

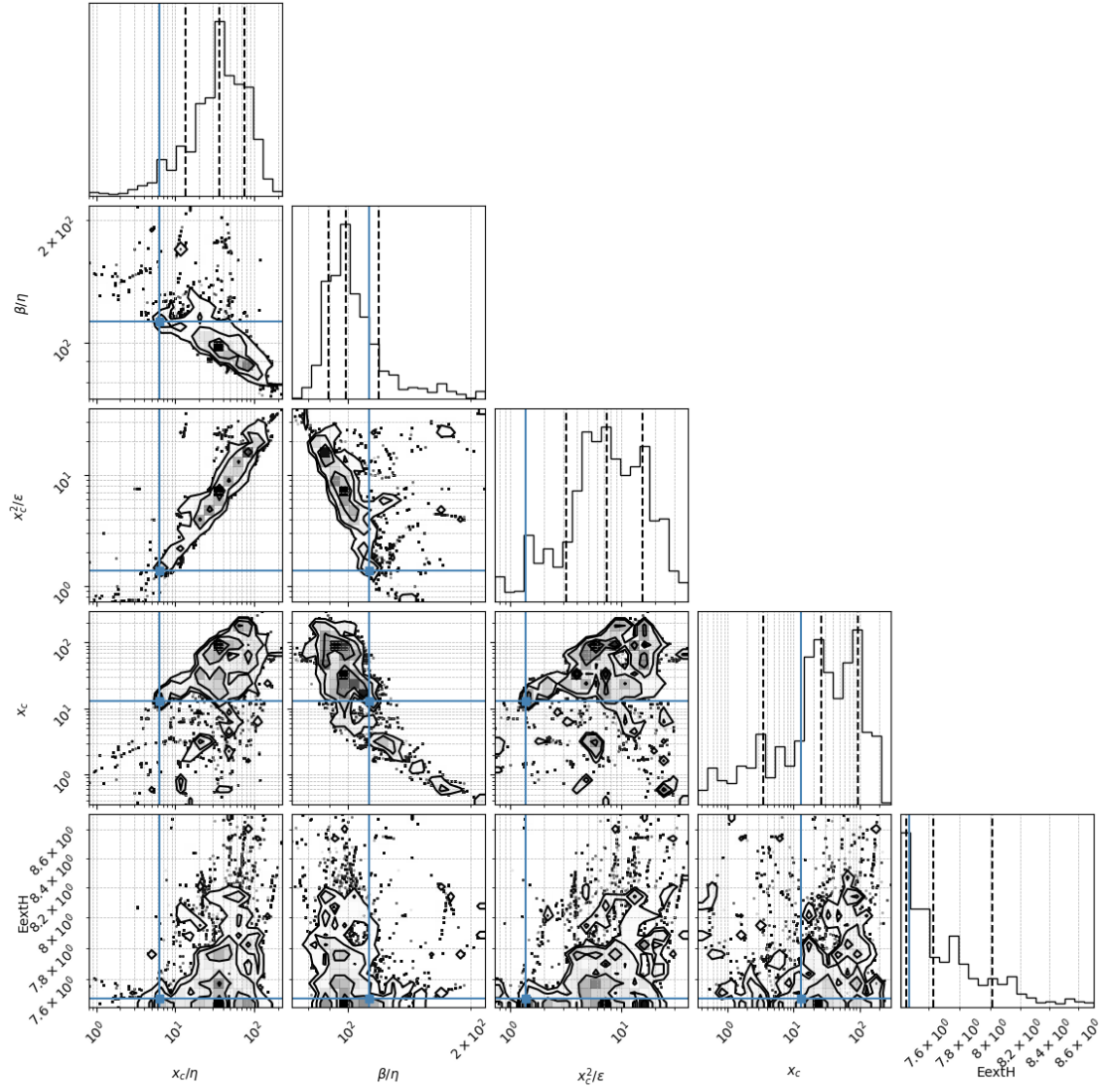
mcmc_analysis_Denmark_F_1890_hetro_baysian

