Evolution of LITpro

Isabelle Tallon-Bosc, Michel Tallon *CRAL*
Guillaume Mella "GUI Master", Hervé Beust *IPAG*

Outline

- Current status
- Objectives of the evolution
- Actions in progress
  - Fitters
  - Users functions
- Next actions
  - read the OIFITS2 format

Current status

LITpro proposes to the user:

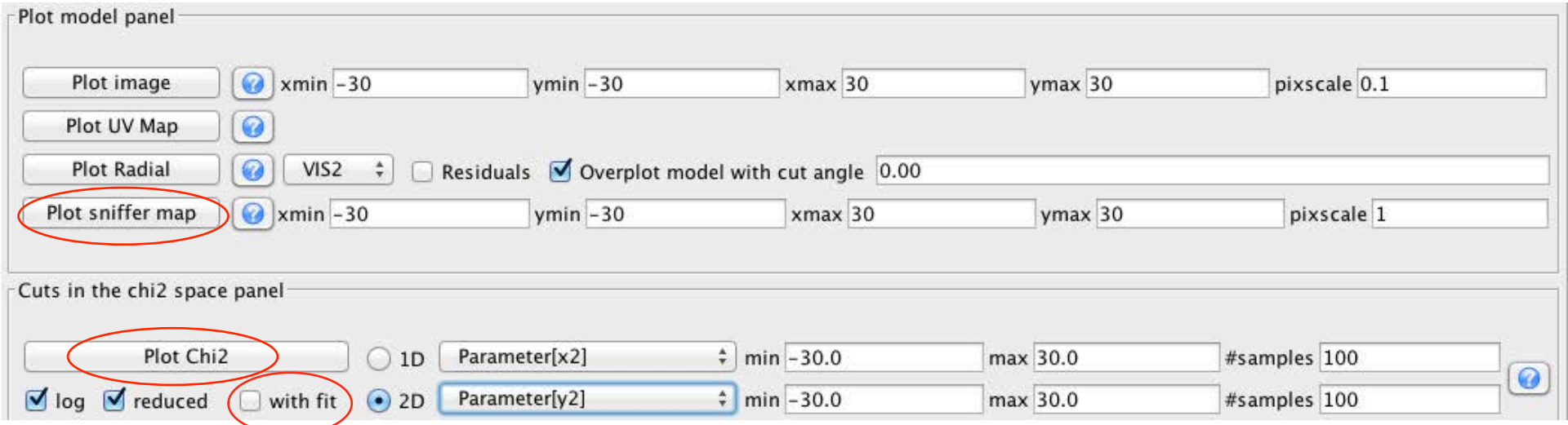
- one fitter (Levenberg Marquardt with trust regions and bounds on the parameters)

  up-to-now the most efficient for seeking local minima

- a search of global minimum by gridding parameters

  "Plot chi2 with fit"

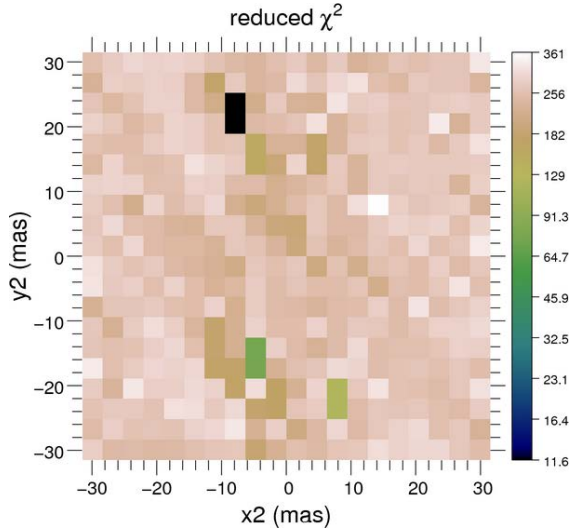
Search of global minimum by gridding parameters



Search of global minimum by gridding parameters

ex: binary of the 2004 Interferometric Imaging Beauty Contest

Plot Chi2 *for x2,y2 with fit of the flux_weights*

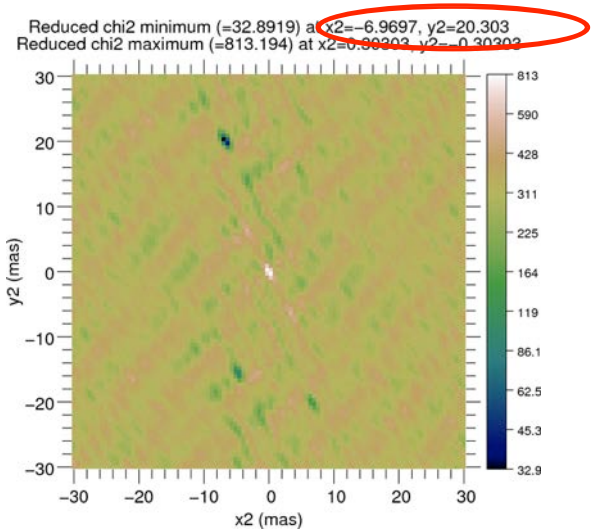


n REDUCED CHI2 MINIMA:

chi2 @ x2, y2 | flux_weight1 flux_weight2

coordinates | fitted parameters

Plot sniffer map *for x2,y2 :*



n REDUCED CHI2 MINIMA:

chi2 @ x2, y2

n fixed by default in the GUI (up-to-now)

