First Year of pyLIMA: progress and plans

21st International Microlensing Conference

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Outline

- What can we do with pyLIMA?

- How does it work?

- Some results

- Future plans and expected release

What can we do with pyLIMA?

NOW, pyLIMA can handle these microlensing models :

Point Source Point Lens (Paczynski 1986)

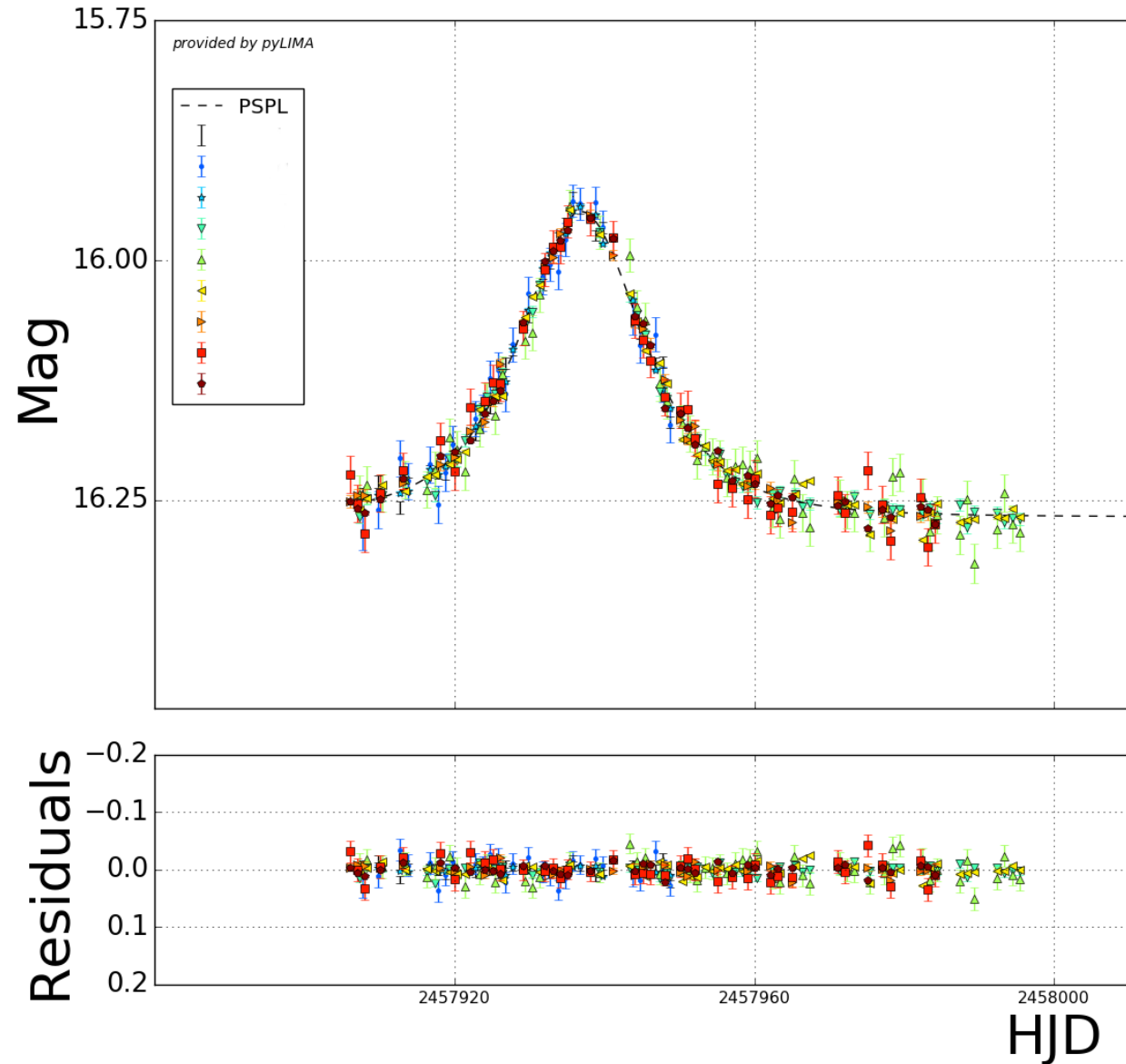**Finite Source Point Lens (Yoo 2004 , Cassan 2006)**

Double Source Point Lens (Hwang 2013)

Uniform Source Point Lens (Bozza 2010)

http://www.fisica.unisa.it/GravitationAstrophysics/VBBinaryLensing.htm

What can we do with pyLIMA?