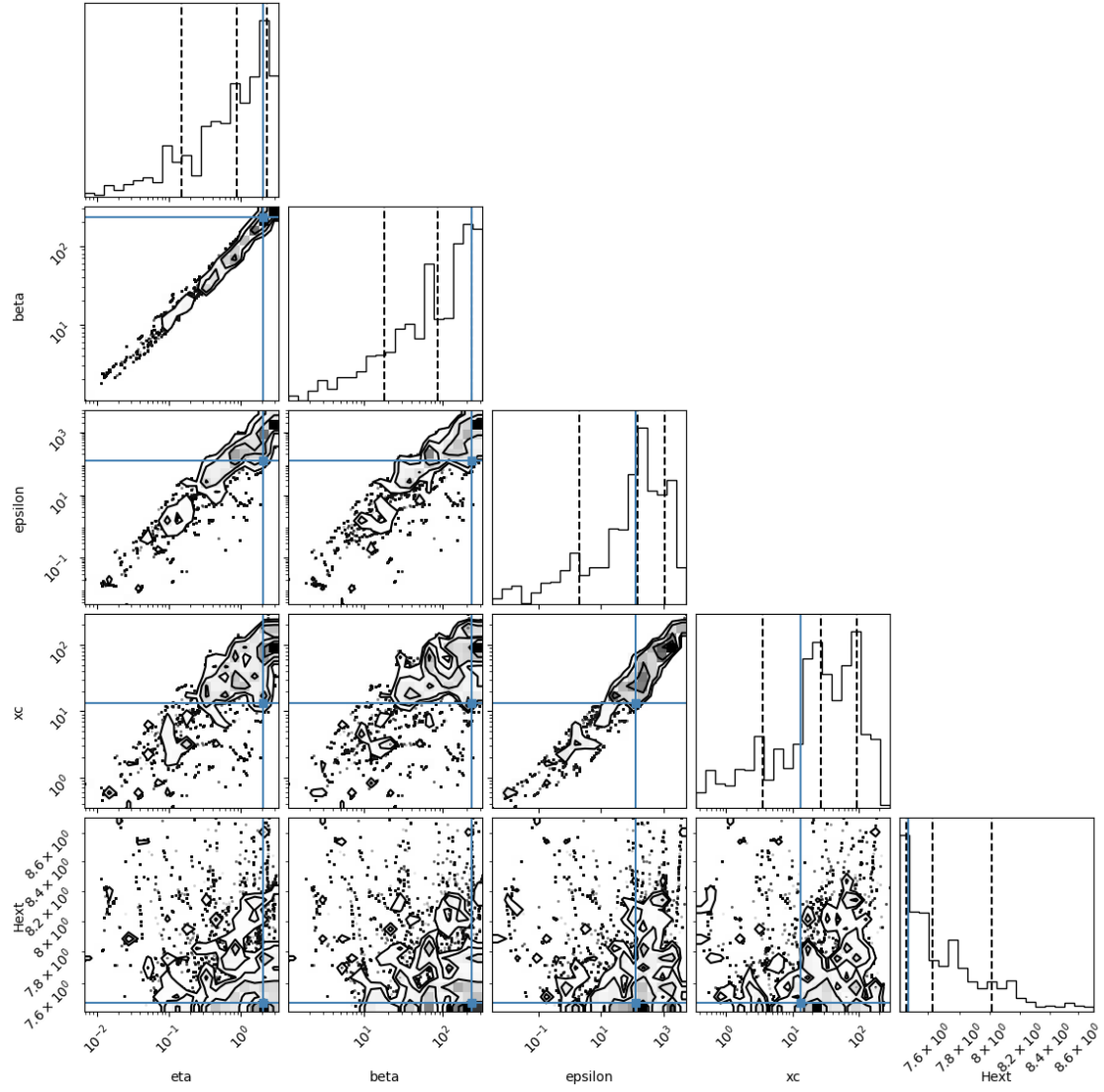
November 24, 2025