==> "*Plot sniffer map*" will disappear from the GUI

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- one fitter (Levenberg Marquardt with trust regions and bounds on the parameters)
  up-to-now the most efficient for seeking local minima
- a search of global minimum by gridding parameters
  "Plot chi2 with fit"
- one estimation of the error bars (from χ^2 curvature)
- a library of combinable object models
  easy to expand

lpb_punct() - Single point (Dirac function)
lpb_background() - Background
lpb_disk() - Uniform disk with normalized total flux
lpb_disk_polar() - Uniform disk with normalized total flux
lpb_nonorm_disk() - Not normalized uniform disk
lpb_circle() - Circle
lpb_gaussian() - Gaussian
lpb_ring() - Uniform ring
lpb_gaussian_ring() - Gaussian ring
lpb_square() - Uniform square
lpb_modulated_circle() - Gaussian ring
lpb_elong_disk() - Ellipse (elongated disk)
lpb_nonorm_elong_disk() - Not normalized ellipse (elongated disk)
lpb_elong_gaussian() - Elongated Gaussian
lpb_elong_ring() - Elongated ring
lpb_elong_limb_power() - Ellipse (elongated disk)
lpb_flatten_disk() - Ellipse (flattened disk)
lpb_nonorm_flatten_disk() - Not normalized Ellipse (flattened disk)
lpb_flatten_gaussian() - Flattened Gaussian
lpb_flatten_ring() - Flattened ring
lpb_stretched_disk() - Stretched Gaussian
lpb_stretched_gaussian() - Stretched Gaussian
lpb_stretched_gaussian_ring() - Stretched Gaussian Ring
lpb_stretched_modulated_circle() - Stretched modulated circle
lpb_stretched_modulated_gaussian_ring() - Stretched modulated gaussian ring
lpb_limb_power() - Limb-darkened disk with power law
lpb_limb_linear() - Limb-darkened disk with linear law
lpb_limb_quadratic() - Limb-darkened disk with quadratic law
lpb_limb_sqrt() - Limb-darkened disk with square root law

lpb_limb_nonlinear_Claret() - Limb-darkened disk with the new non-linear law of Claret (2000)
lpb_blackbody() - Weight with relative flux of black-body
lpb_background_BB() - Background with black-body emission

lpb_punct_BB() - Single point (Dirac function) with black body emission
lpb_disk_BB() - Uniform disk with black body emission
lpb_elong_disk_BB() - Elongated disk with black body emission
lpb_stretched_disk_BB() - Stretched disk with black body emission
lpb_gaussian_BB() - Uniform disk with black body emission
lpb_stretched_gaussian_BB() - Stretched Gaussian with blackbody

present model functions : a lot !

Current status

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  up-to-now the most efficient for seeking local minima
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  "Plot chi2 with fit"
- one estimation of the error bars (from χ^2 curvature)
- a library of combinable object models
  easy to expand

Objectives of the evolution

LITpro will allow the user to:

/Fitters:

- use other fitters (global and local)
- use different estimators of the error bars

  χ^2 curvature, resampling, MCMC, ...

/Model functions:

- build its own model
- → public and sharable library of user models (website)

Actions in progress

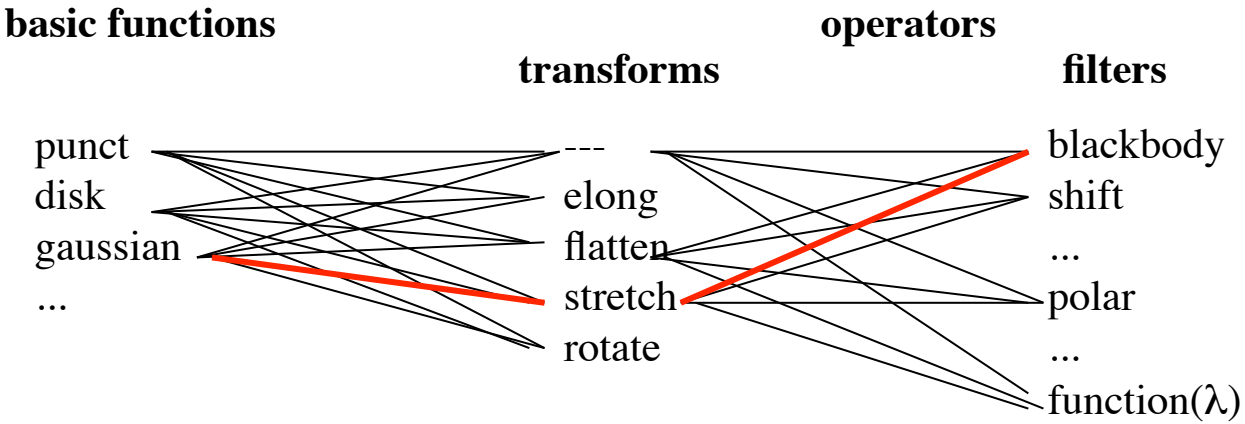
- / Fitters
  - implementation of fitters as "pluggins": operational
  - pluggin "genetic algorithm" implemented (global fitter)
    tests under way (by Hervé)
  - other fitters ready to be implemented
    Neadler-Mead (local fitter)
    "gutsyfit" (global fitter) (Michel)
  - use different estimators of the error bars: to be done

