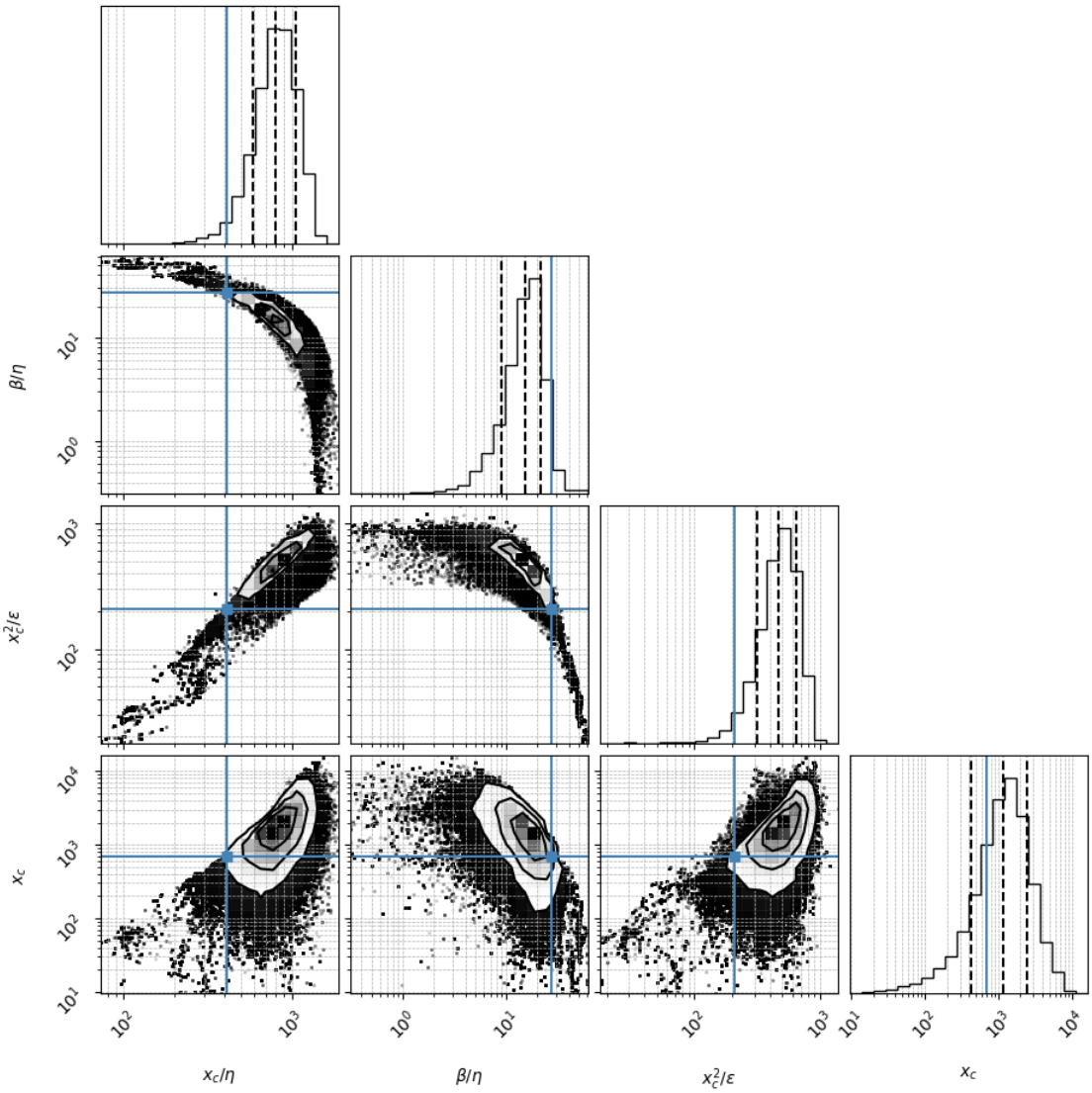
mcmc_analysis_drosophila_441_baysian

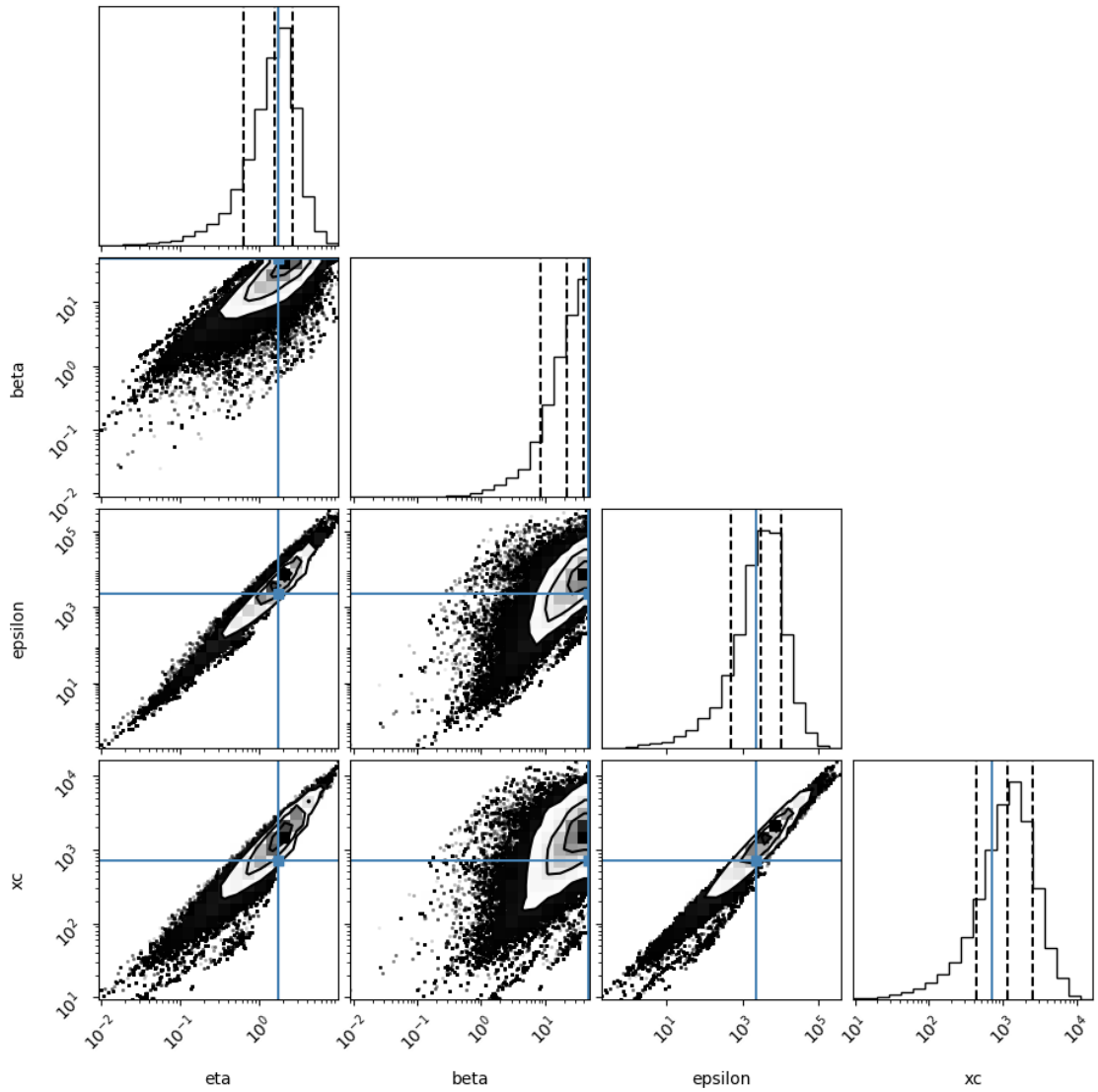
November 24, 2025

1 # 1. Density coner plot

A sample is 1 parameter set scanned. For the corner plot below, the quantiles (represented by the solid lines) are 0.16,0.5,0.84 of the samples. Dots represent individual samples (outside the line surrounding 0.84 of the samples) The parameter search is performed in the transformed space of x_c/η, β/η, x_c^2/ϵ, x_c but we also show the regular parameters