You can use those to : simulate realistic observations (Earth and Space based)

What can we do with pyLIMA?

Some second-order effects are implemented:

Annual/Terrestrial/Space parallaxes

(Gould 2004, Calchi-Novati 2015)

Alternative parameters $\qquad$ $\rho \rightarrow \log(\rho.t_E)$

Orbital motion

Xallarap

What can we do with pyLIMA?

Several fitting methods implemented :

Levenberg-Marquardt (scipy)

Differential Evolution (scipy)

MCMC (emcee)

GRIDS

How it works ?

Architecture based on python

Uses standard python libraries (numpy, scipy, astropy, matplotlib …)

You can plug your fancy library from other language with SWIG

How it works ?

Version control, open access, collaborations

Join us :

https://github.com/ebachelet/pyLIMA

How it works ?

Stability control

Python provides a framework for systematic and routine unit testing

Travis runs these automatically online, issues warnings

Gmail ▾	□ ▾	⟳	Plus ▾			1–50 sur 3 072	‹ ›	⚙ ▾
NOUVEAU MESSAGE	□ ☆ 📁	Rachel Street	Iridium flare tomorrow - Hi all, Returning to a conversation we had in the car: there will be an Iridium flare visible tomorrow e					28 janv.
Boîte de réception (97)	□ ☆ □	**Travis CI**	**Fixed: ebachelet/pyLIMA#106 (master - 00c0959)** - ebachelet / pyLIMA (master) Build #106 was fixe	View Build ↗				27 janv.
Messages suivis	□ ☆ □	**Travis CI**	**Fixed: ebachelet/pyLIMA#105 (master - b8c0481)** - ebachelet / pyLIMA (master) Build #105 was fixe	View Build ↗				27 janv.
Important								
Messages envoyés	□ ☆ □	**MOA transient alert**	**MOA 2017-BLG-002** - MOA_ID: 2017-BLG-002 Internal ID: gb22-R-1-1852 Discovery Date: 2017-01-28T01:37:04 UT RA: .					27 janv.
Brouillons (60)	□ ☆ □	MOA transient alert (2)	**MOA 2017-BLG-001** - MOA_ID: 2017-BLG-001 Internal ID: gb2-R-2-19629 Discovery Date: 2017-01-27T23:15:22 UT RA: 1					27 janv.
▼ Cercles								

How it works ?

To help users, we provide :

Examples, using **IP[y]: IPython**
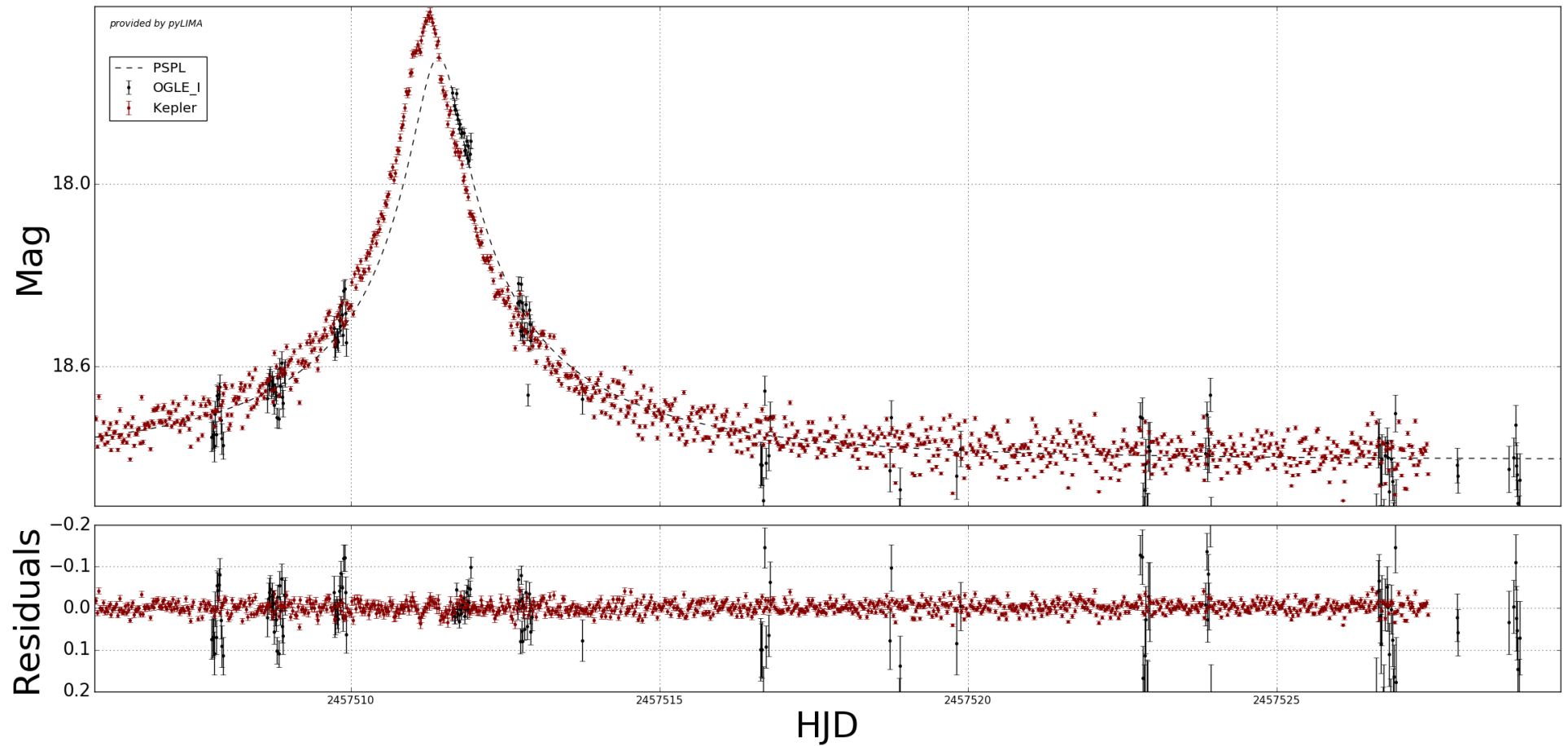
Documentation, using **SPHINX** PYTHON DOCUMENTATION GENERATOR