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

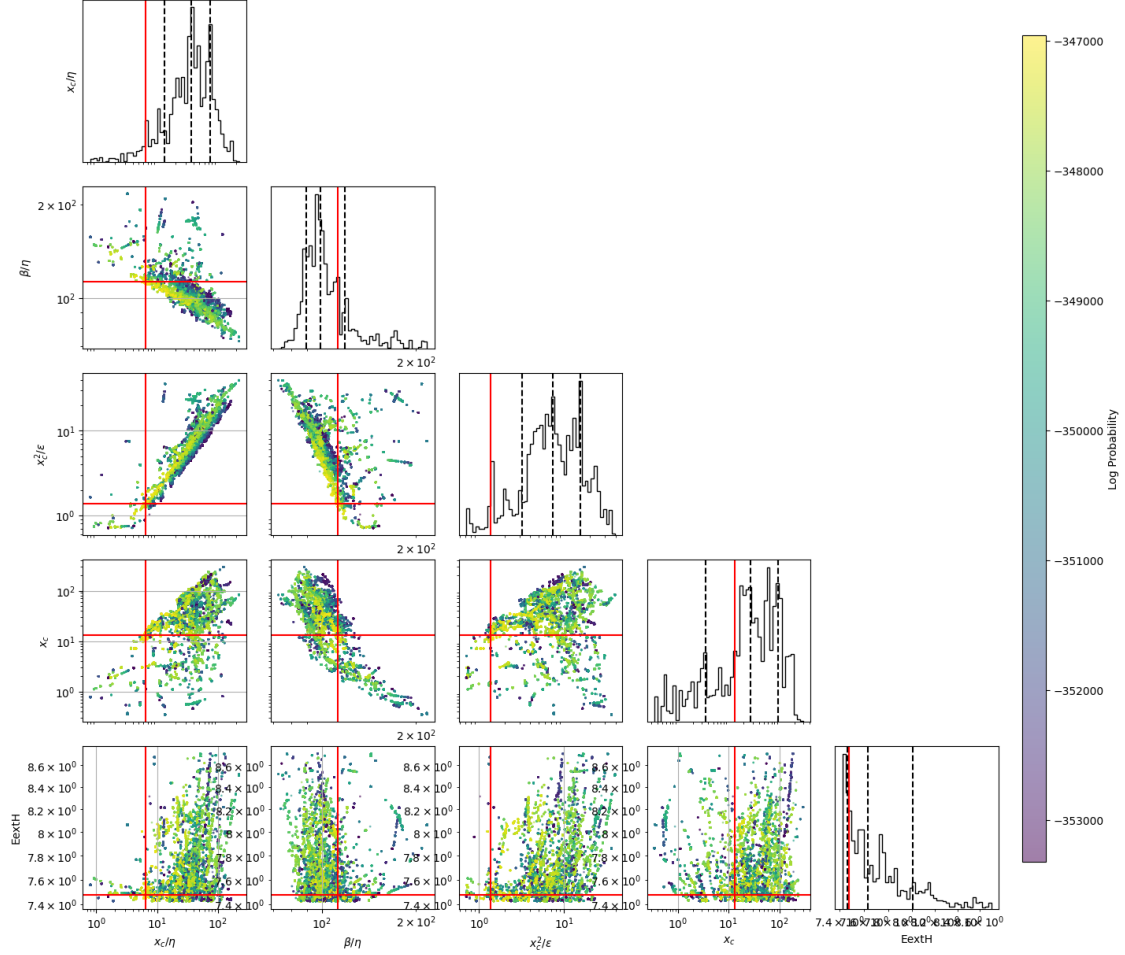
(25,)





