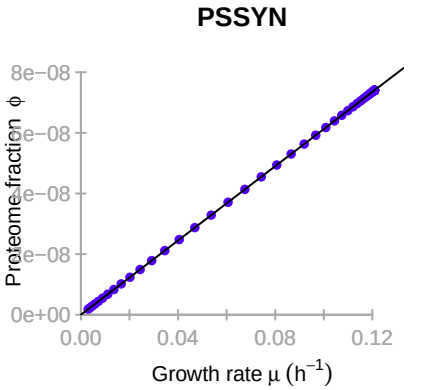

PGPP
Proteome fraction ϕ
2e−07
1.5e−07
1e−07
5e−08
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

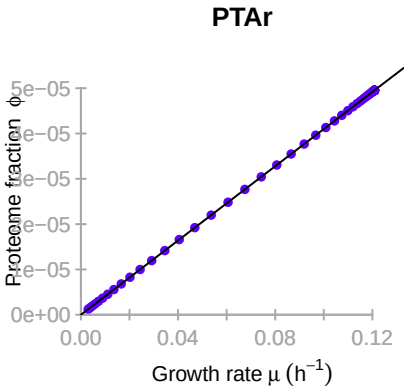

PGSA
Proteome fraction ϕ
1.5e−06
1e−06
5e−07
0.0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

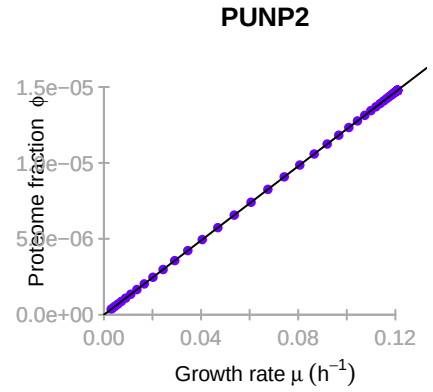

PPA
Proteome fraction ϕ
4e−04
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

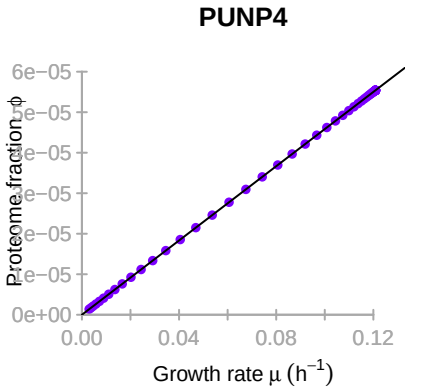

PPM2
Proteome fraction ϕ
0.0025
0.0020
0.0015
0.0010
0.0005
0.0000
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

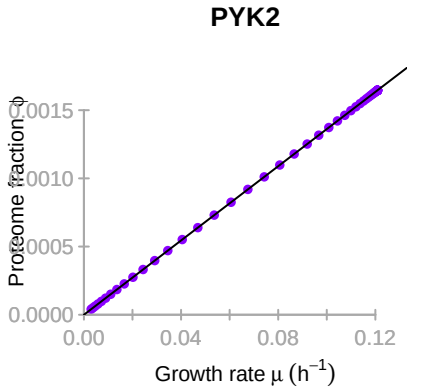

PRPPS
Proteome fraction ϕ
0.015
0.010
0.005
0.000
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

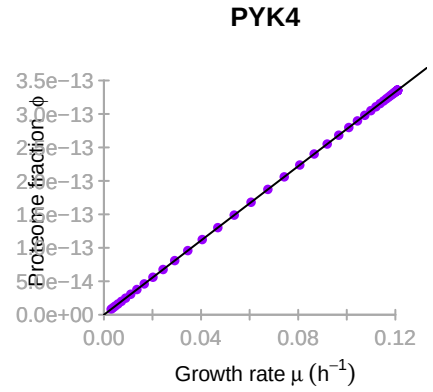

PSSYN
Proteome fraction ϕ
8e−08
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