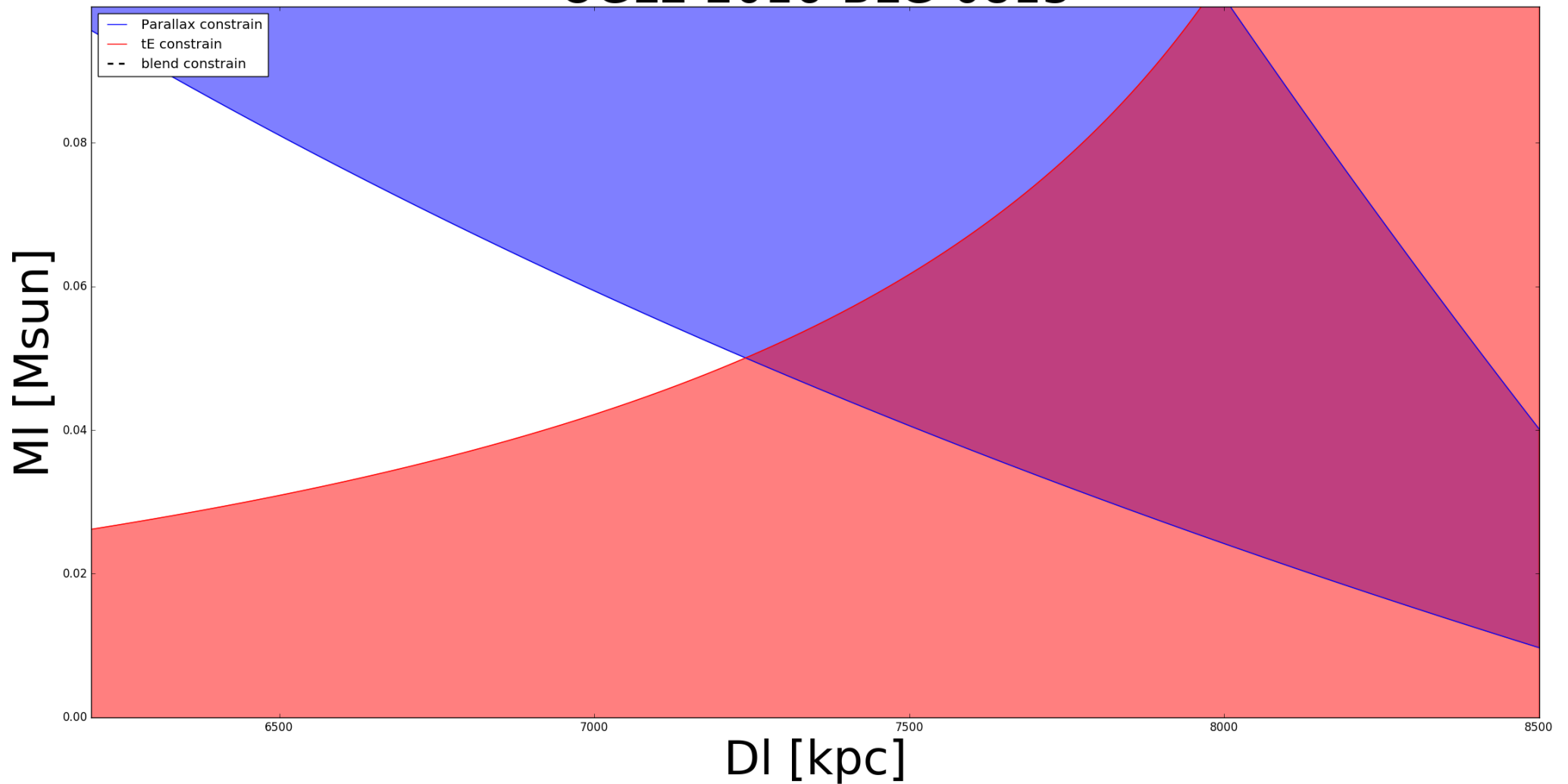# Some results

K2 campaign
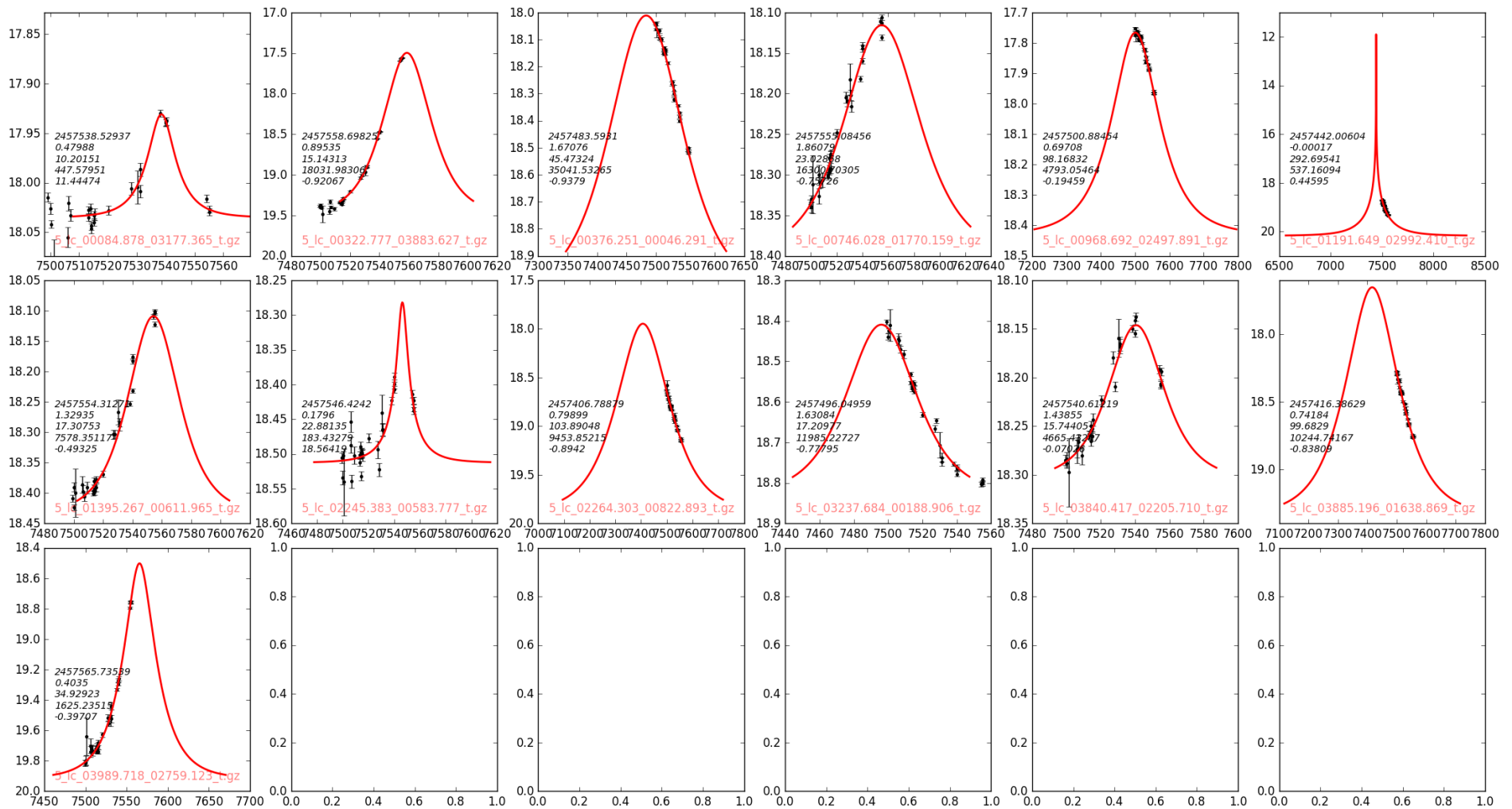
OB160813