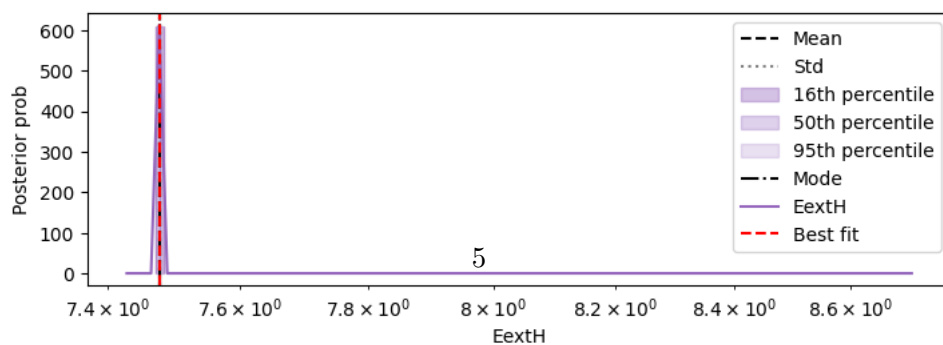
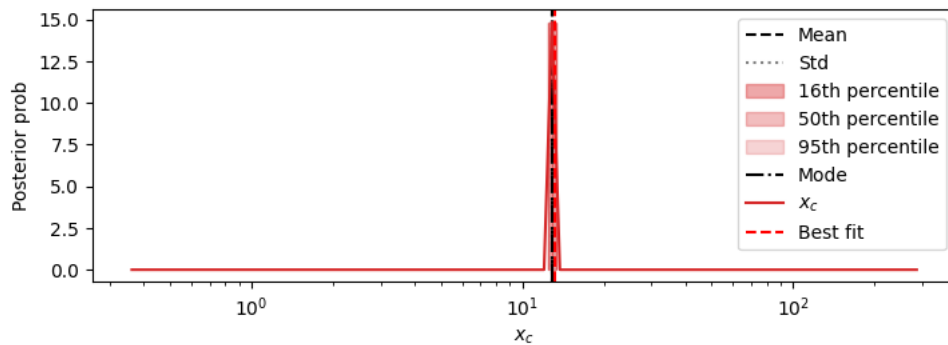
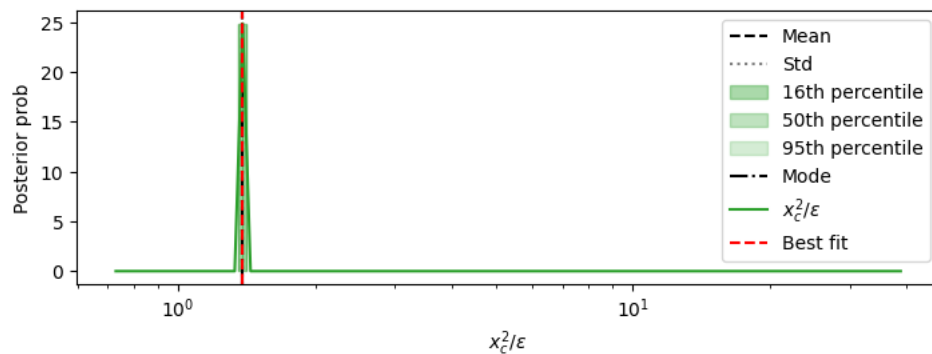
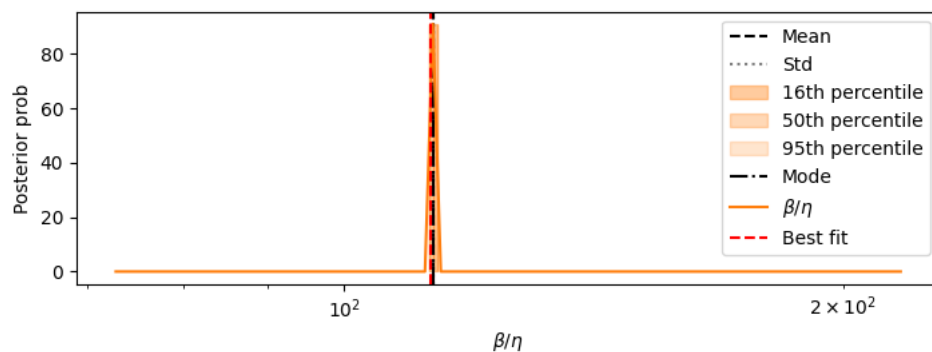
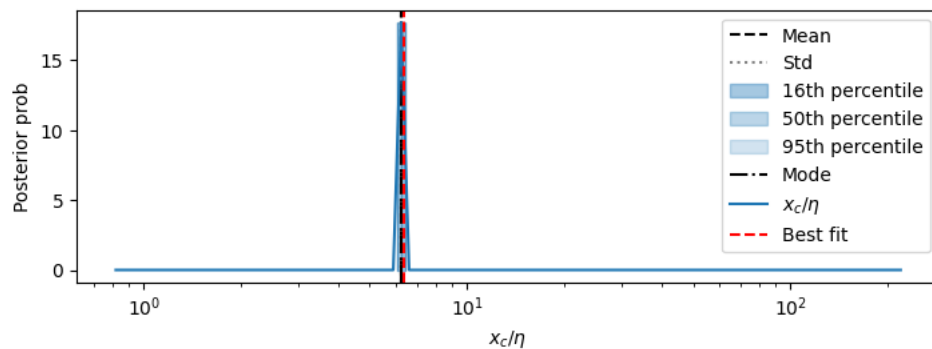
2 2. Heat map corner plot of raw samples