Actions in progress

- / Users functions
  - to replace the present functions by an algebra combining
    - a set of basic model functions

    with
    - a set of operators (transforms & filters)

Actions in progress
user functions



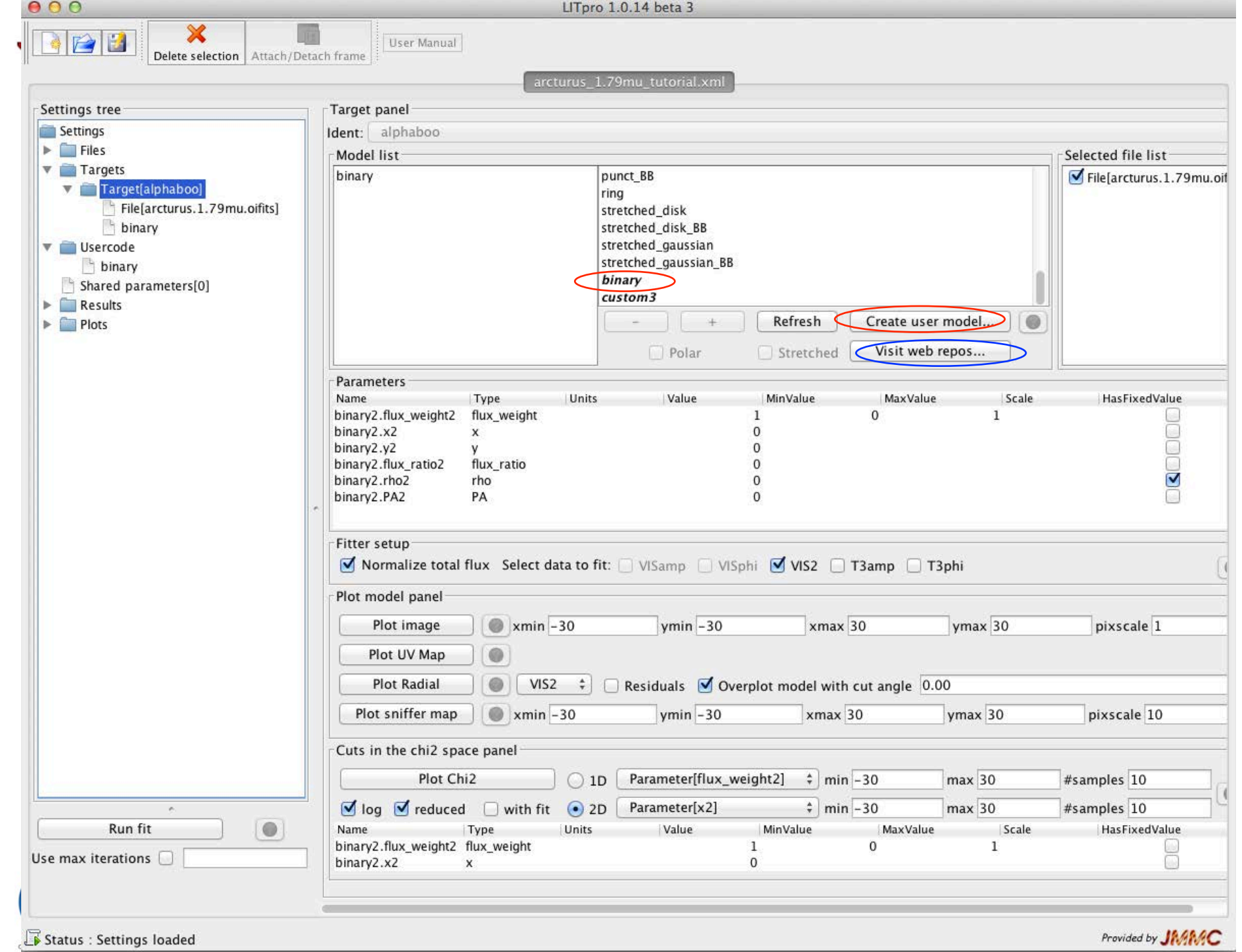
ex: lpb_stretched_gaussian_BB()

