OGLE-2015-BLG-1395: A Possible Giant Planet Beyond the Snow Line from Microlensing + Adaptive Optics Observations

Andrew Cole

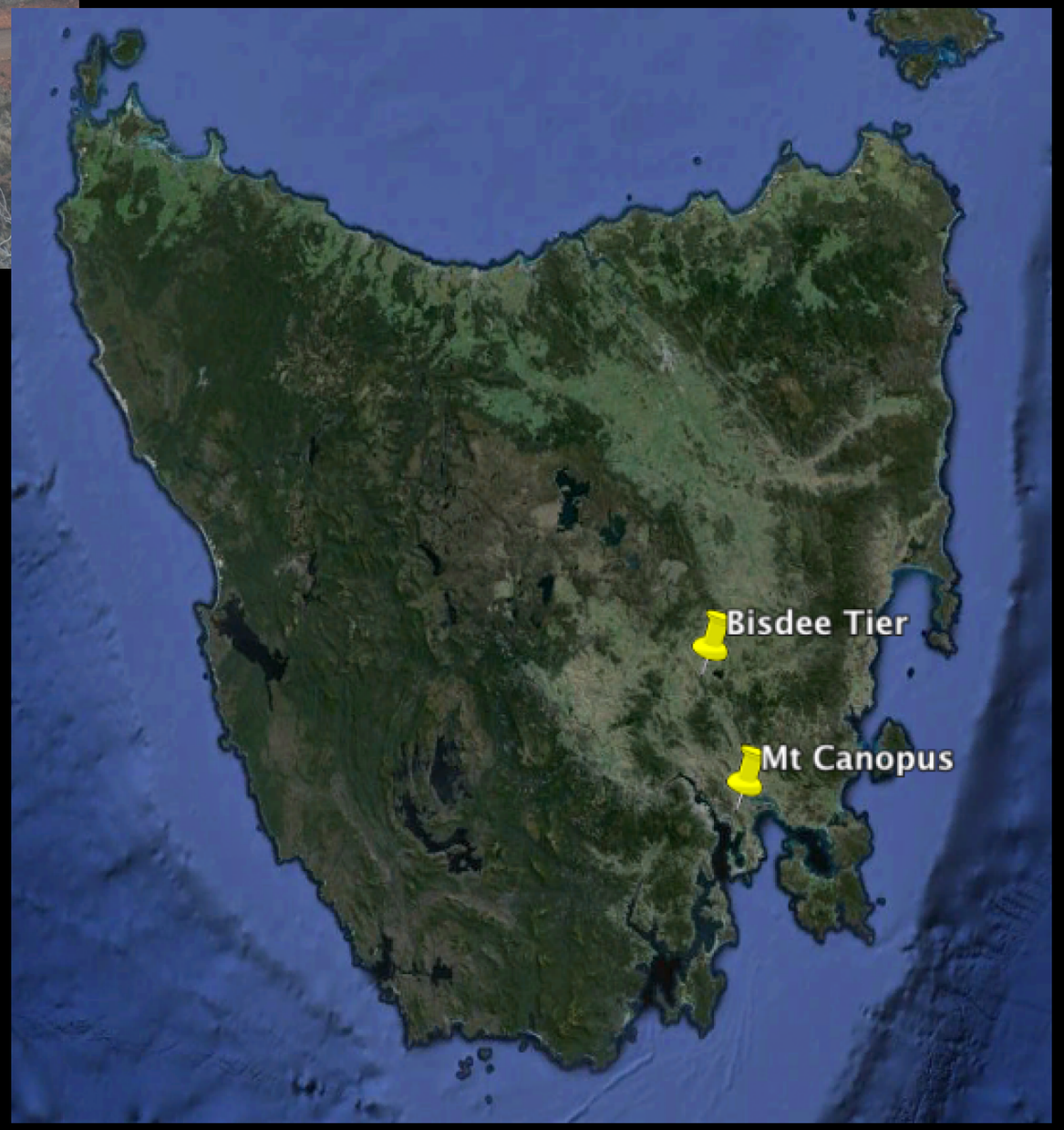
University of Tasmania