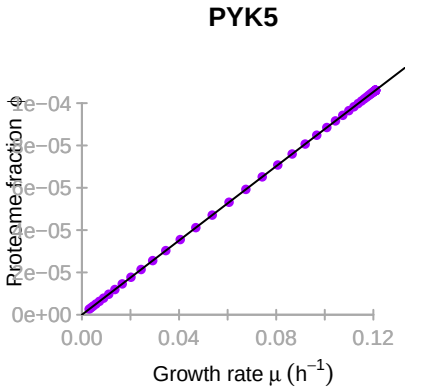

PTAr
Proteome fraction ϕ
5e−05
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

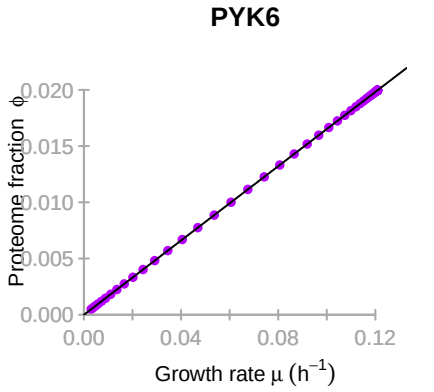

PUNP2
Proteome fraction ϕ
1.5e−05
1e−05
5e−06
0.0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

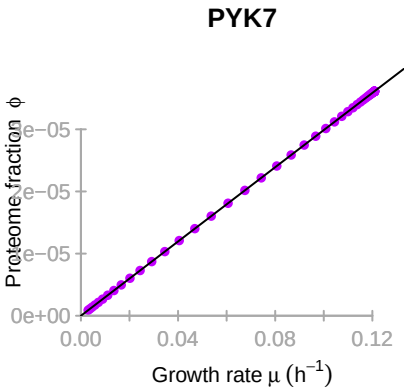

PUNP4
Proteome fraction ϕ
6e−05
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

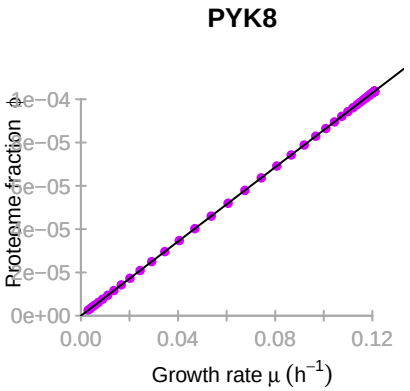

PYK2
Proteome fraction ϕ
0.0015
0.0010
0.0005
0.0000
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

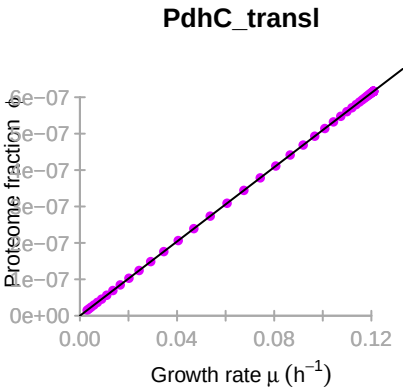

PYK4
Proteome fraction ϕ
3.5e−13
0.0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

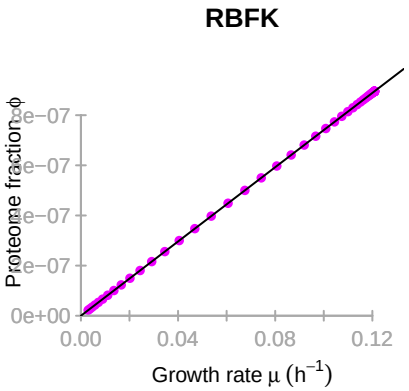

PYK5
Proteome fraction ϕ
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

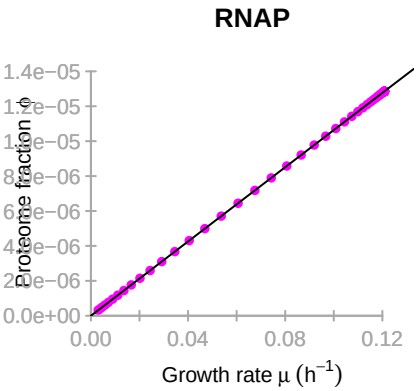

PYK6
Proteome fraction ϕ
0.020
0.015
0.010
0.005
0.000
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

