

TS CONTOUR MAP

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GOAL

Produce maps of confidence levels for any pair of source model parameters.

Procedure:

- 1_Predict boundaries for the map
- 2_Produce TS Contour MAP

Boundaries for the parameters

a)

- 1_ A first fit is generated using python likelihood, and the values of the model parameters are obtained along with the log likelihood value.
- 2_ One parameter is stepped (to the right and left side of the value obtained with the first fit).
- 3_ For each of these new values, which now are fixed, python likelihood is run again to produce a new fit until (eventually) a new maximum of log likelihood is found.
- 4_ Python Likelihood runs again for the value obtained in step (a3) +/- two times the error in the parameter.

Boundaries for the parameters (cont)

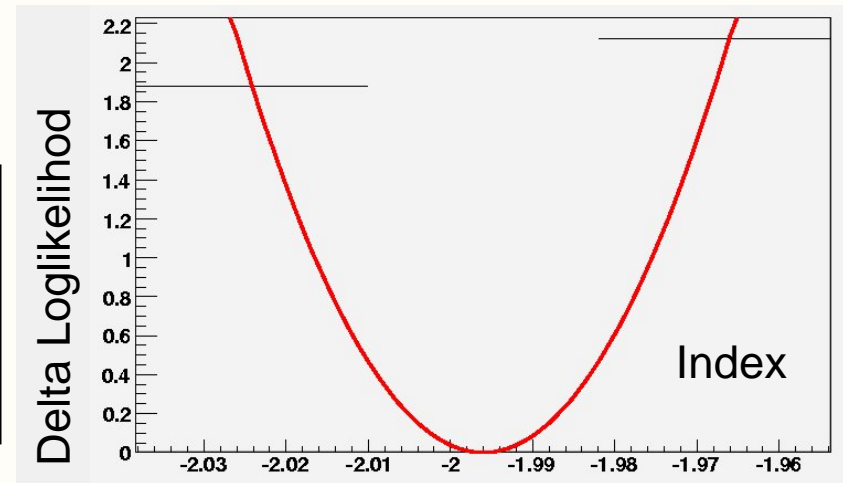
4_ With the point obtained in (a3) and the two points obtained in (a4) a parabola is fitted (x-axis: parameter, y-axis: delta loglikelihood).

Simulation:
3C279
PowerLaw2
2 months

Points to be fitted:

(-1.968, 2.1239)
(-1.996, 0)
(-2.024, 1.8807)

First fit:
Npred~2967
Integral=2.49
Index=-2.0



5_ From this new maximum and assuming that the likelihood statistic is distributed like Chi2 the value of this parameter is obtained until a confidence level of 68% 90% 95% 99%.

6_ The same procedure is repeated for the second parameter.

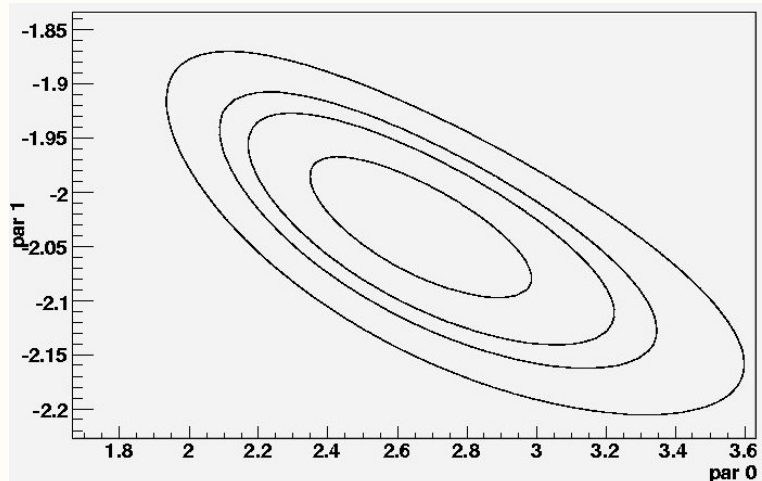
b)

- 1_ After the boundaries in both parameters are obtained python likelihood runs several times in a nxn grid (with the boundaries obtained in the previous step) with the parameters fixed.
- 2_ Finally the contour plot is produced with x-axis first parameter, y-axis second parameter, and z-axis confidence levels: 68%, 90%, 95%, 99%.
- 3_ This procedure may be repeated for each pair of parameters.

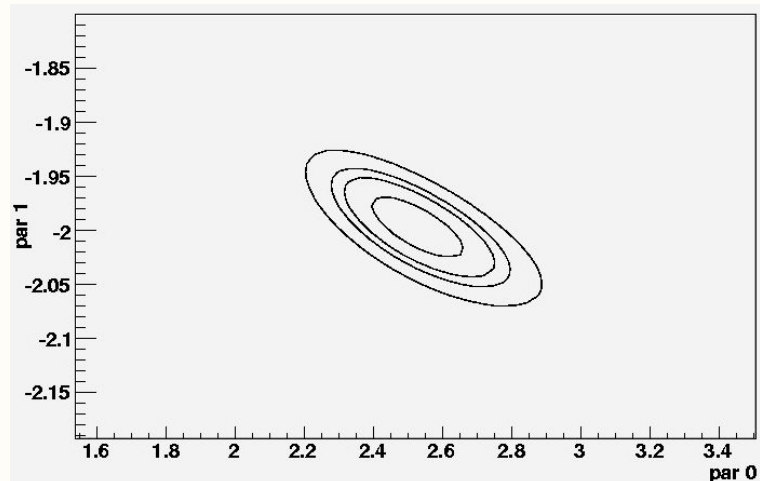
TS CONTOUR MAP (cont)

Example 1: Simulation of 3C279 - PowerLaw2 - src only, no bkg

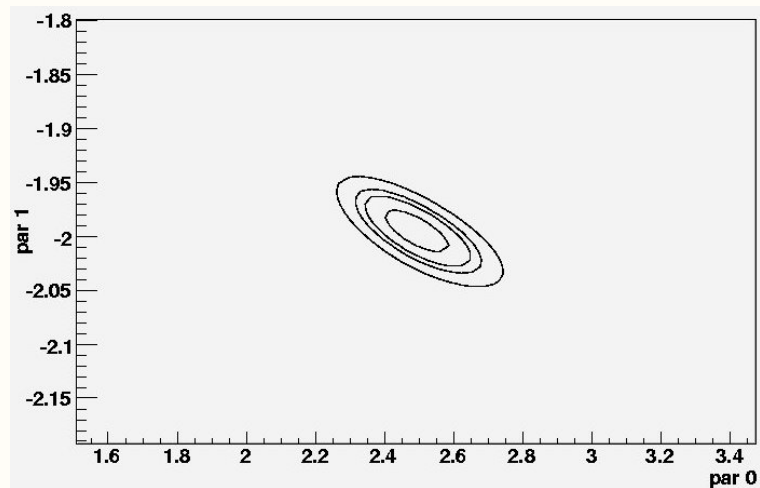
7 days: Npred~293,
Integral:2.65, index:-2.03; grid:61x61



1 month: Npred~1508
Integral:2.52, index:-2; grid:61x61



2 months: Npred~2967
Integral:2.49, index:-2; grid:61x61



Par 0: Integral
Par 1: Index

Confidence levels:
68%, 90%, 95%, 99%

TS CONTOUR MAP (cont)

Example 2: Simulation 3C279, 3C273, Background

7 days: 3C279: PowerLaw2, Npred~390
Index=-2.1,
Grid 61x61