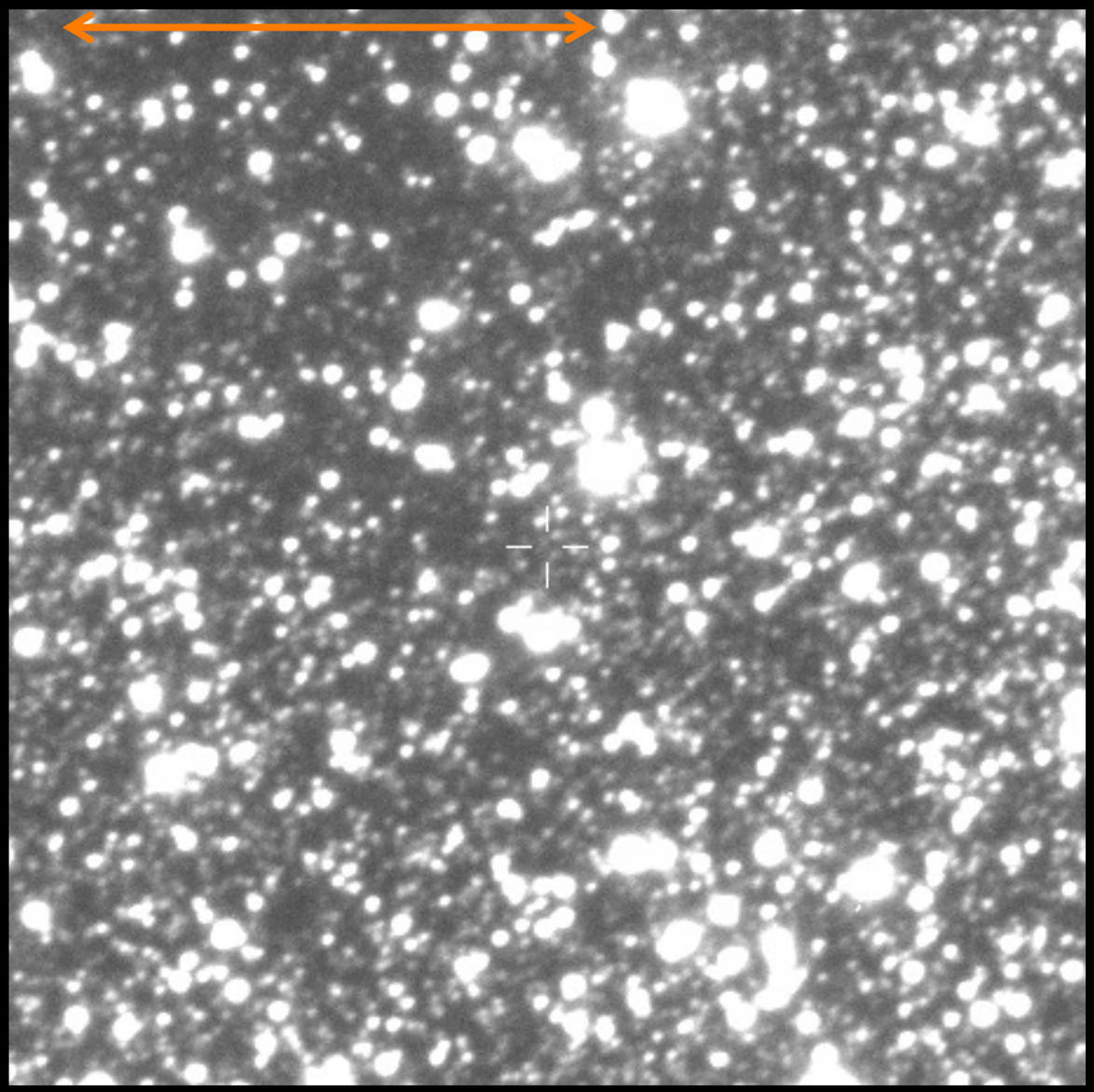
J.B. Marquette, J.P. Beaulieu, C. Coutures, K.M. Hill, M. Albrow, I. Bond, V. Bozza, A. McDougall, C. Ranc, D. Bennett, A. Fukui, A. Gould, OGLE & other survey and followup groups