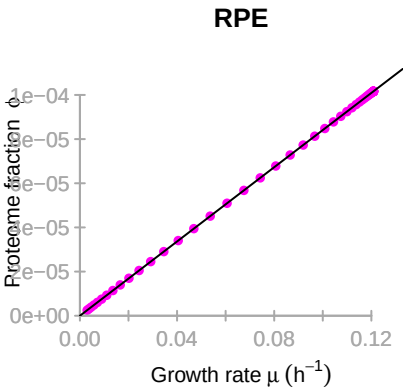

PYK7
Proteome fraction ϕ
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

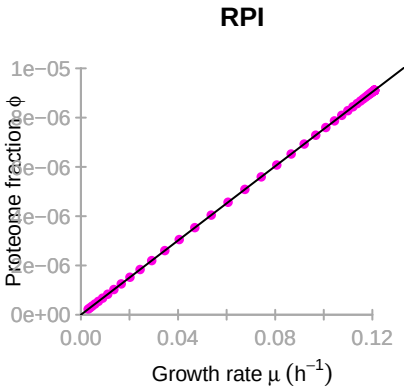

PYK8
Proteome fraction ϕ
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

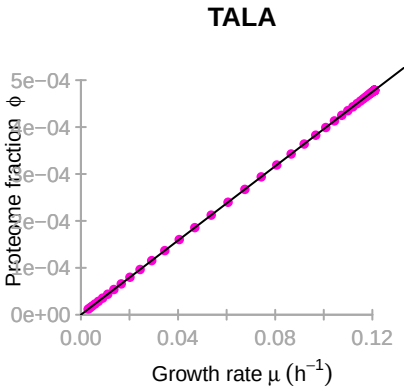

PdhC_transl
Proteome fraction ϕ
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

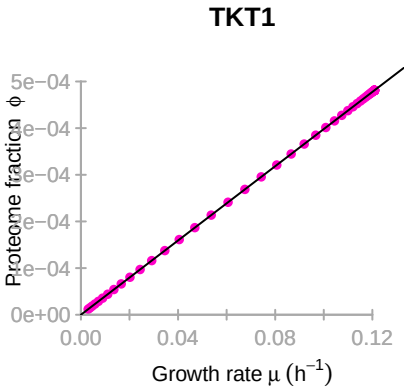

RBFK
Proteome fraction ϕ
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

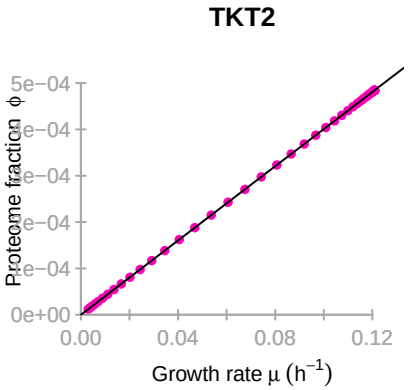

RNAP
Proteome fraction ϕ
0.0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

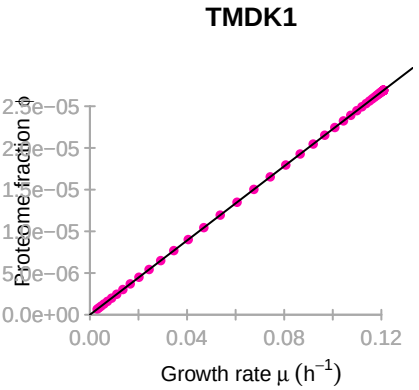

RPE
Proteome fraction ϕ
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

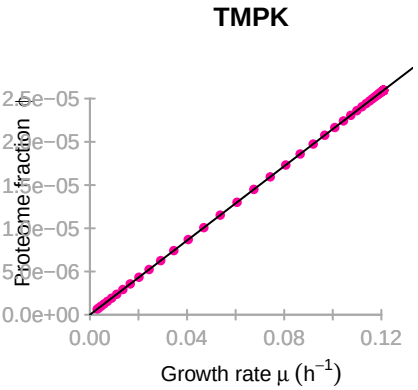

RPI
Proteome fraction ϕ
1e−05
8e−06
6e−06
4e−06
2e−06
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