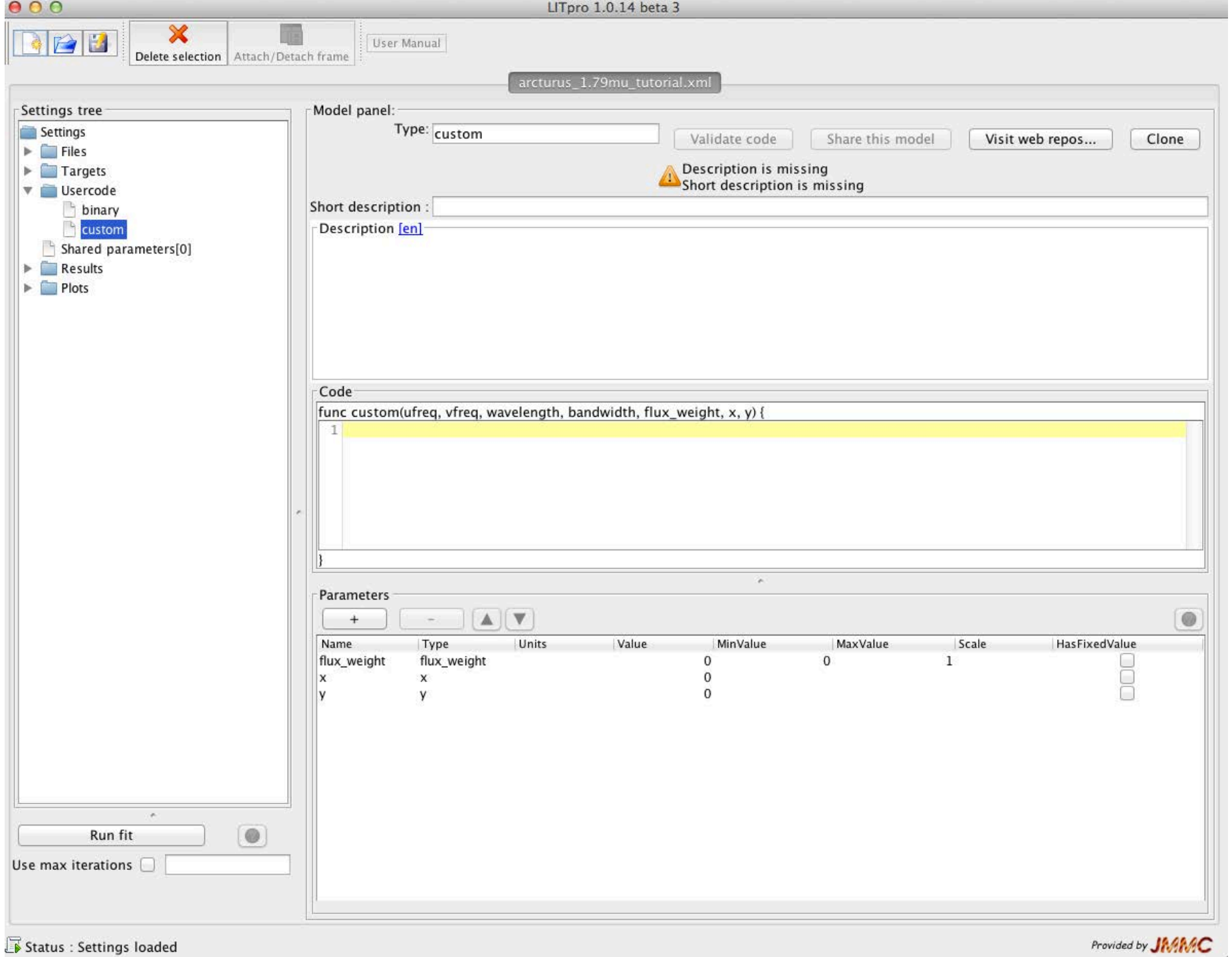
--> the user may compose any model easily
and also write its own function

func *UserFunc* (coordinates, parameters)
coordinates = ufreq, vfreq, wavelength, bandwidth, MJD,...
parameters = x, y, flux_weight, diameter, temperature,...