This plot shows all the raw sample points and their Inprobability



3. Posterior distributions of parameters

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

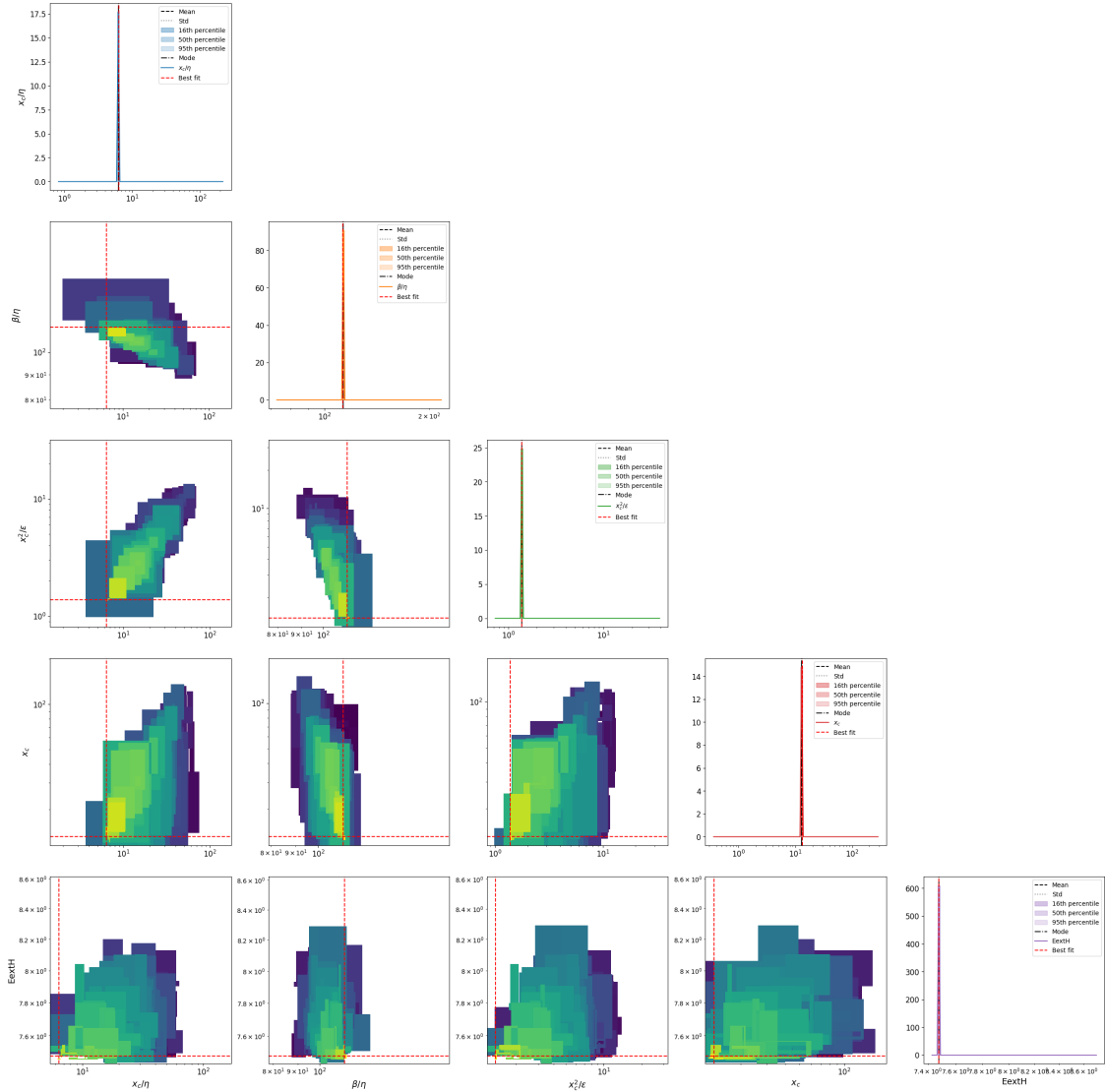


2D marginalizations of posterior distributions

/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)
```

2D Marginalized Posterior



Rescaling the samples TIME by 365

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	6.254	
beta/eta	113.183	
xc^2/epsilon	1.386	
xc	12.88	
ExtH	7.477	
eta	2.107	
beta	233.692	
epsilon	135.151	
sqrt(xc/eta)	2.501	
s= eta^0.5*xc^1.5/epsilon	0.551	
beta*xc/epsilon	24.771	
eta*xc/epsilon	0.216	
Fx=beta^2/eta*xc	1963.936	
Dx =beta*epsilon/eta*xc^2	81.953	
Pk=beta*k/epsilon	0.874	
Fk=beta^2/eta*k	51983.007	
Dk =beta*epsilon/eta*k^2	54177.338	
Fk^2/Dk=beta^3/eta*epsilon	47436.977	
epsilon/beta^2	0.00223	
k/beta	0.00214	
k^2/epsilon	0.00185	
eta/xc	0.16	
beta/xc	17.88	
epsilon/xc^2	0.722	
k/xc	0.0388	
best fit no ext hazard_MedianLifetime	76.4	
best fit no ext hazard_MaxLifetime	110.0	
best fit_MedianLifetime	75.92	
best fit_MaxLifetime	108.44	
data_MedianLifetime	70.0	
data_MaxLifetime	108.5	
ML_lnprob	-346955.237712	
std \		
xc/eta		[2.27e-10,
2.27e-10]		
beta/eta		[5e-08,
5e-08]		
xc^2/epsilon		[2.23e-09,
2.23e-09]		
xc		[3.49e-08,

3.49e-08]	
ExtH	[9.82e-10,
9.82e-10]	
eta	[0.000147,
0.000147]	
beta	[0.0224,
0.0224]	
epsilon	[0.0323,
0.0323]	
$\sqrt{xc/eta}$	[5.82e-11,
5.82e-11]	
