

## Practical Introduction to Model Fitting

4 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. model fitting with **degeneracies**
4. application to a set of AMBER data :  
**to you to exercise yourself!**



## Exercise 1- simple fit

- Load the file **arcturus.1.79mu.oifits** from: <http://apps.jmmc.fr/oidata/>
- Launch LITpro
- Proceed by the different steps:
  - New settings
  - Load OIFile (→ see the data (vis2, uvcoverage,...))
  - Add new target
  - Add model (for ex. disk)
  - Initialize the parameters
  - Run fit
  - Visualize the result of the fit: table, plots
- Same operations with the file **arcturus.1.52mu.oifits**  
**What happens?**



## 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



## Exercise 3 - Fit with degeneracies

- Aim : estimate the separation of the binary Theta1 Ori C
  - from the file **Theta1Ori2007Dec03\_2.fits**
  - build the model
  - **select VIS2 only**
  - ... and run fit ...

**What happens ?**

Check with 'tuto team'



## Exercise 3 - 2

- Use the tools **Plot sniffer map**, or **Plot 2D chi2(x2, y2)**...

How looks the chi2 map?

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

... Why ?



## Exercise 3-4

- Add T3phi
- Do again the fit (with same initial conditions than the previous one)
- Compare the result with the published one (ask the *'tuto-team'*)
- **Plot image**

How the fit can be improved?



## Exercise 3 - 3

- After the degeneracy has been analysed:
  - 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?

... and why ?



## Exercise 4: for you alone...

- Load from: <http://apps.jmmc.fr/oidata/> 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 yourself the fit

