Searching for extrasolar-comets in Kepler lightcurves

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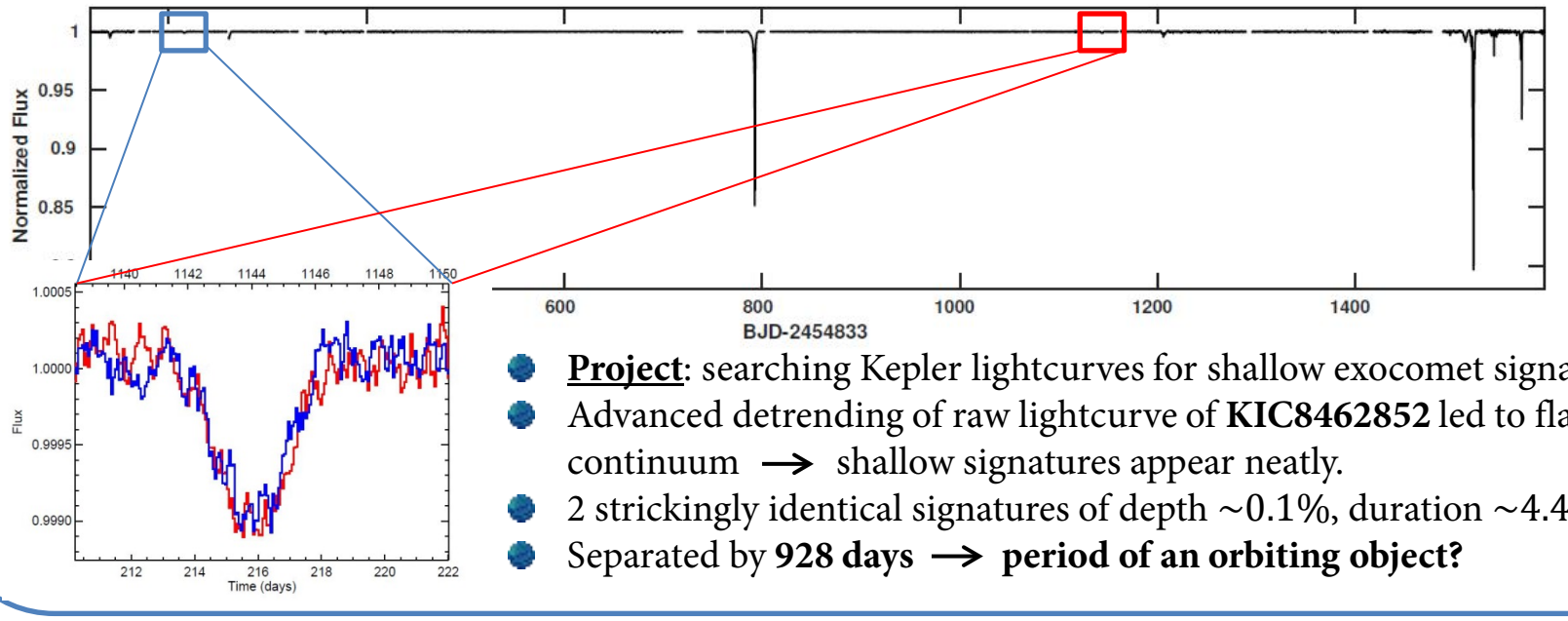
Recently published in **Kiefer et al. 2017, A&A**

Exocomet signatures in KIC 8462852 lightcurve?

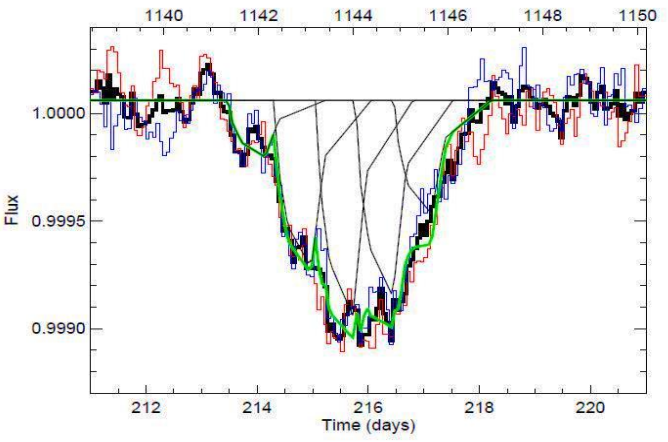


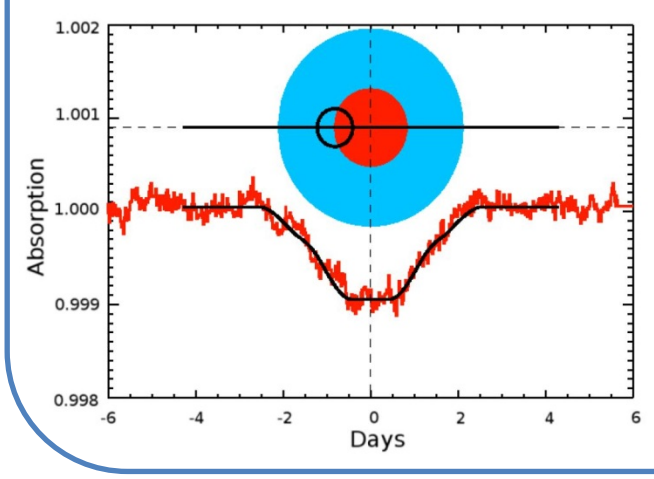
- **Project**: searching Kepler lightcurves for shallow exocomet signatures,
- Advanced detrending of raw lightcurve of **KIC8462852** led to flat quiet continuum → shallow signatures appear neatly.
- 2 strickingly identical signatures of depth ~0.1%, duration ~4.4 days
- Separated by **928 days** → **period of an orbiting object?**

Two possible models: comets or ring planet

Transit of string of 5 to 7 Halley-type exocomets (**right figure**),

- exocomet tails simulated using *Lecavelier+ 1999*,
- periastron q~0.3 au,
- dust production rate $\dot{M}$~10^{5-6} kg/s.

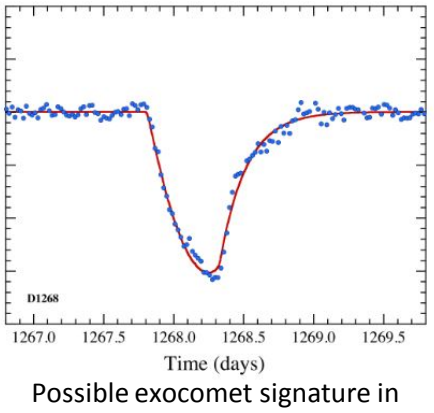




Transit of a system of giant rings around a massive planet (**left figure**),

- 2 large rings with different opacities,
- rings size, r_{in}~2 R_* and r_{out}~5 R_*
- semi-major axis of planet orbit, a~2.1 au,

Prospects for future missions CHEOPS and PLATO



Possible exocomet signature in Kepler lightcurve of KIC3542116 *Rappaport+ 2017*

- Possible exocomets also discovered in Kepler lightcurves of KIC3542116 and KIC11084727, by Rappaport+ 2017.
- **Excellent prospects** for future exocomets detections with space photometers such as CHEOPS, TESS, and PLATO.
- Method used up to now: human visual inspection of lightcurves
  - Efficient, but expensive in human ressources,
  - Usually biased and no full completion
- PLATO will deliver up to **1million of light curves**
  - Something one single human cannot do,
  - Absolute need for an automatic pipeline of reduction and detection of exocomet signatures
- **Supervised machine-learning** is the key
  - The most powerful technic to detect patterns.

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