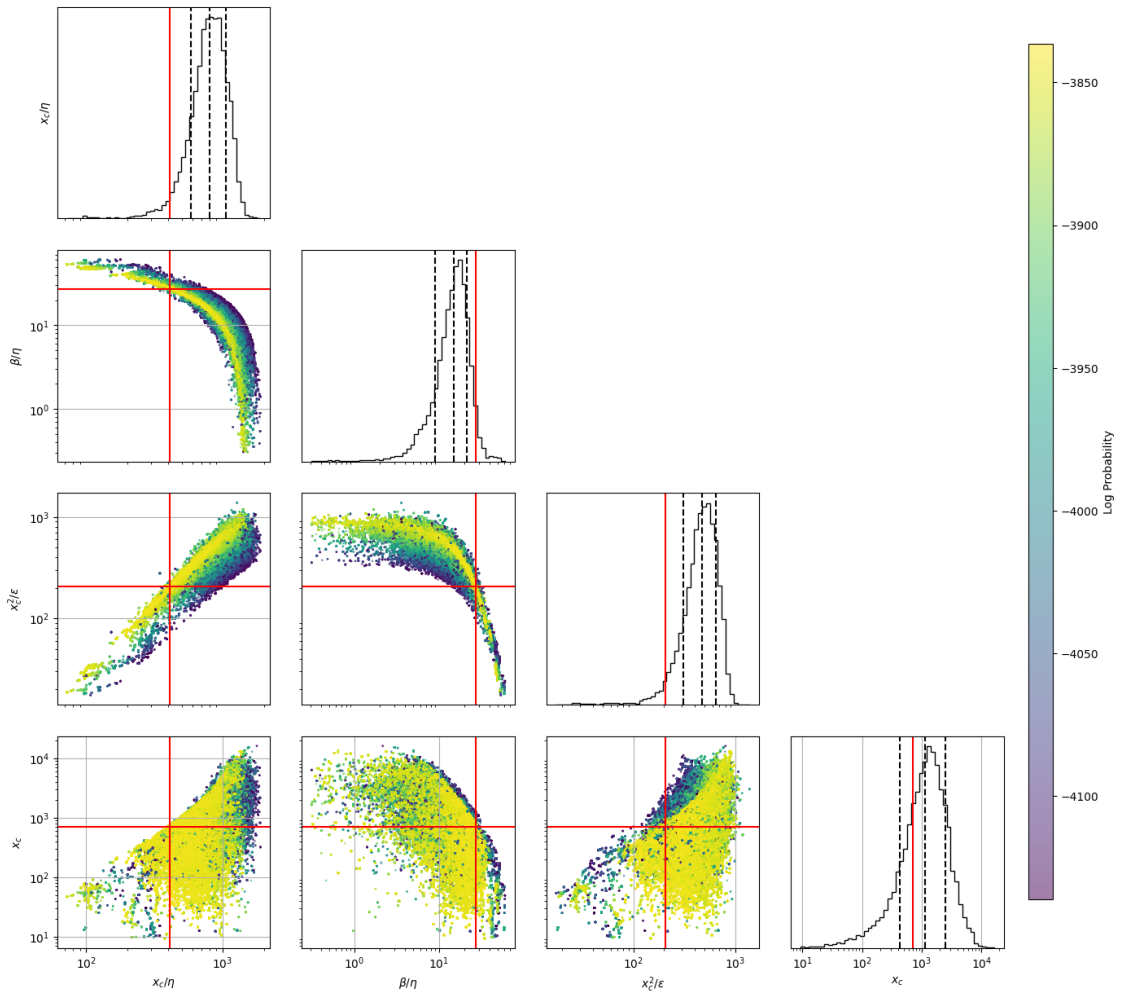
```
(16,)
```


x_c/η
β/η
x_c^2/ε
x_c



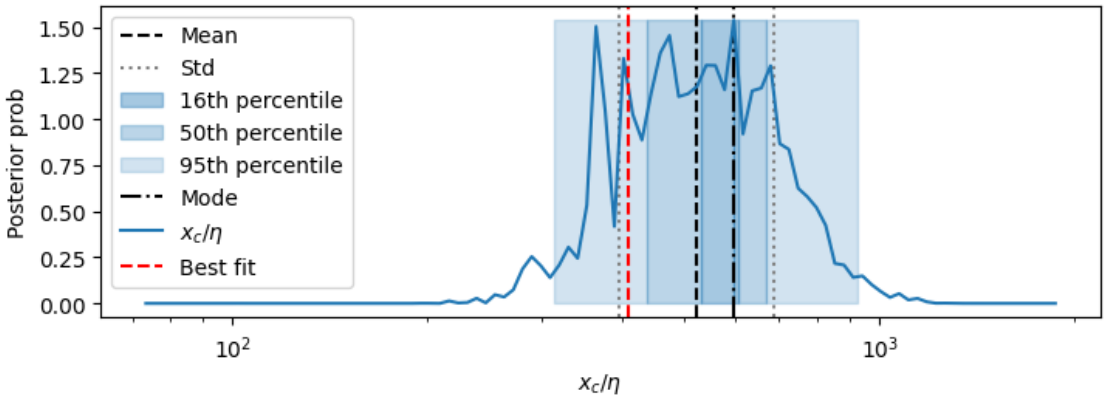
2 2. Heat map corner plot of raw samples