Some results

K2 campaign

OGLE-2016-BLG-0813

Some results

Event detection in LCO data

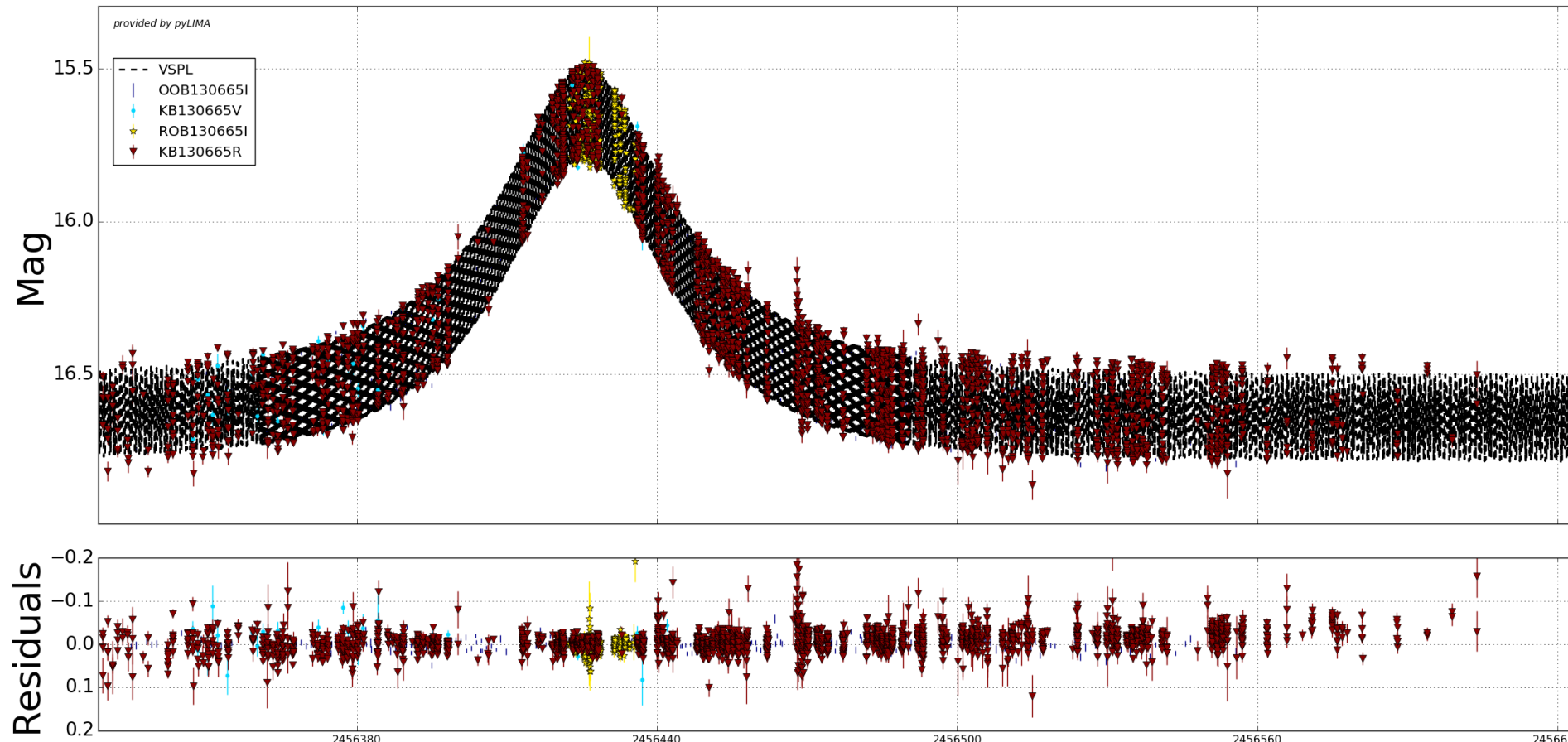# Some results

OB130665/MB13300 : a microlensed RRLyrae

pyLIMA is flexible enough, so you can write whatever model you need.

