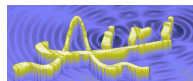


Practical Introduction to Model Fitting

5 examples of model fitting, all on real data : to be made **successively**

1. fitting of a **simple** model on **one** file
2. fitting with **parameters sharing** on several files
3. fitting with **degeneracies**
4. application to a set of AMBER data :
exercise yourself!
5. Fitting another set of data for fun

In red, questions or advices



Exercise 1- simple fit

1.1

- Launch LITpro
- Load the data file **arcturus.1.79mu.oifits** from the local repository */home/linux/data/Model_Fitting/tutorial/LITpro/*
(note that the data used for the practice are also available from *http://apps.jmmc.fr/oidata/*)
- Proceed with these steps:
 - Select File > New settings
 - Click “Load oifiles”

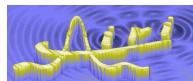
What kind of data did you load ?

 - explore the data :
In File Panel, with “Plot VIS2DATA...”, UV coverage,...

What clue do you get from the OI_T3 data ?

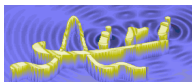
 - Add a target (click “Targets”)
 - Add model (for ex. disk)
 - Initialize the parameters
 - Run fit
 - Visualize the result of the fit: tables, plots
- Try a fit after removing the setting “Normalize total flux”:

Explain the value of parameters and of Chi2
- Save the settings (click File > Save settings)



- Same operations with the file **arcturus.1.52mu.oifits**
- Fit from various initial “Values” for the diameter
What is the problem ?
- Analyze with “Plot Chi2” tools
Why the final Chi2 is not so good?
- Try to improve the final Chi2

Check with a “nice teacher”

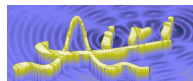


Exercise 2 - Fit with sharing of parameter

- Aim : on **2** data sets, one by wavelength, fit a model of **center-to-limb darkening** (e.g. power law) considering that:
 - the diameter of the photosphere (therefore common to both groups) is achromatic
 - the center-to-limb darkening coefficient is chromatic
- Files to load: **arcturus.1.52mu.oifits** and **arcturus.1.79mu.oifits**
- Select for ex. limb_power model for each of one and share the diameter between both
(use **contextual menu** – mouse right click)

To do: plot all the data and fitted models on the same graph

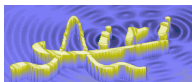
Check with a “nice teacher”



- Aim : estimate the separation of the binary Theta1 Ori C
 - from the file **Theta1Ori2007Dec03_2.fits**
 - build the model: combine **2 puncts**
 - select **only VIS2**
 - and run fit

What happens ?

Check with a “nice teacher”



- Use the tools *Plot Chi2 2D with (x2, y2), (fx_w1, fx_w2)...*

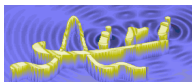
How looks the chi2 map?

How are x2, y2 ? (see also the correlation matrix)

Why ?

How to overcome the difficulty ?

Check with a “nice teacher”

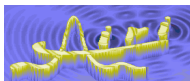


- After the degeneracy has been analyzed:
 - load the file **Theta1Ori2007Dec05_2.fits**
 - set the suitable values for flux_weight1, flux_weight2, [x2, y2]
 - and fit both files

Are there different solutions?

You can convert the results to polar coordinates (use **contextual menu** – mouse right click on punct2.x2 or punct2.y2 -)

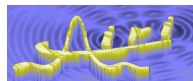
... If yes, **why** ?



- Add T3phi
- Do again the fit (with same initial conditions than the previous one)
- Compare the result with the published one - Ask a “nice teacher”-
- Plot an image of your model

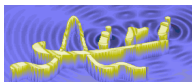
How the fit can be improved?

Check your solution with a “nice teacher”



Exercise 4: exercise yourself!

- Load from the local repository `/home/linux/data/Model_Fitting/tutorial/LITpro/` the files:
PRODUCT_HD87643_1.94-2.31micron_2008-03-01T02_01_57.1002.fits
PRODUCT_HD87643_1.94-2.41micron_2008-03-05T03_05_13.1075.fits
PRODUCT_HD87643_1.94-2.54micron_2008-03-12T00_24_20.3943.fits
PRODUCT_HD87643_1.96-2.55micron_2008-03-11T00_17_20.5606.fits
- Observe the data... VIS2 and T3phi, remembering exercise 3
- Build a first model and conduct the fit yourself



Exercise 5: another binary

- Load the data file **2004-BSC1948I.fits** from the local repository */home/linux/data/Model_Fitting/tutorial/LITpro/*
- Conduct the fit like for Exercise 3
Beware of the symmetries

Check your solution with a “nice teacher”