Actions in progress

- coding under way
- ---> "new" GUI with new functionalities


LITpro 1.0.14 beta 3
Delete selection
Attach/Detach frame
User Manual
arcturus_1.79mu_tutorial.xml
Settings tree
Settings
Files
Targets
Target[alphaboo]
File[arcturus.1.79mu.oifits]
binary
Usercode
binary
Shared parameters[0]
Results
Plots
Target panel
Ident: alphaboo
Model list
binary
punct_BB
ring
stretched_disk
stretched_disk_BB
stretched_gaussian
stretched_gaussian_BB
binary
custom3
Refresh
Create user model...
Polar
Stretched
Visit web repos...
Selected file list
File[arcturus.1.79mu.oif
Parameters
Name Type Units Value MinValue MaxValue Scale HasFixedValue
binary2.flux_weight2 flux_weight 1 0 1
binary2.x2 x 0
binary2.y2 y 0
binary2.flux_ratio2 flux_ratio 0
binary2.rho2 rho 0
binary2.PA2 PA 0
Fitter setup
Normalize total flux
Select data to fit:
VISamp
VISphi
VIS2
T3amp
T3phi
Plot model panel
Plot image
xmin -30 ymin -30 xmax 30 ymax 30 pixscale 1
Plot UV Map
Plot Radial
VIS2
Residuals
Overplot model with cut angle 0.00
Plot sniffer map
xmin -30 ymin -30 xmax 30 ymax 30 pixscale 10
Cuts in the chi2 space panel
Plot Chi2
1D
Parameter[flux_weight2]
min -30 max 30 #samples 10
log
reduced
with fit
2D
Parameter[x2]
min -30 max 30 #samples 10
Name Type Units Value MinValue MaxValue Scale HasFixedValue
binary2.flux_weight2 flux_weight 1 0 1
binary2.x2 x 0
Run fit
Use max iterations
Status : Settings loaded
Provided by JMMC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Settings tree
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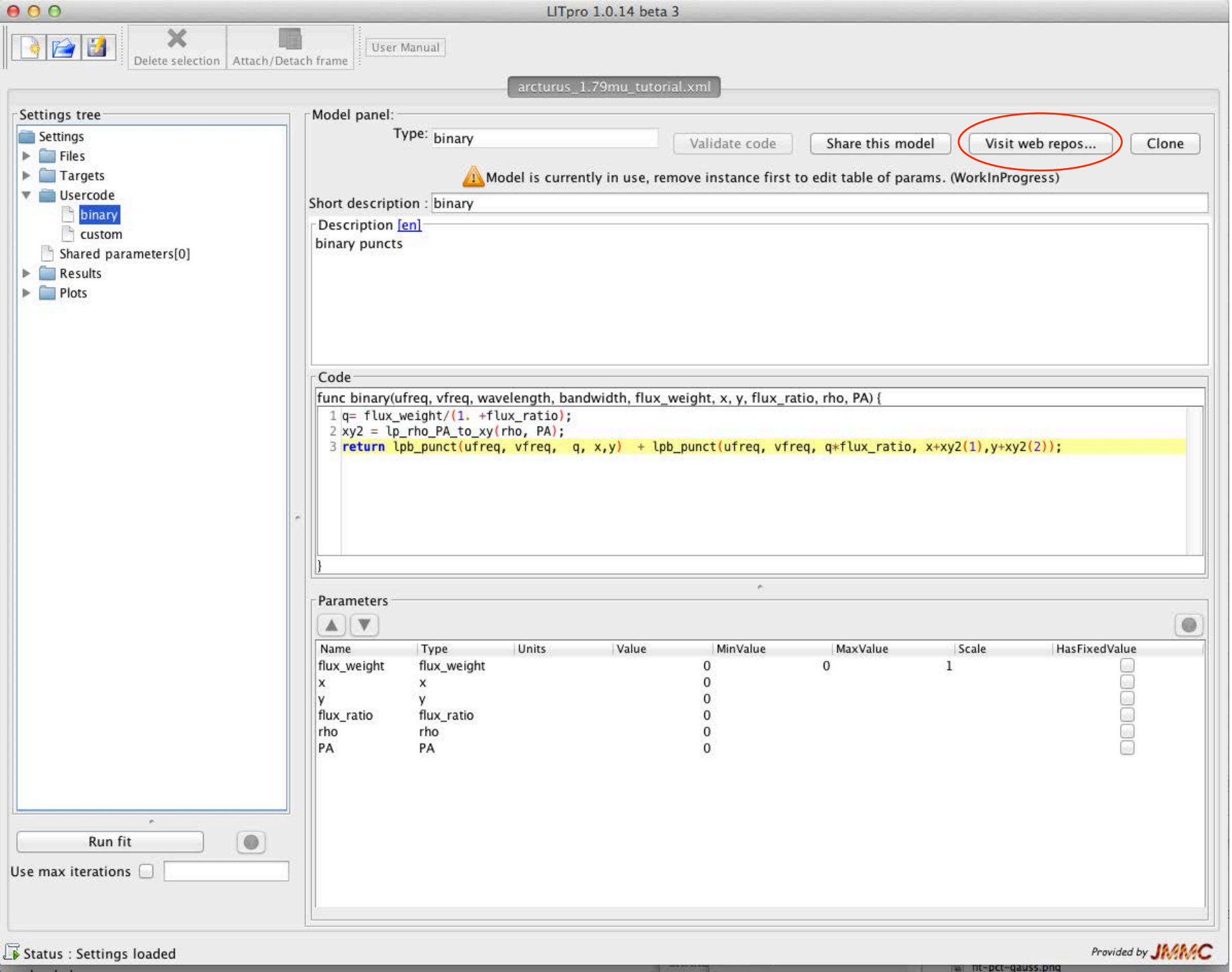
Usercode
binary
custom
Shared parameters[0]
Results
Plots
Model panel:
Type: custom
Validate code
Share this model
Visit web repos...
Clone
Description is missing
Short description is missing
Short description :
Description [en]
Code
func custom(ufreq, vfreq, wavelength, bandwidth, flux_weight, x, y) {
1
}
Parameters
+
-
Name Type Units Value MinValue MaxValue Scale HasFixedValue
flux_weight flux_weight 0 0 1
x x 0
y y 0
Run fit
Use max iterations
Status : Settings loaded
Provided by JMMC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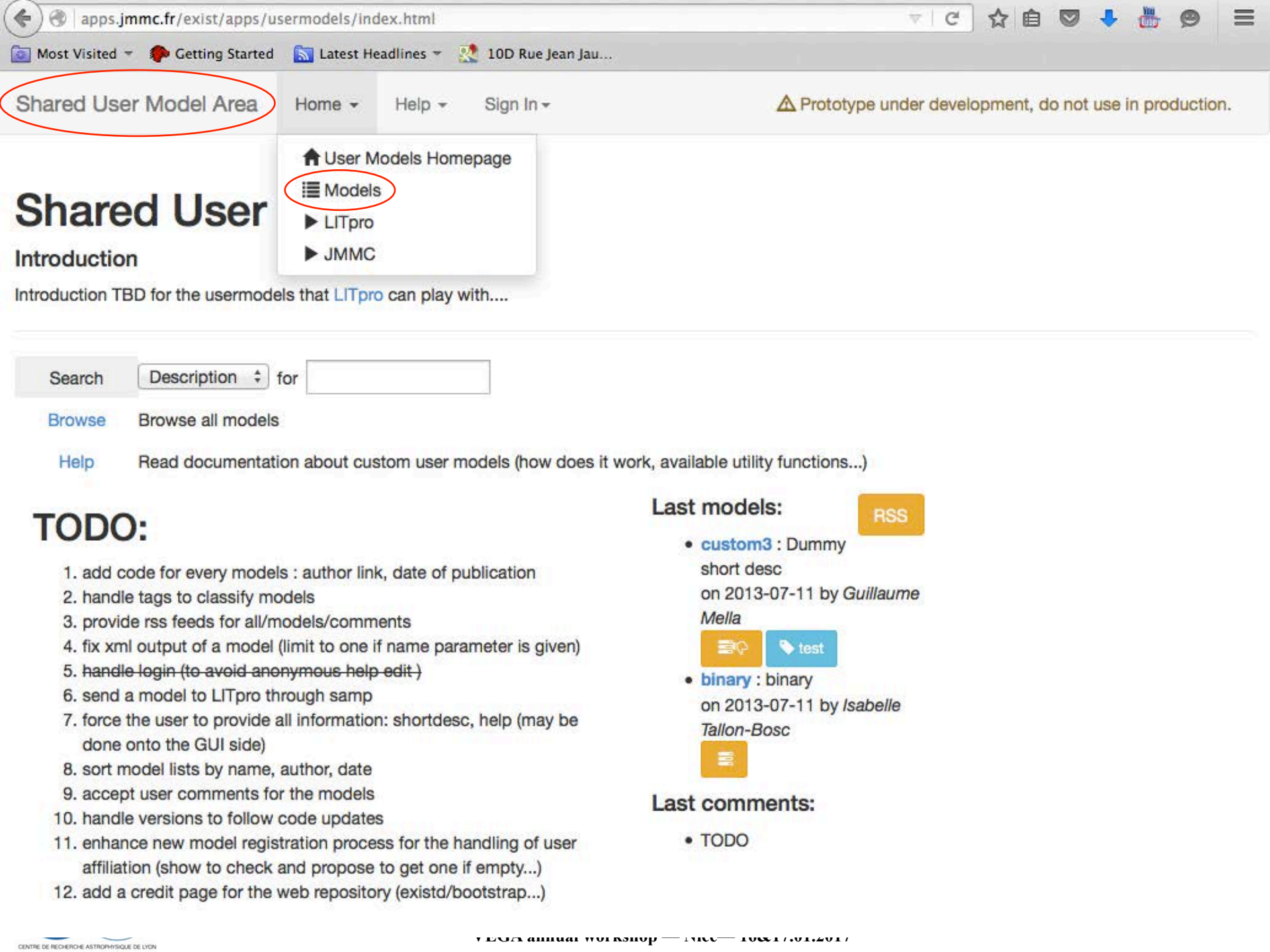
custom
Shared parameters[0]
Results
Plots
Model panel:
Type: binary
Validate code
Share this model
Visit web repos...
Clone
Model is currently in use, remove instance first to edit table of params. (WorkInProgress)
Short description : binary
Description [en]
binary puncts
Code
func binary(ufreq, vfreq, wavelength, bandwidth, flux_weight, x, y, flux_ratio, rho, PA) {
1 q= flux_weight/(1. +flux_ratio);
2 xy2 = lp_rho_PA_to_xy(rho, PA);
3 return lpb_punct(ufreq, vfreq, q, x,y) + lpb_punct(ufreq, vfreq, q*flux_ratio, x+xy2(1),y+xy2(2));
}
Parameters
Name Type Units Value MinValue MaxValue Scale HasFixedValue
flux_weight flux_weight 0 0 1
x x 0
y y 0
flux_ratio flux_ratio 0
rho rho 0
PA PA 0
Run fit
Use max iterations
Status : Settings loaded
Provided by JMMC