21st International Microlensing Conference - 2017/02/02

Greenhill Observatory

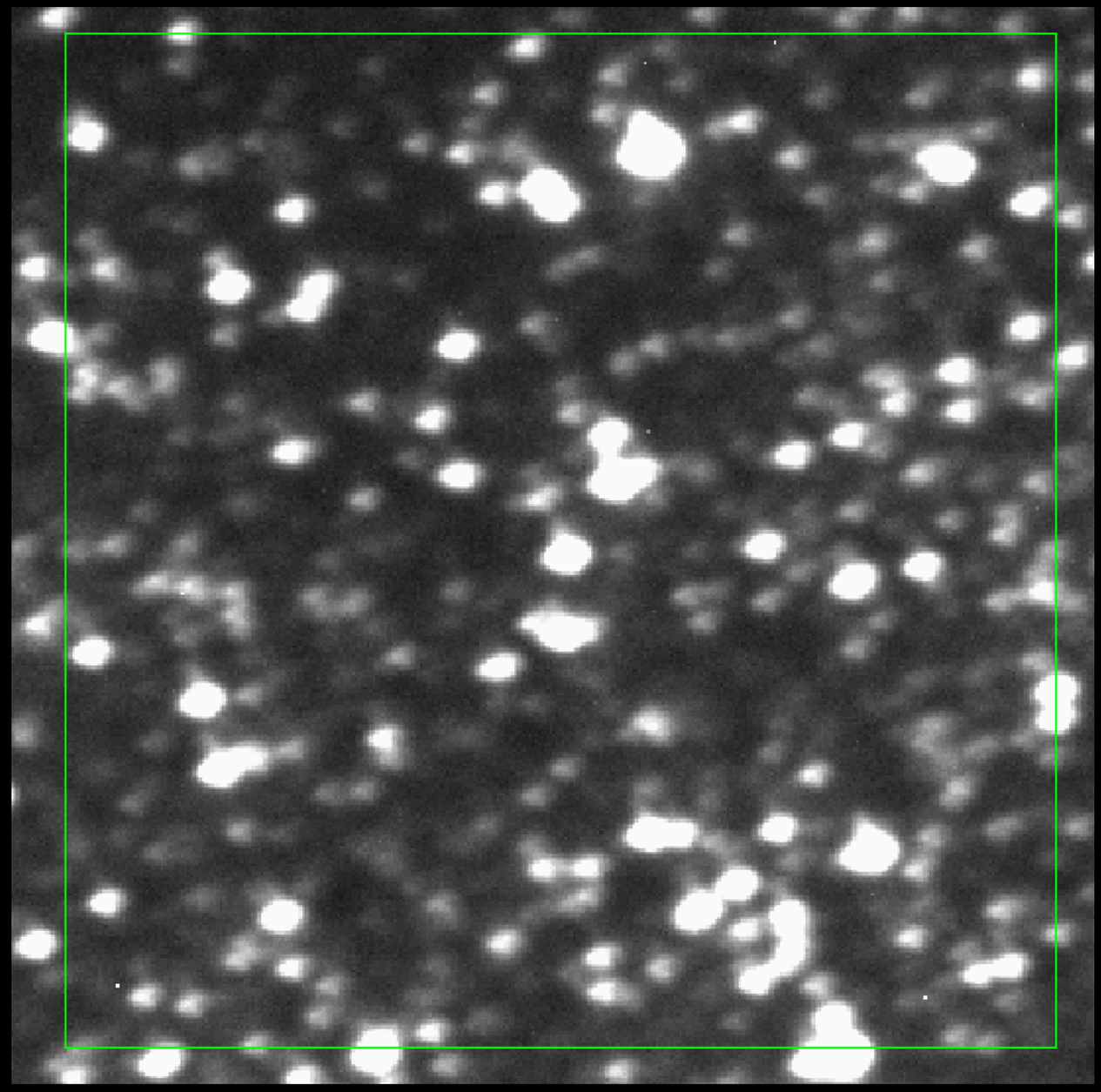
- H127 telescope: 1.27-metre primary mirror
- f/8.7 modified Ritchey-Chrétien optical design
- 65 km north of Hobart, elevation 650 m.