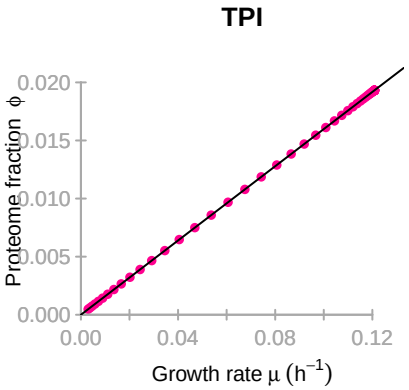

TALA
Proteome fraction ϕ
5e−04
4e−04
3e−04
2e−04
1e−04
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

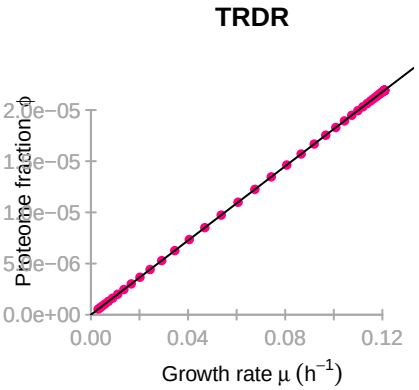

TKT1
Proteome fraction ϕ
5e−04
4e−04
3e−04
2e−04
1e−04
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

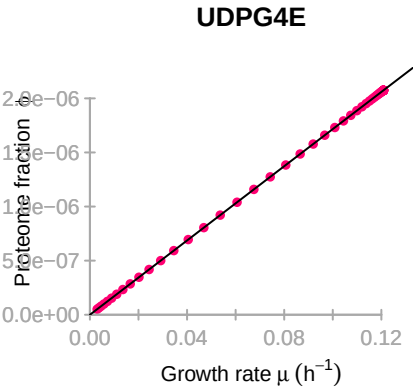

TKT2
Proteome fraction ϕ
5e−04
4e−04
3e−04
2e−04
1e−04
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

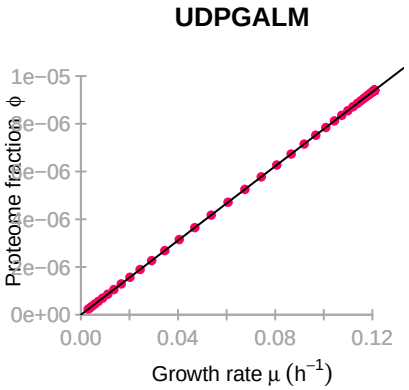

TMDK1
Proteome fraction ϕ
2.5e−05
2e−05
1.5e−05
1e−05
5e−06
0.0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

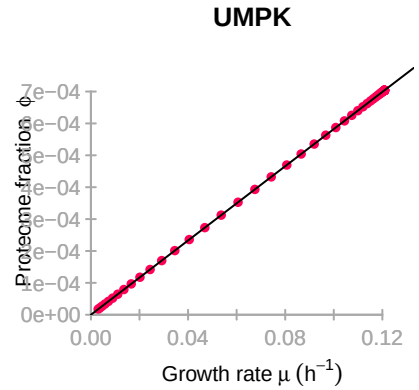

TMPK
Proteome fraction ϕ
2.5e−05
2e−05
1.5e−05
1e−05
5e−06
0.0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

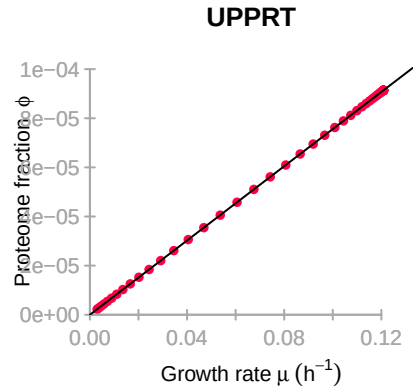

TPI
Proteome fraction ϕ
0.020
0.015
0.010
0.005
0.000
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

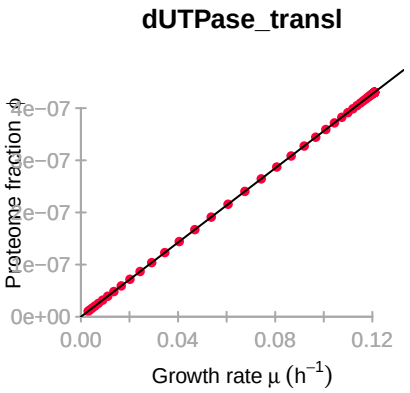

TRDR
Proteome fraction ϕ
2.0e−05
1.5e−05
1.0e−05
5.0e−06
0.0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