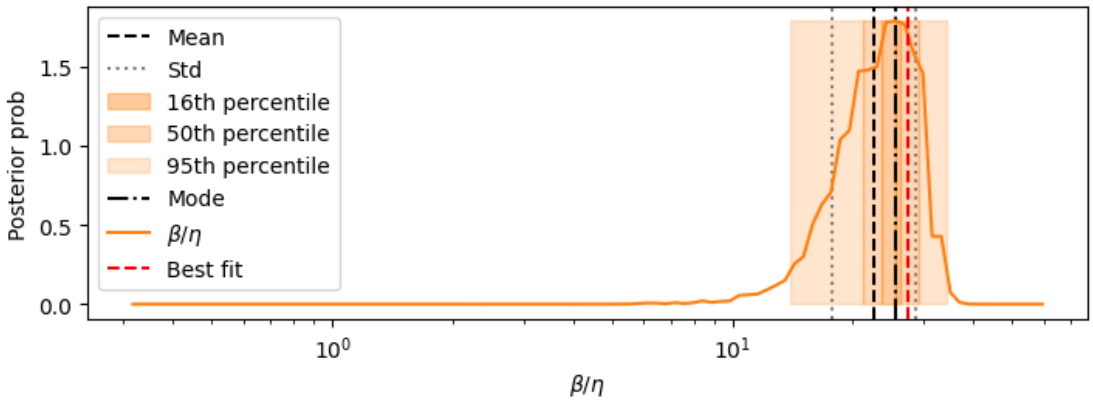
This plot shows all the raw sample points and their lnprobability

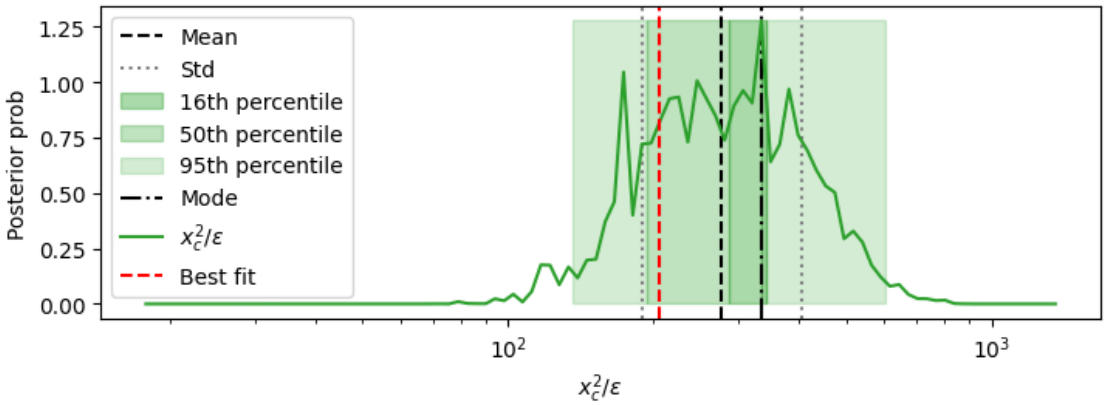


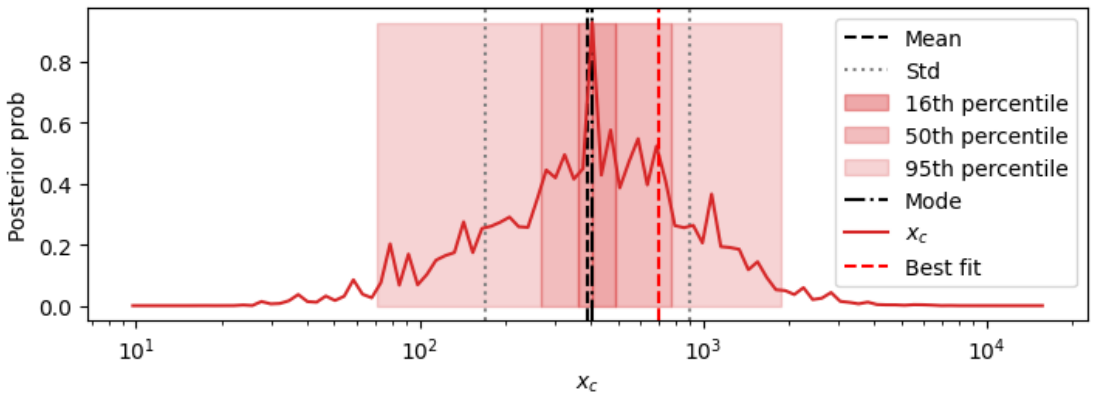
3 3. Posterior distributions of parameters

1d marginalizations of posterior distributions. we use a grid of size nbins=100-150


Mean
Std
16th percentile
50th percentile
95th percentile
Mode
x_c/η
Best fit
Posterior prob
1.50
1.25
1.00
0.75
0.50
0.25
0.00
10^2
10^3
x_c/η