apps.jmmc.fr/exist/apps/usermodels/index.html
Most Visited
Getting Started
Latest Headlines
10D Rue Jean Jau...
Shared User Model Area
Home
Help
Sign In
Prototype under development, do not use in production.
User Models Homepage
Models
LITpro
JMMC
Shared User
Introduction
Introduction TBD for the usermodels that LITpro can play with....
Search
Description
for
Browse
Browse all models
Help
Read documentation about custom user models (how does it work, available utility functions...)
TODO:
1. add code for every models : author link, date of publication
2. handle tags to classify models
3. provide rss feeds for all/models/comments
4. fix xml output of a model (limit to one if name parameter is given)
5. handle login (to avoid anonymous help edit)
6. send a model to LITpro through samp
7. force the user to provide all information: shortdesc, help (may be done onto the GUI side)
8. sort model lists by name, author, date
9. accept user comments for the models
10. handle versions to follow code updates
11. enhance new model registration process for the handling of user affiliation (show to check and propose to get one if empty...)
12. add a credit page for the web repository (existd/bootstrap...)
Last models:
RSS
custom3 : Dummy
short desc
on 2013-07-11 by Guillaume Mella
test
binary : binary
on 2013-07-11 by Isabelle Tallon-Bosc
Last comments:
TODO