$s= eta^{0.5}*xc^{1.5}/epsilon$	[7.34e-10,
7.34e-10]	
$beta*xc/epsilon$	[3.88e-08,
3.88e-08]	
$eta*xc/epsilon$	[7.53e-06,
7.53e-06]	
$Fx=beta^2/eta*xc$	[0.0791,
0.0791]	
$Dx =beta*epsilon/eta*xc^2$	[0.00217,
0.00217]	
$Pk=beta*k/epsilon$	[1.62e-06,
1.62e-06]	
$Fk=beta^2/eta*k$	[0.415,
0.415]	
$Dk =beta*epsilon/eta*k^2$	[1.052,
1.052]	
$Fk^2/Dk=beta^3/eta*epsilon$	[0.00368,
0.00368]	
$epsilon/beta^2$	[1.33e-10,
1.33e-10]	
$k/beta$	[1.13e-10,
1.13e-10]	
$k^2/epsilon$	[2.45e-10,
2.45e-10]	
eta/xc	[9.92e-14,
9.92e-14]	
$beta/xc$	[1.26e-11,
1.26e-11]	
$epsilon/xc^2$	[1.16e-09,
1.16e-09]	
k/xc	[1.05e-10,
1.05e-10]	
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
0.5
data_MaxLifetime
0
ML_lnprob [-346955.23771160276,
-346955.23771160276]

```

```

mode \
xc/eta 6.254
beta/eta 113.183
xc^2/epsilon 1.386
xc 12.88
ExtH 7.477
eta 2.107
beta 233.692
epsilon 135.151
sqrt(xc/eta) 2.501
s= eta^0.5*xc^1.5/epsilon 0.551
beta*xc/epsilon 24.771
eta*xc/epsilon 0.216
Fx=beta^2/eta*xc 1963.936
Dx =beta*epsilon/eta*xc^2 81.953
Pk=beta*k/epsilon 0.874
Fk=beta^2/eta*k 51983.006
Dk =beta*epsilon/eta*k^2 54177.338
Fk^2/Dk=beta^3/eta*epsilon 47436.977
epsilon/beta^2 0.00223
k/beta 0.00214
k^2/epsilon 0.00185
eta/xc 0.16
beta/xc 17.88
epsilon/xc^2 0.722
k/xc 0.0388
best_fit_no_ext_hazard_MedianLifetime 76.4
best_fit_no_ext_hazard_MaxLifetime 110.0
best_fit_MedianLifetime 75.92
best_fit_MaxLifetime 108.44
data_MedianLifetime 70.0
data_MaxLifetime 108.5
ML_lnprob -346955.237712