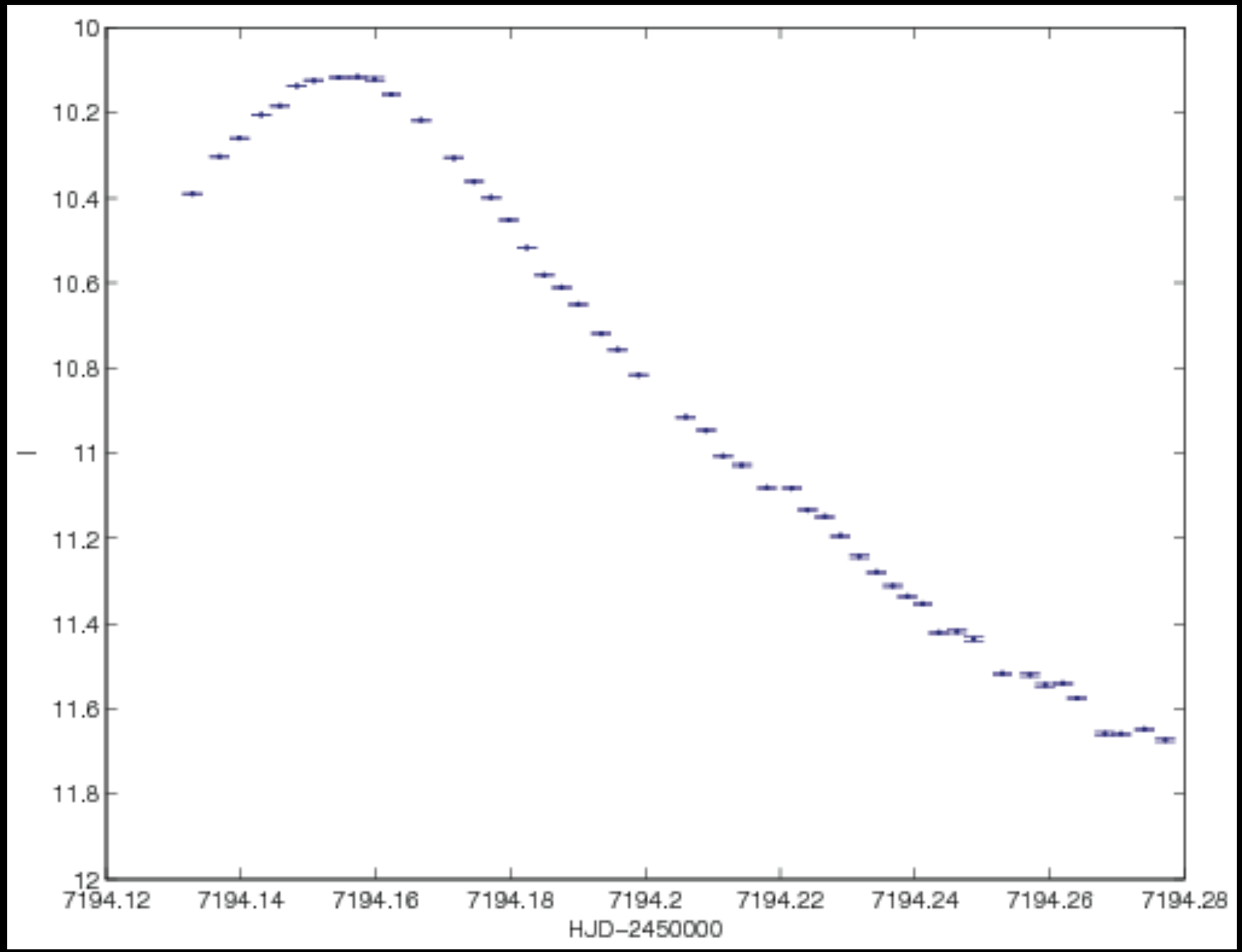


OGLE-2015-BLG-1395

Announced as a “new object” by
OGLE on 2015-June-19

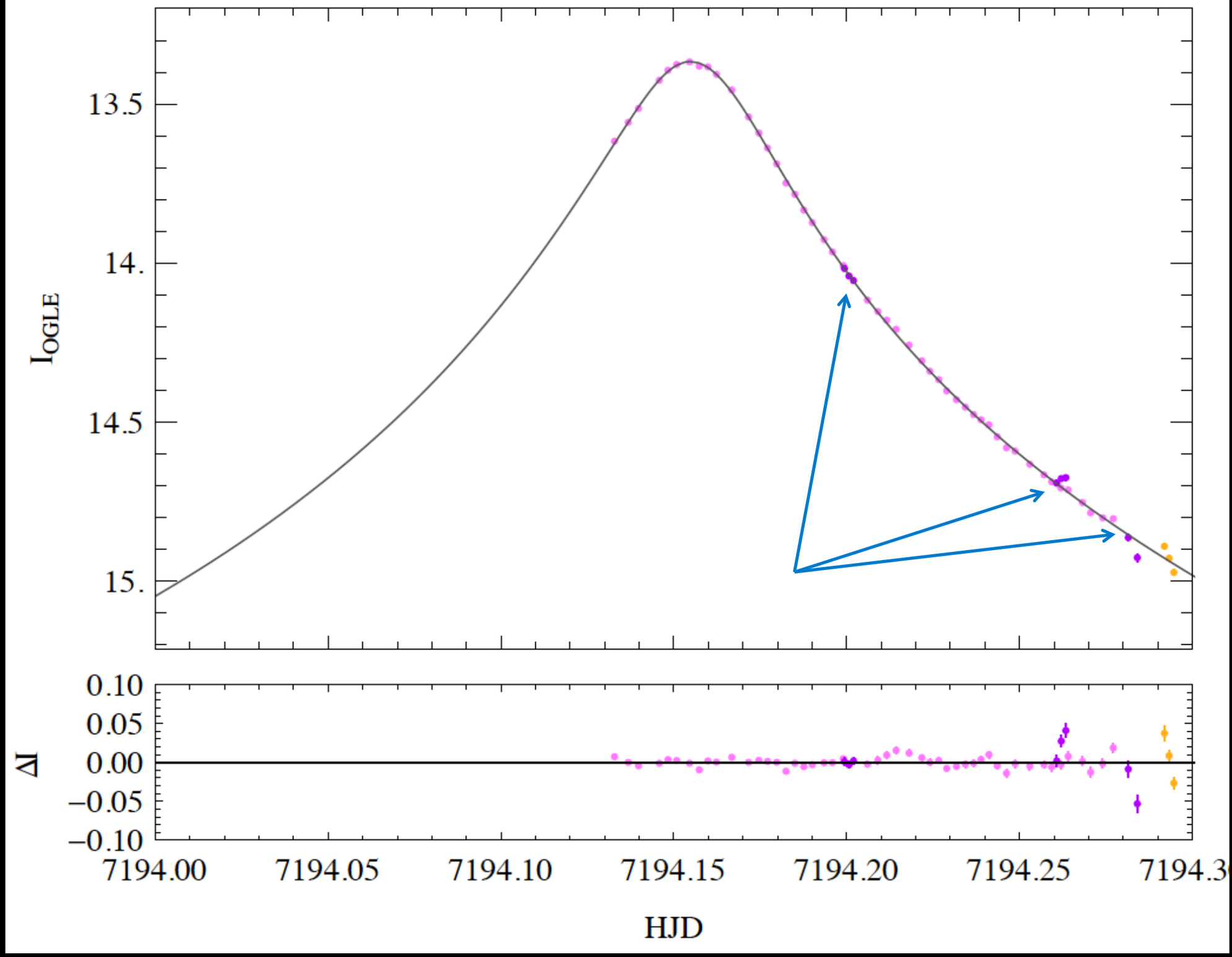


2015-June-20 UTAS H127
SBIG-STX camera No filter
2 minutes unguided