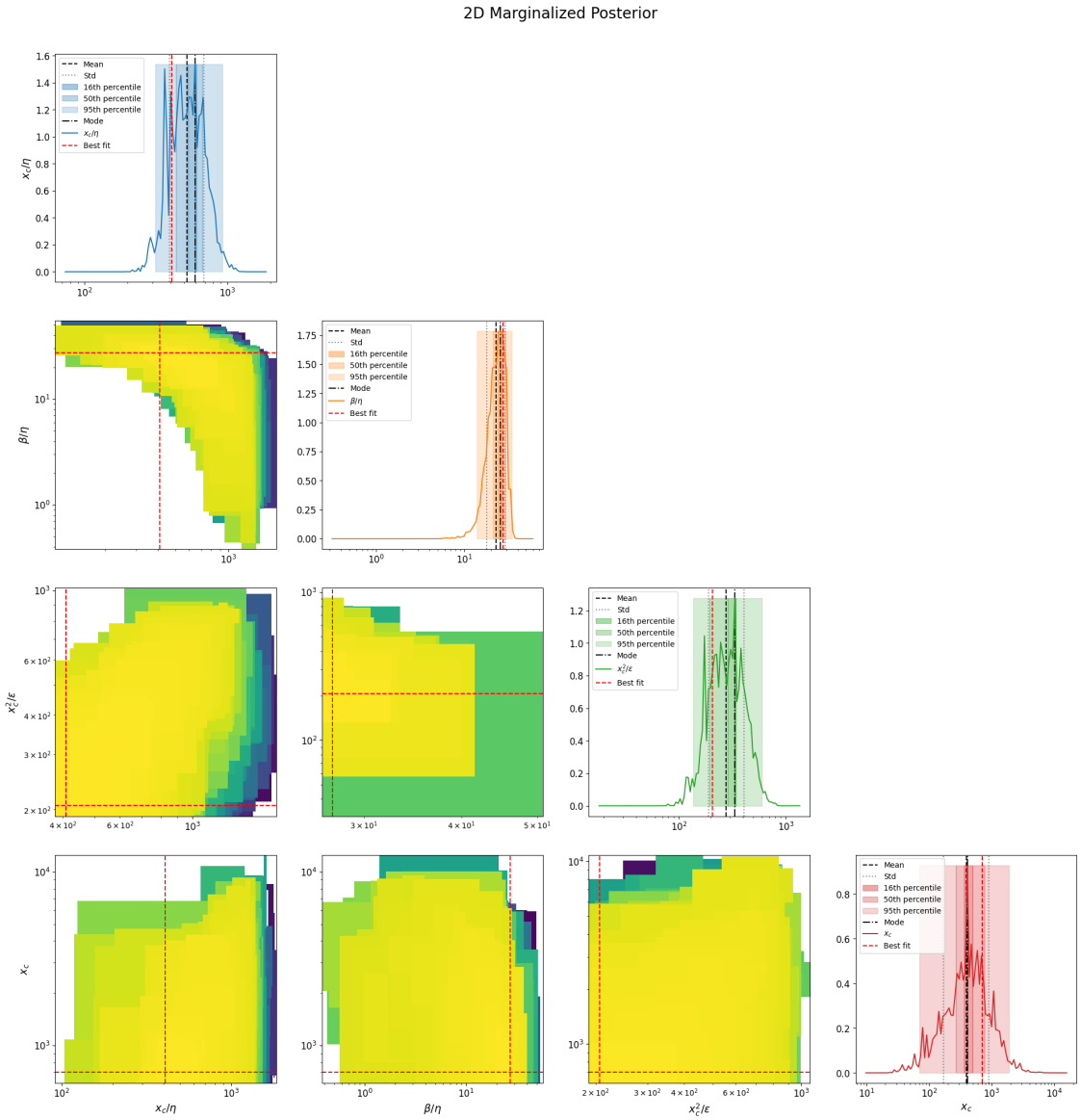

Mean
Std
16th percentile
50th percentile
95th percentile
Mode
β/η
Best fit
Posterior prob
1.5
1.0
0.5
0.0
10^0
10^1
β/η


Mean
Std
16th percentile
50th percentile
95th percentile
Mode
x_c^2/ε
Best fit
Posterior prob
1.25
1.00
0.75
0.50
0.25
0.00
10^2
10^3
x_c^2/ε


Mean
Std
16th percentile
50th percentile
95th percentile
Mode
x_c
Best fit
Posterior prob
0.8
0.6
0.4
0.2
0.0
10^1
10^2
10^3
10^4
x_c

2D marginalizations of posterior distributions

```
/Volumes/alon/navehr/SRtools/SRtools/samples_utils.py:474: UserWarning: The
input coordinates to pcolormesh are interpreted as cell centers, but are not
monotonically increasing or decreasing. This may lead to incorrectly calculated
cell edges, in which case, please supply explicit cell edges to pcolormesh.
  ax.pcolormesh(X, Y, Z, **kwargs)
```