Here, we have a RR Lyrae microlensing events.
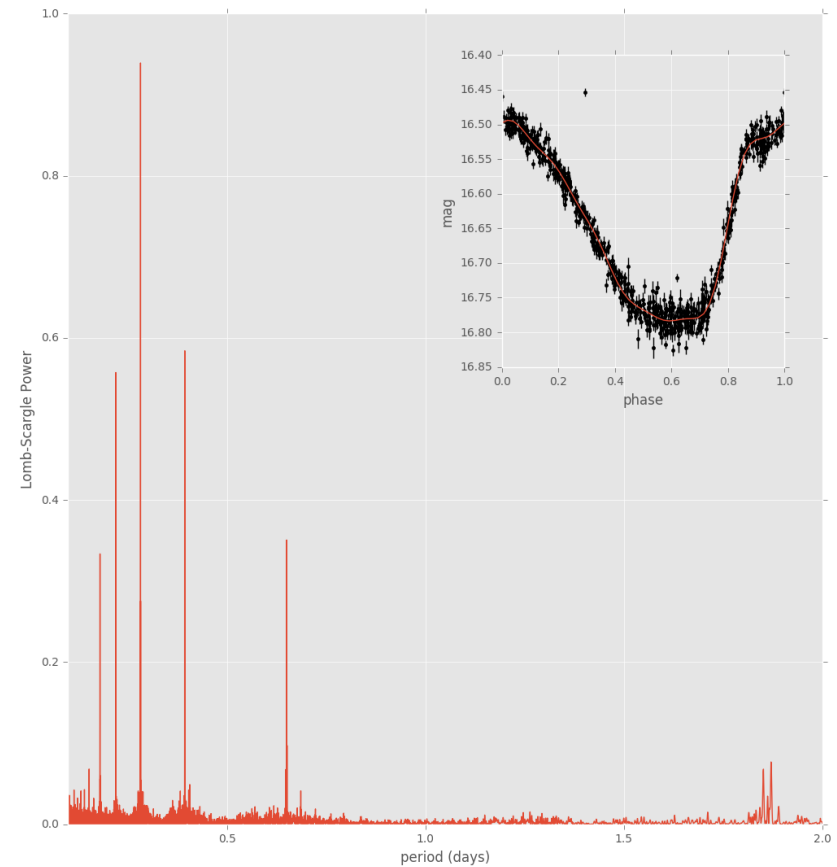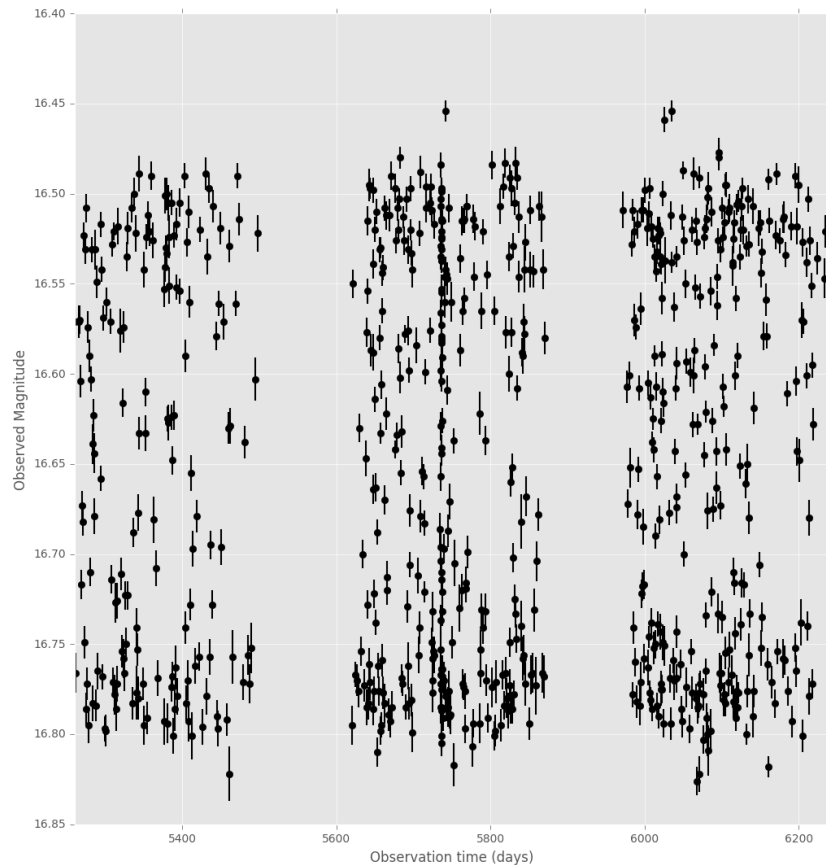
Some results