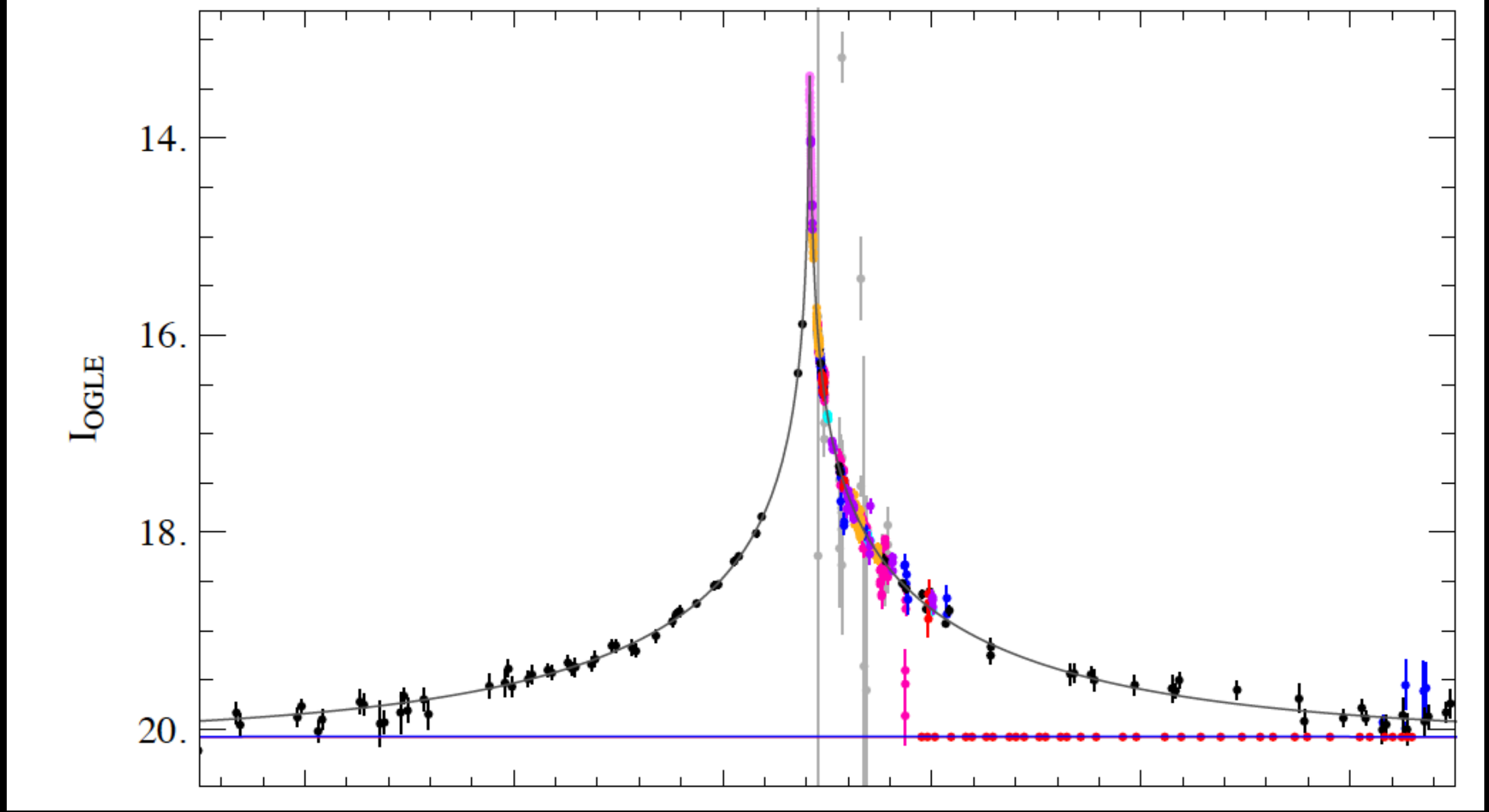
~50 usable images over ~3.5 hours, AC & J-B Marquette.
Stopped observing when ice started to form on the dome.
Data processed in “pseudo-real-time”: images to Paris,
PySIS photometry by C. Coutures & JP Beaulieu.