4 4. Table of results

mode is the marginalized mode, max_likwlihood is the sample with highest likelihood mode_overall is the 4D posterior mode

	mean	\
xc/eta	520.612	
beta/eta	22.623	
xc^2/epsilon	277.107	
xc	392.252	
eta	0.614	
beta	14.167	
epsilon	358.033	
sqrt(xc/eta)	23.047	
s= eta^0.5*xc^1.5/epsilon	12.317	
beta*xc/epsilon	11.909	
eta*xc/epsilon	0.537	
Fx=beta^2/eta*xc	0.907	
Dx =beta*epsilon/eta*xc^2	0.0765	
Pk=beta*k/epsilon	0.0186	
Fk=beta^2/eta*k	647.837	
Dk =beta*epsilon/eta*k^2	37800.469	
Fk^2/Dk=beta^3/eta*epsilon	12.98	
epsilon/beta^2	1.852	
k/beta	0.0364	
k^2/epsilon	0.000715	
eta/xc	0.00194	
beta/xc	0.0442	
epsilon/xc^2	0.00366	
k/xc	0.00132	
best fit no ext hazard_MedianLifetime	49.57	
best fit no ext hazard_MaxLifetime	75.12	
best fit_MedianLifetime	49.61	
best fit_MaxLifetime	75.84	
data_MedianLifetime	50.0	
data_MaxLifetime	82.0	
ML_lnprob	-3836.29993	

std \		
xc/eta	[125.763,	165.82]
beta/eta	[4.836,	6.15]
xc^2/epsilon	[87.576,	128.043]
xc	[221.509,	508.88]

```
eta                                                    [0.352,
0.822]
beta                                                   [8.249,
19.749]
epsilon                                              [292.36,
1593.868]
sqrt(xc/eta)                                           [2.947,
3.38]
s= eta^0.5*xc^1.5/epsilon                              [2.634,
3.351]
beta*xc/epsilon                                        [1.655,
1.922]
eta*xc/epsilon                                       [0.0545,
0.0606]
Fx=beta^2/eta*xc                                       [0.479,
1.017]
Dx =beta*epsilon/eta*xc^2                            [0.0351,
0.0648]
Pk=beta*k/epsilon                                    [0.0114,
0.0295]
Fk=beta^2/eta*k                                      [401.625,
1056.762]
Dk =beta*epsilon/eta*k^2                           [30903.771,
169382.079]
Fk^2/Dk=beta^3/eta*epsilon                             [7.788,
19.472]
epsilon/beta^2                                         [0.907,
1.779]
k/beta                                               [0.0211,
0.0504]
k^2/epsilon                                        [0.000583,
0.00316]
eta/xc                                             [0.000465,
0.000611]
beta/xc                                                [0.0175,
0.029]
epsilon/xc^2                                         [0.00115,
0.00167]
k/xc                                               [0.000753,
0.00175]
best fit no ext hazard_MedianLifetime
0.51
best fit no ext hazard_MaxLifetime
0
best fit_MedianLifetime
0.51
best fit_MaxLifetime
```

0
data_MedianLifetime
0.55
data_MaxLifetime
0
ML_lnprob [-3836.2999302519147,
-3836.2999302519147]

	mode	\
xc/eta	595.804	
beta/eta	25.542	
xc^2/epsilon	334.52	
xc	406.701	
eta	1.267	
beta	28.638	
epsilon	1298.774	
sqrt(xc/eta)	24.409	
s= eta^0.5*xc^1.5/epsilon	13.979	
beta*xc/epsilon	13.137	
eta*xc/epsilon	0.527	
Fx=beta^2/eta*xc	1.306	
Dx =beta*epsilon/eta*xc^2	0.0789	
Pk=beta*k/epsilon	0.0162	
Fk=beta^2/eta*k	1781.174	
Dk =beta*epsilon/eta*k^2	280462.732	
Fk^2/Dk=beta^3/eta*epsilon	25.721	
epsilon/beta^2	1.326	
k/beta	0.0348	
k^2/epsilon	0.000298	
eta/xc	0.00211	
beta/xc	0.0654	
epsilon/xc^2	0.00299	
k/xc	0.00123	
best fit no ext hazard_MedianLifetime	49.57	
best fit no ext hazard_MaxLifetime	75.12	
best fit_MedianLifetime	49.61	
best fit_MaxLifetime	75.84	
data_MedianLifetime	50.0	
data_MaxLifetime	82.0	
ML_lnprob	-3836.29993	

	percentile_16 \	
xc/eta	[531.358,	605.628]
beta/eta	[23.595,	26.226]
xc^2/epsilon	[287.066,	