```

```

percentile_16 \
xc/eta

```

[6.08,

6.433]	
beta/eta	[112.561,
113.808]	
xc^2/epsilon	[1.358,
1.414]	
xc	[12.453,
13.321]	
ExtH	[7.471,
7.483]	
eta	[2.042,
2.173]	
beta	[227.139,
240.435]	
epsilon	[125.875,
145.11]	
sqrt(xc/eta)	[2.466,
2.536]	
s= eta^0.5*xc^1.5/epsilon	[0.542,
0.56]	
beta*xc/epsilon	[24.292,
25.26]	
eta*xc/epsilon	[0.213,
0.22]	
Fx=beta^2/eta*xc	[1894.58,
2035.83]	
Dx =beta*epsilon/eta*xc^2	[80.043,
83.908]	
Pk=beta*k/epsilon	[0.829,
0.922]	
Fk=beta^2/eta*k	[50592.448,
53411.786]	
Dk =beta*epsilon/eta*k^2	[50663.809,
57934.53]	
Fk^2/Dk=beta^3/eta*epsilon	[45027.655,
49975.216]	
epsilon/beta^2	[0.00212,
0.00234]	
k/beta	[0.00208,
0.0022]	
k^2/epsilon	[0.00172,
0.00198]	
eta/xc	[0.155,
0.164]	
beta/xc	[17.316,
18.463]	
epsilon/xc^2	[0.707,
0.736]	

k/xc	[0.0375,
0.0401]	
best fit no ext hazard_MedianLifetime	[75.91000000000001,
76.91000000000001]	
best fit no ext hazard_MaxLifetime	[110.0,
110.0]	
best fit_MedianLifetime	[75.43,
76.43]	
best fit_MaxLifetime	[108.44,
108.44]	
data_MedianLifetime	[69.51,
70.5]	
data_MaxLifetime	[108.5,
108.5]	
ML_lnprob	[-346955.23771160276,
-346955.23771160276]	
percentile_50 \	
xc/eta	[6.08,
6.433]	
beta/eta	[112.561,
113.808]	
xc^2/epsilon	[1.358,
1.414]	
xc	[12.453,
13.321]	
ExtH	[7.471,
7.483]	
eta	[2.042,
2.173]	
beta	[227.139,
240.435]	
epsilon	[125.875,
145.11]	
sqrt(xc/eta)	[2.466,
2.536]	
s= eta^0.5*xc^1.5/epsilon	[0.542,
0.56]	
beta*xc/epsilon	[24.292,
25.26]	
eta*xc/epsilon	[0.213,
0.22]	
Fx=beta^2/eta*xc	[1894.58,
2035.83]	
Dx =beta*epsilon/eta*xc^2	[80.043,
83.908]	
Pk=beta*k/epsilon	[0.829,

0.922]	
Fk=beta^2/eta*k	[50592.448,
53411.786]	
Dk =beta*epsilon/eta*k^2	[50663.809,
57934.53]	
Fk^2/Dk=beta^3/eta*epsilon	[45027.655,
49975.216]	
epsilon/beta^2	[0.00212,
0.00234]	
k/beta	[0.00208,
0.0022]	
k^2/epsilon	[0.00172,
0.00198]	
eta/xc	[0.155,
0.164]	
beta/xc	[17.316,
18.463]	
epsilon/xc^2	[0.707,
0.736]	
k/xc	[0.0375,
0.0401]	
best fit no ext hazard_MedianLifetime	[75.91000000000001,
76.91000000000001]	
best fit no ext hazard_MaxLifetime	[110.0,
110.0]	
best fit_MedianLifetime	[75.43,
76.43]	
best fit_MaxLifetime	[108.44,
108.44]	
data_MedianLifetime	[69.51,
70.5]	
data_MaxLifetime	[108.5,
108.5]	
ML_lnprob	[-346955.23771160276,
-346955.23771160276]	
percentile_95 \	
xc/eta	[6.08,
6.433]	
beta/eta	[112.561,
113.808]	
xc^2/epsilon	[1.358,
1.414]	
xc	[12.453,
13.321]	
ExtH	[7.471,
7.483]	