OB130665/MB13300 : a microlensed RRLyrae

Some results

OB130665/MB13300 : a microlensed RRLyrae
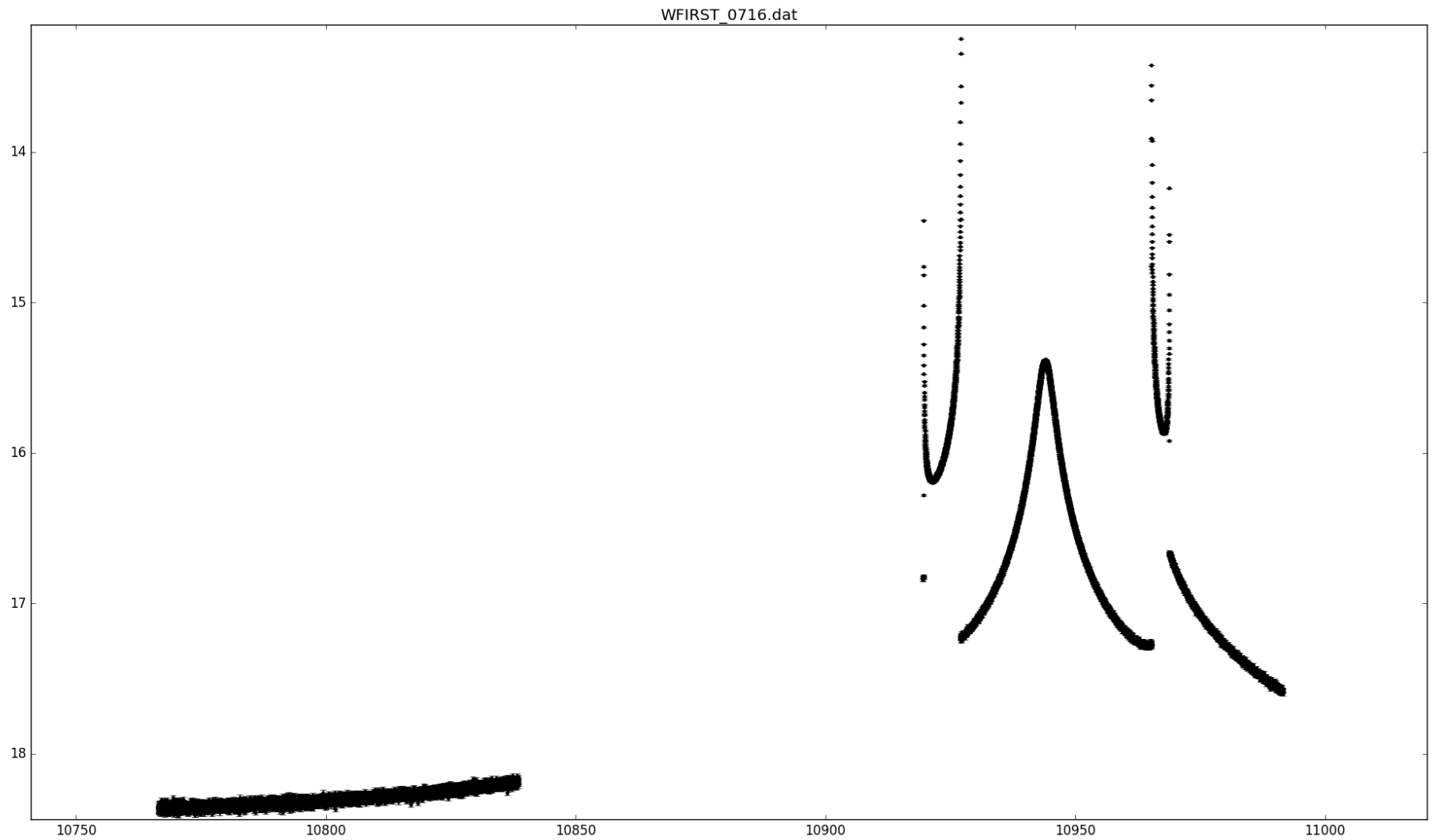
Some results