∗ *RTModel by Valerio Bozza – University of Salerno* ∗

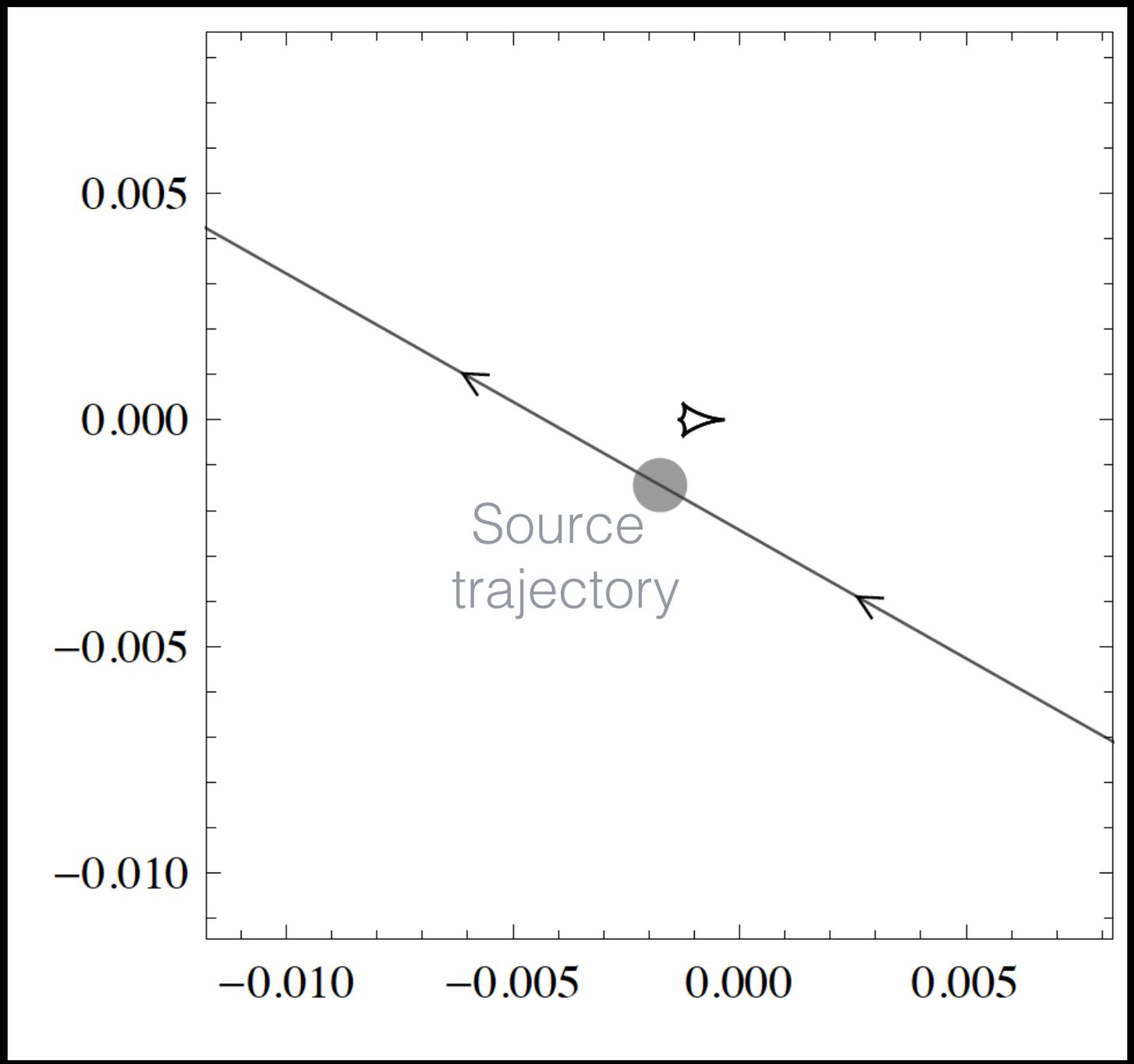


Tasmanian data overlaps with Robonet (Siding Spring)
at several points post-peak

∗ *RTModel by Valerio Bozza – University of Salerno* ∗