eta	[2.042,
2.173]	
beta	[227.139,
240.435]	
epsilon	[125.875,
145.11]	
$\sqrt{xc/eta}$	[2.466,
2.536]	
$s = eta^{0.5} * xc^{1.5} / epsilon$	[0.542,
0.56]	
$beta * xc / epsilon$	[24.292,
25.26]	
$eta * xc / epsilon$	[0.213,
0.22]	
$Fx = beta^2 / eta * xc$	[1894.58,
2035.83]	
$Dx = beta * epsilon / eta * xc^2$	[80.043,
83.908]	
$Pk = beta * k / epsilon$	[0.829,
0.922]	
$Fk = beta^2 / eta * k$	[50592.448,
53411.786]	
$Dk = beta * epsilon / eta * k^2$	[50663.809,
57934.53]	
$Fk^2 / Dk = beta^3 / eta * epsilon$	[45027.655,
49975.216]	
$epsilon / beta^2$	[0.00212,
0.00234]	
$k / beta$	[0.00208,
0.0022]	
$k^2 / epsilon$	[0.00172,
0.00198]	
eta / xc	[0.155,
0.164]	
$beta / xc$	[17.316,
18.463]	
$epsilon / xc^2$	[0.707,
0.736]	
k / xc	[0.0375,
0.0401]	
best fit no ext hazard_MedianLifetime	[75.91000000000001,
76.91000000000001]	
best fit no ext hazard_MaxLifetime	[110.0,
110.0]	
best fit_MedianLifetime	[75.43,
76.43]	
best fit_MaxLifetime	[108.44,

```

108.44]
data_MedianLifetime                                [69.51,
70.5]
data_MaxLifetime                                    [108.5,
108.5]
ML_lnprob                                           [-346955.23771160276,
-346955.23771160276]

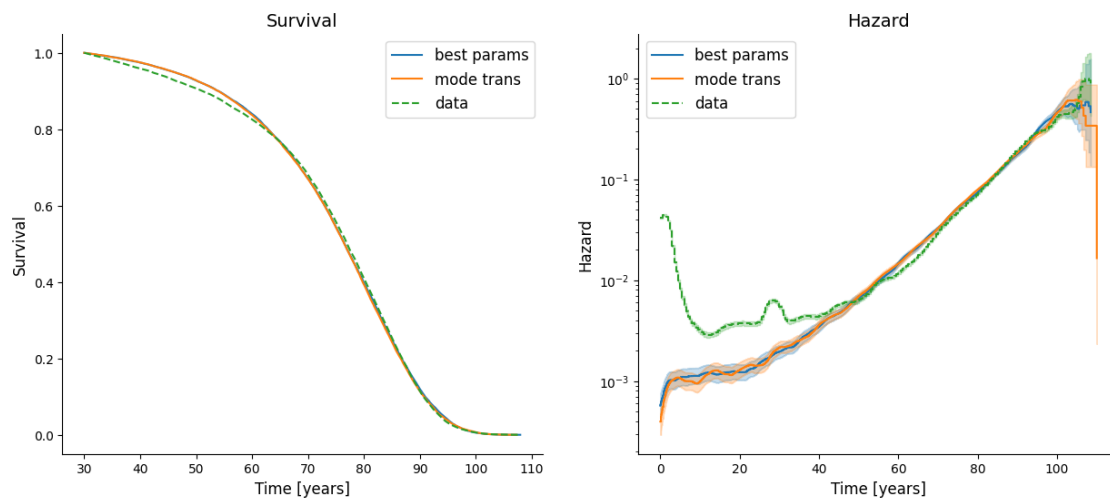
```

	max_likelihood	mode_overall
xc/eta	6.396	6.396
beta/eta	112.717	112.717
xc^2/epsilon	1.38	1.38
xc	13.203	13.203
ExtH	7.479	7.479
eta	2.064	2.064
beta	232.683	232.683
epsilon	126.286	126.286
sqrt(xc/eta)	2.529	2.529
s= eta^0.5*xc^1.5/epsilon	0.546	0.546
beta*xc/epsilon	24.327	24.327
eta*xc/epsilon	0.216	0.216
Fx=beta^2/eta*xc	1986.403	1986.403
Dx =beta*epsilon/eta*xc^2	81.653	81.653
Pk=beta*k/epsilon	0.921	0.921
Fk=beta^2/eta*k	52454.504	52454.504
Dk =beta*epsilon/eta*k^2	56938.198	56938.198
Fk^2/Dk=beta^3/eta*epsilon	48323.887	48323.887
epsilon/beta^2	0.00233	0.00233
k/beta	0.00215	0.00215
k^2/epsilon	0.00198	0.00198
eta/xc	0.156	0.156
beta/xc	17.623	17.623
epsilon/xc^2	0.724	0.724
k/xc	0.0379	0.0379
best fit no ext hazard_MedianLifetime	76.4	NaN
best fit no ext hazard_MaxLifetime	110.0	NaN
best fit_MedianLifetime	75.92	NaN
best fit_MaxLifetime	108.44	NaN
data_MedianLifetime	70.0	NaN
data_MaxLifetime	108.5	NaN
ML_lnprob	-346955.237712	-346955.237712

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')