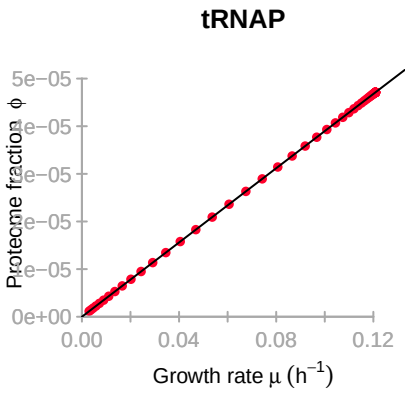

UDPG4E
Proteome fraction ϕ
2.0e−06
1.5e−06
1.0e−06
5.0e−07
0.0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

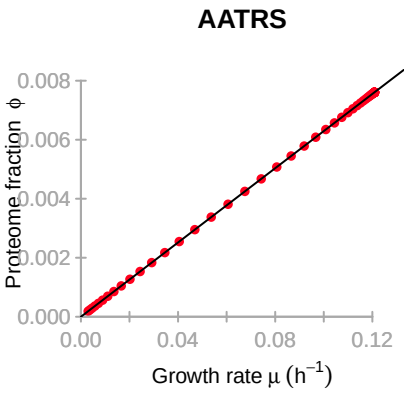

UDPGALM
Proteome fraction ϕ
1e−05
8e−06
6e−06
4e−06
2e−06
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

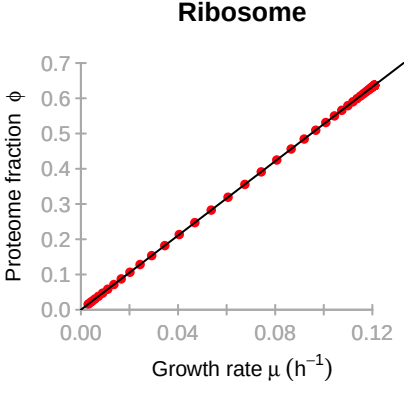

UMPK
Proteome fraction ϕ
7e−04
6e−04
5e−04
4e−04
3e−04
2e−04
1e−04
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

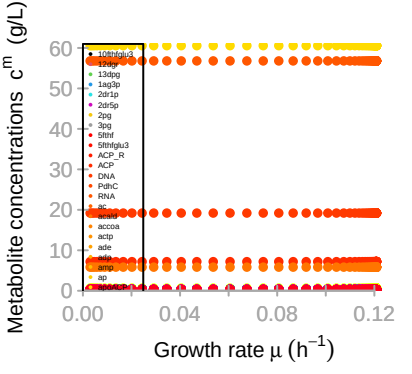

UPPRT
Proteome fraction ϕ
1e−04
8e−05
6e−05
4e−05
2e−05
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)

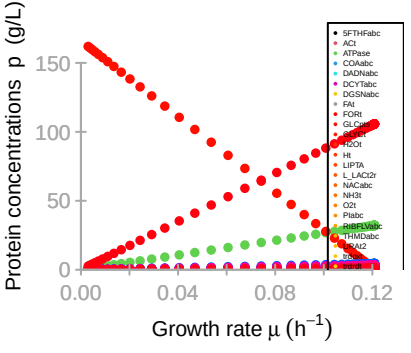

dUTPase_transl
Proteome fraction ϕ
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)


tRNAP
Proteome fraction ϕ
5e−05
0e+00
0.00
0.04
0.08
0.12
Growth rate μ (h−1)


AATRS
Proteome fraction ϕ
0.008
0.006
0.004
0.002
0.000
0.00
0.04
0.08
0.12
Growth rate μ (h−1)


Ribosome
Proteome fraction ϕ
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0.00
0.04
0.08
0.12
Growth rate μ (h−1)


Metabolite concentrations cm (g/L)
60
50
40
30
20
10
0
0.00
0.04
0.08
0.12
Growth rate μ (h−1)


Protein concentrations p (g/L)
150
100
50
0
0.00
0.04
0.08
0.12
Growth rate μ (h−1)