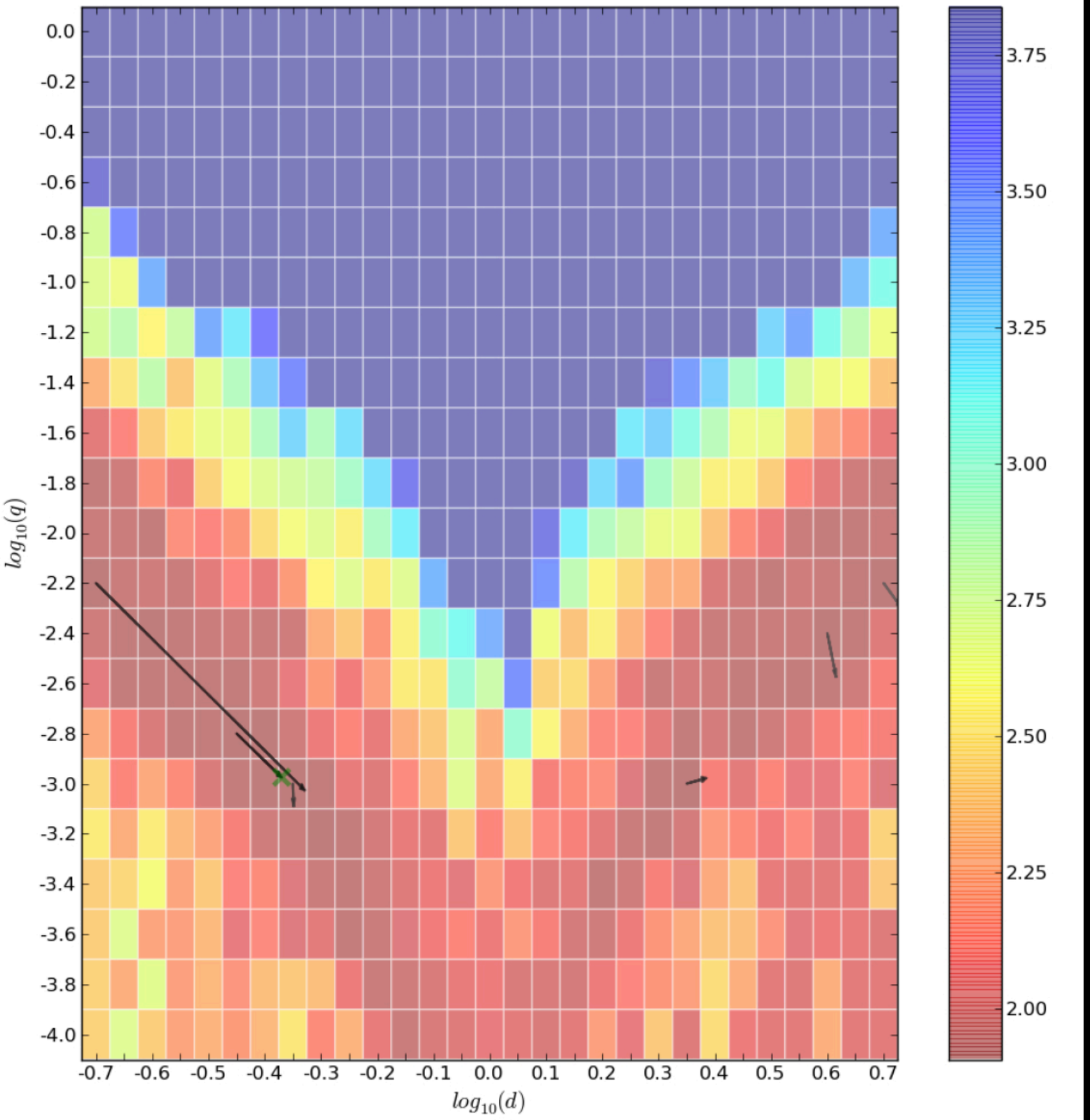
Spitzer Observations starting a few days later
(Calchi Novati et al. 2015)



Two independent modellers, each working with two different sets of UTAS photometry, find similar results.