binary model

Short description

binary

Description

```
binary puncts
```

Code

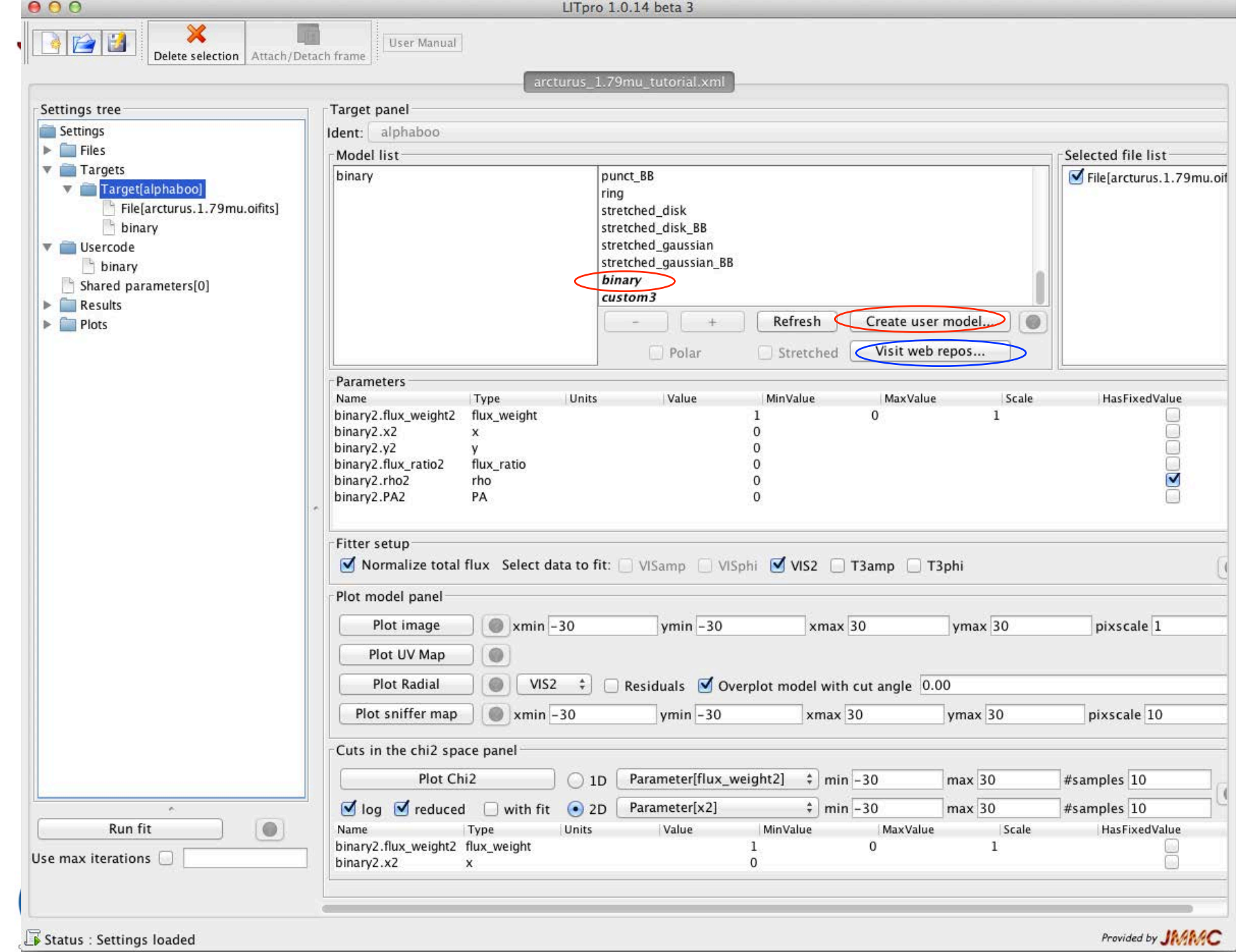
```
binary(ufreq, vfreq, wavelength, bandwidth, flux_weight, x, y, flux_ratio, rho, PA) {
q= flux_weight/(1. +flux_ratio);
xy2 = lp_rho_PA_to_xy(rho, PA);
return lpb_punct(ufreq, vfreq,  q, x,y)  + lpb_punct(ufreq, vfreq, q*flux_ratio, x+xy2(1),y+xy2(2));
}
```