341.911]
xc [363.636,
490.104]
eta [1.064,
1.508]
beta [23.078,
32.598]
epsilon [1043.359,
2164.875]
sqrt(xc/eta) [23.051,
24.61]
s= eta^0.5*xc^1.5/epsilon [12.528,
14.199]
beta*xc/epsilon [12.765,
13.52]
eta*xc/epsilon [0.521,
0.555]
Fx=beta^2/eta*xc [1.069,
1.596]
Dx =beta*epsilon/eta*xc^2 [0.0753,
0.0993]
Pk=beta*k/epsilon [0.0136,
0.0172]
Fk=beta^2/eta*k [1299.312,
1897.164]
Dk =beta*epsilon/eta*k^2 [159912.091,
303900.507]
Fk^2/Dk=beta^3/eta*epsilon [23.452,
33.931]
epsilon/beta^2 [1.24,
1.619]
k/beta [0.0333,
0.0513]
k^2/epsilon [0.000154,
0.00032]
eta/xc [0.00208,
0.00237]
beta/xc [0.0533,
0.0682]
epsilon/xc^2 [0.00292,
0.00348]
k/xc [0.00102,
0.00138]
best fit no ext hazard_MedianLifetime [49.08,
50.08]
best fit no ext hazard_MaxLifetime [75.12,
75.12]

```
best fit_MedianLifetime                                          [49.12,
50.12]
best fit_MaxLifetime                                             [75.84,
75.84]
data_MedianLifetime                                              [49.51,
50.55]
data_MaxLifetime                                                   [82.0,
82.0]
ML_lnprob                          [-3836.2999302519147,
-3836.2999302519147]

percentile_50  \
xc/eta                                                         [436.675,
668.067]
beta/eta                                                         [21.227,
29.151]
xc^2/epsilon                                                   [193.702,
341.911]
xc                                                              [269.802,
766.87]
eta                                                                [0.568,
1.734]
beta                                                             [10.611,
35.537]
epsilon                                                        [324.515,
3354.536]
sqrt(xc/eta)                                                     [21.592,
26.273]
s= eta^0.5*xc^1.5/epsilon                                        [10.713,
15.597]
beta*xc/epsilon                                                  [12.053,
14.319]
eta*xc/epsilon                                                       [0.5,
0.59]
Fx=beta^2/eta*xc                                                 [0.548,
1.596]
Dx =beta*epsilon/eta*xc^2                                       [0.0571,
0.144]
Pk=beta*k/epsilon                                              [0.00957,
0.0347]
Fk=beta^2/eta*k                                                [609.439,
2152.296]
Dk =beta*epsilon/eta*k^2                                     [37711.041,
303900.507]
Fk^2/Dk=beta^3/eta*epsilon                                       [9.314,
33.931]
epsilon/beta^2                                                   [0.832,
```

```
2.113]
k/beta                                                    [0.0153,
0.0513]
k^2/epsilon                                             [7.44e-05,
0.00089]
eta/xc                                                   [0.00155,
0.00237]
beta/xc                                                    [0.0326,
0.0682]
epsilon/xc^2                                             [0.00292,
0.00516]
k/xc                                                      [0.000652,
0.002]
best fit no ext hazard_MedianLifetime                        [49.08,
50.08]
best fit no ext hazard_MaxLifetime                           [75.12,
75.12]
best fit_MedianLifetime                                      [49.12,
50.12]
best fit_MaxLifetime                                         [75.84,
75.84]
data_MedianLifetime                                          [49.51,
50.55]
data_MaxLifetime                                               [82.0,
82.0]
ML_lnprob                          [-3836.2999302519147,
-3836.2999302519147]

percentile_95  \
xc/eta                                                   [314.856,
926.547]
beta/eta                                                   [13.906,
34.161]
xc^2/epsilon                                             [136.543,
603.521]
xc                                                       [70.428,
1877.535]
eta                                                          [0.106,
2.457]
beta                                                       [2.666,
50.195]
epsilon                                                   [9.764,
6014.946]
sqrt(xc/eta)                                               [17.744,
29.945]
s= eta^0.5*xc^1.5/epsilon                                  [7.834,
20.035]
```