OB130665/MB13300 : a microlensed RRLyrae

The RR Lyrae is the source because flux variations are independent of the magnification

Period ~ 0.28 RR c Lyrae

Potential parallax measurement
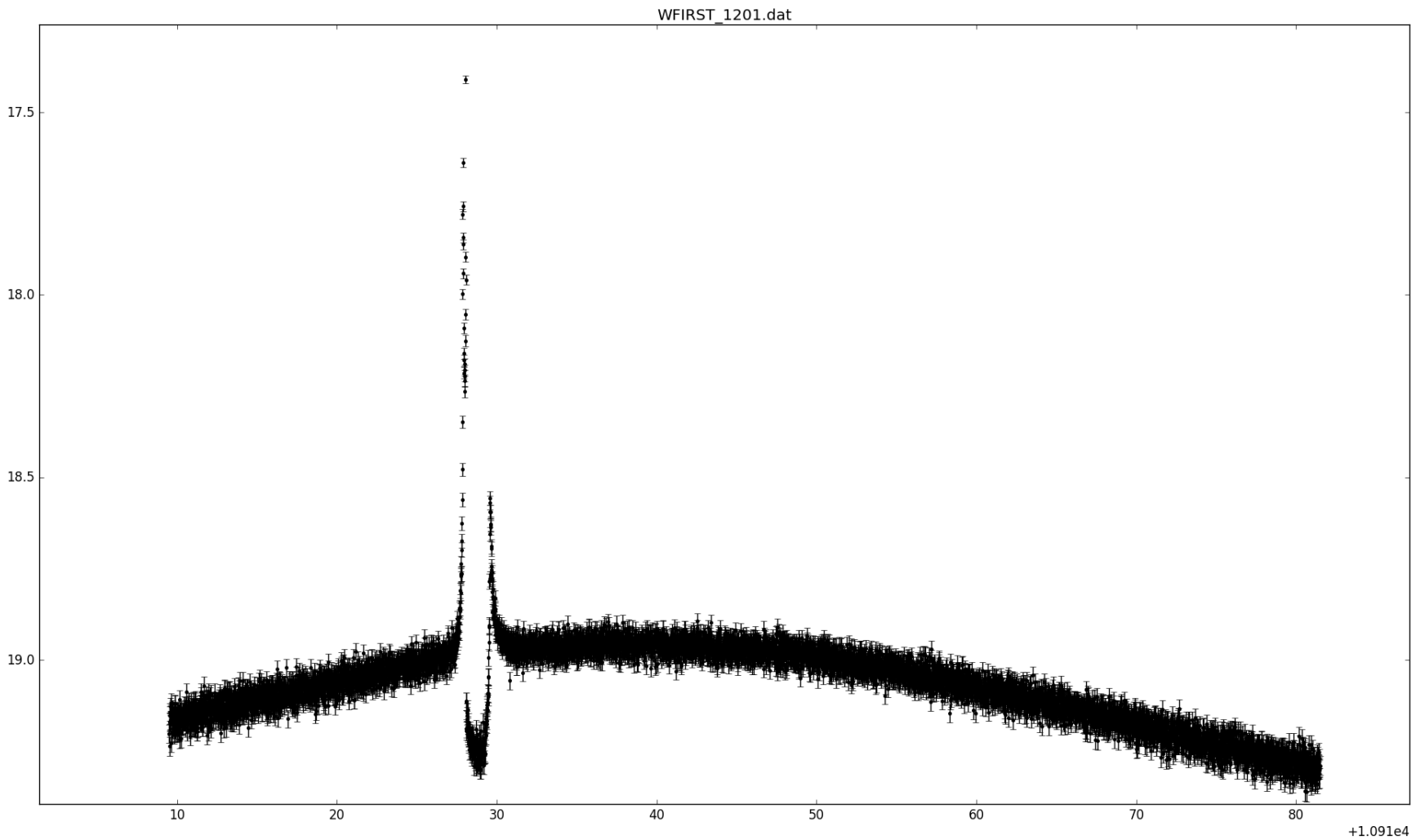
Some results

Sagan Workshop

Some results

Sagan Workshop

Future plans

Release v1.0 very soon, stay tuned!

Optimizing binary fitting

Working on some events

Do you need something ? Let's talk!