Comments

Please login to enter comments

Model Info

Submitted: 2013-07-11
Version: 1
Author: Isabelle Tallon-Bosc (*CRAL*)
Tags:
Status:
Comments:0
UID: d7f8a169-7fa8-4600-b9fc-bd93abc561eb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binary2.x2 x 0
binary2.y2 y 0
binary2.flux_ratio2 flux_ratio 0
binary2.rho2 rho 0
binary2.PA2 PA 0
Fitter setup
Normalize total flux
Select data to fit: VISamp VISphi VIS2 T3amp T3phi
Plot model panel
Plot image
xmin -30 ymin -30 xmax 30 ymax 30 pixscale 1
Plot UV Map
Plot Radial
VIS2
Residuals
Overplot model with cut angle 0.00
Plot sniffer map
xmin -30 ymin -30 xmax 30 ymax 30 pixscale 10
Cuts in the chi2 space panel
Plot Chi2
1D
Parameter[flux_weight2]
min -30 max 30 #samples 10
log
reduced
with fit
2D
Parameter[x2]
min -30 max 30 #samples 10
Name Type Units Value MinValue MaxValue Scale HasFixedValue
binary2.flux_weight2 flux_weight 1 0 1
binary2.x2 x 0
Run fit
Use max iterations
Status : Settings loaded
Provided by JMMC

Actions in progress

- coding under way
- ---> "new" GUI with new functionalities
- link with an interactive web page, where users:
  - find help
  - see the codes of existing model functions
  - may contribute to the library (sharing his model, commenting others)

Next actions

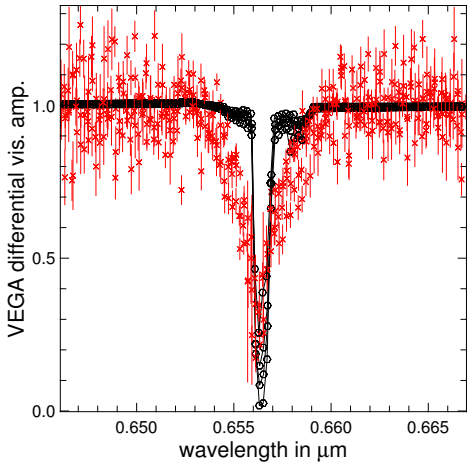
- Read OIFITS2 format

  – read *OI_SPECTRUM*

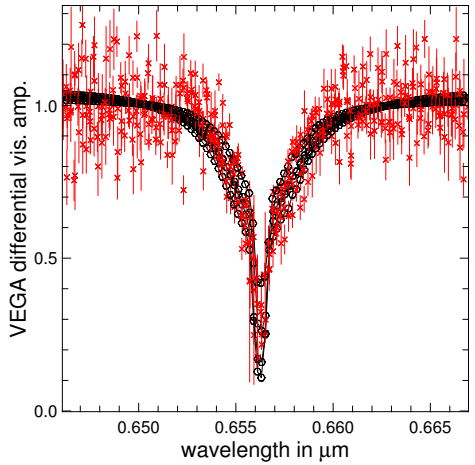
  (LITpro already fits SED and visibilities simultaneously)

  – adapt the model of data with the instrument (identified by keywords *INSTRUME/INSMODE*)

  ex.: prototypic work on the VEGA differential visibilities (*OI_VIS*) on PCygni (POLCA project)



without



with

a model of the instrument

Conclusions

- This evolution = our priority
  - fitters & user functions in 2017
  - OIFITS2 later on

- it will be tested by the "beta-testers" of the group

(JB LeBouquin *IPAG*, A. Domiciano, N. Nardetto, M. Vannier *OCA*)

and others welcome !

Do not hesitate to tell us your needs