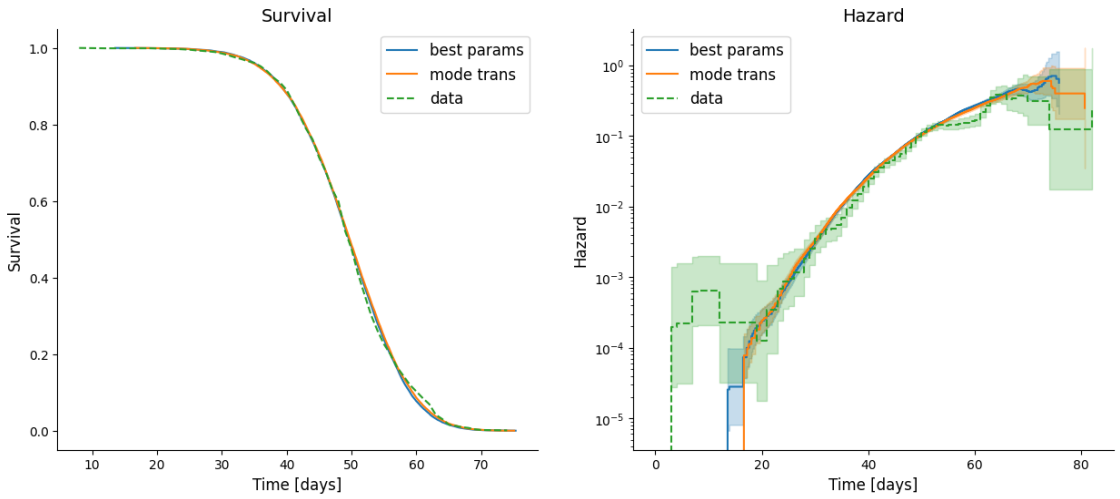
```
beta*xc/epsilon                                                  [8.541,
14.319]
eta*xc/epsilon                                                    [0.432,
0.655]
Fx=beta^2/eta*xc                                                  [0.215,
4.064]
Dx =beta*epsilon/eta*xc^2                                        [0.0249,
0.274]
Pk=beta*k/epsilon                                               [0.00264,
0.126]
Fk=beta^2/eta*k                                                [104.177,
3142.631]
Dk =beta*epsilon/eta*k^2                                     [1295.703,
678100.523]
Fk^2/Dk=beta^3/eta*epsilon                                       [2.125,
59.051]
epsilon/beta^2                                                    [0.558,
7.003]
k/beta                                                          [0.00995,
0.187]
k^2/epsilon                                                    [4.15e-05,
0.0256]
eta/xc                                                          [0.00112,
0.00328]
beta/xc                                                           [0.0169,
0.121]
epsilon/xc^2                                                    [0.00173,
0.00765]
k/xc                                                            [0.000287,
0.0071]
best fit no ext hazard_MedianLifetime                             [49.08,
50.08]
best fit no ext hazard_MaxLifetime                                [75.12,
75.12]
best fit_MedianLifetime                                           [49.12,
50.12]
best fit_MaxLifetime                                              [75.84,
75.84]
data_MedianLifetime                                               [49.51,
50.55]
data_MaxLifetime                                                    [82.0,
82.0]
ML_lnprob                          [-3836.2999302519147,
-3836.2999302519147]

                                  max_likelihood mode_overall
xc/eta                                   408.216      369.433
```

beta/eta	27.351	29.285
xc^2/epsilon	206.282	174.09
xc	699.98	406.44
eta	1.715	1.726
beta	46.9	36.029
epsilon	2375.26	3252.286
sqrt(xc/eta)	20.204	19.221
s= eta^0.5*xc^1.5/epsilon	10.21	9.057
beta*xc/epsilon	13.821	13.8
eta*xc/epsilon	0.505	0.505
Fx=beta^2/eta*xc	1.833	1.833
Dx =beta*epsilon/eta*xc^2	0.133	0.133
Pk=beta*k/epsilon	0.00987	0.017
Fk=beta^2/eta*k	2565.594	1886.996
Dk =beta*epsilon/eta*k^2	259867.644	259867.644
Fk^2/Dk=beta^3/eta*epsilon	25.329	25.329
epsilon/beta^2	1.08	1.44
k/beta	0.0107	0.0361
k^2/epsilon	0.000105	0.000906
eta/xc	0.00245	0.00271
beta/xc	0.067	0.0793
epsilon/xc^2	0.00485	0.00574
k/xc	0.000714	0.00123
best fit no ext hazard_MedianLifetime	49.57	NaN
best fit no ext hazard_MaxLifetime	75.12	NaN
best fit_MedianLifetime	49.61	NaN
best fit_MaxLifetime	75.84	NaN
data_MedianLifetime	50.0	NaN
data_MaxLifetime	82.0	NaN
ML_lnprob	-3836.29993	-3836.29993

5 5. Fits of simulations to data

best params is the sample with highest likelihood. mode trans is the 4D posterior mode in the transformed space of x_c/η, β/η, x_c^2/ϵ, x_c

```
Text(0, 0.5, 'Hazard')
```




```
Text(0, 0.5, 'Prob density')
```