Additional detail from flux constraints: CTIO V, I and H data + reddening maps show source has $(V–I)_0$ colour of a G9 star in the bulge.

Angular radius-colour relation gives $q_* \sim 0.6$ μas



Familiar close-wide degeneracy in the solutions.

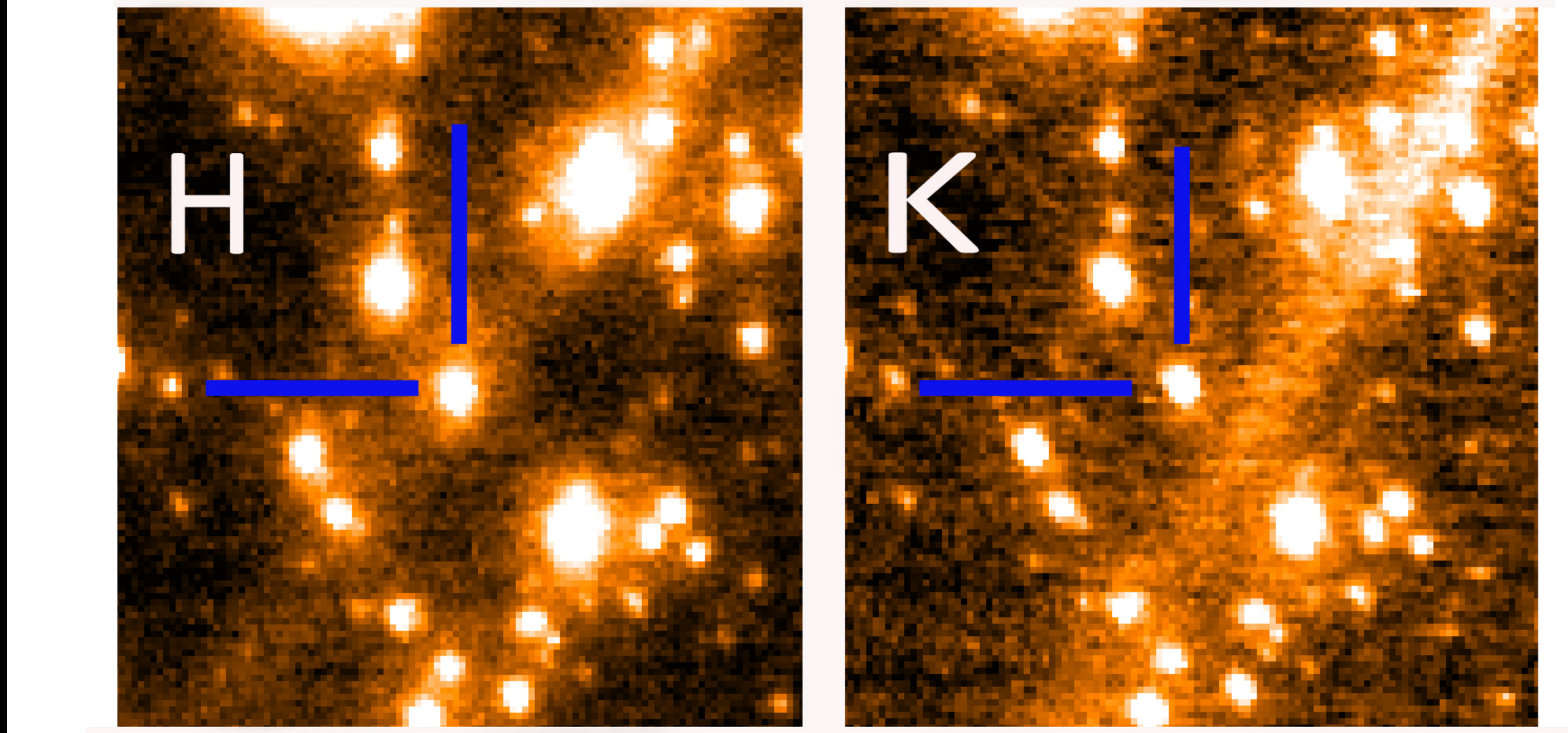
Extended valleys in parameter space.

q strongly correlated with $a_\perp$

Best solutions have

$s \sim 0.44$ or 2.2

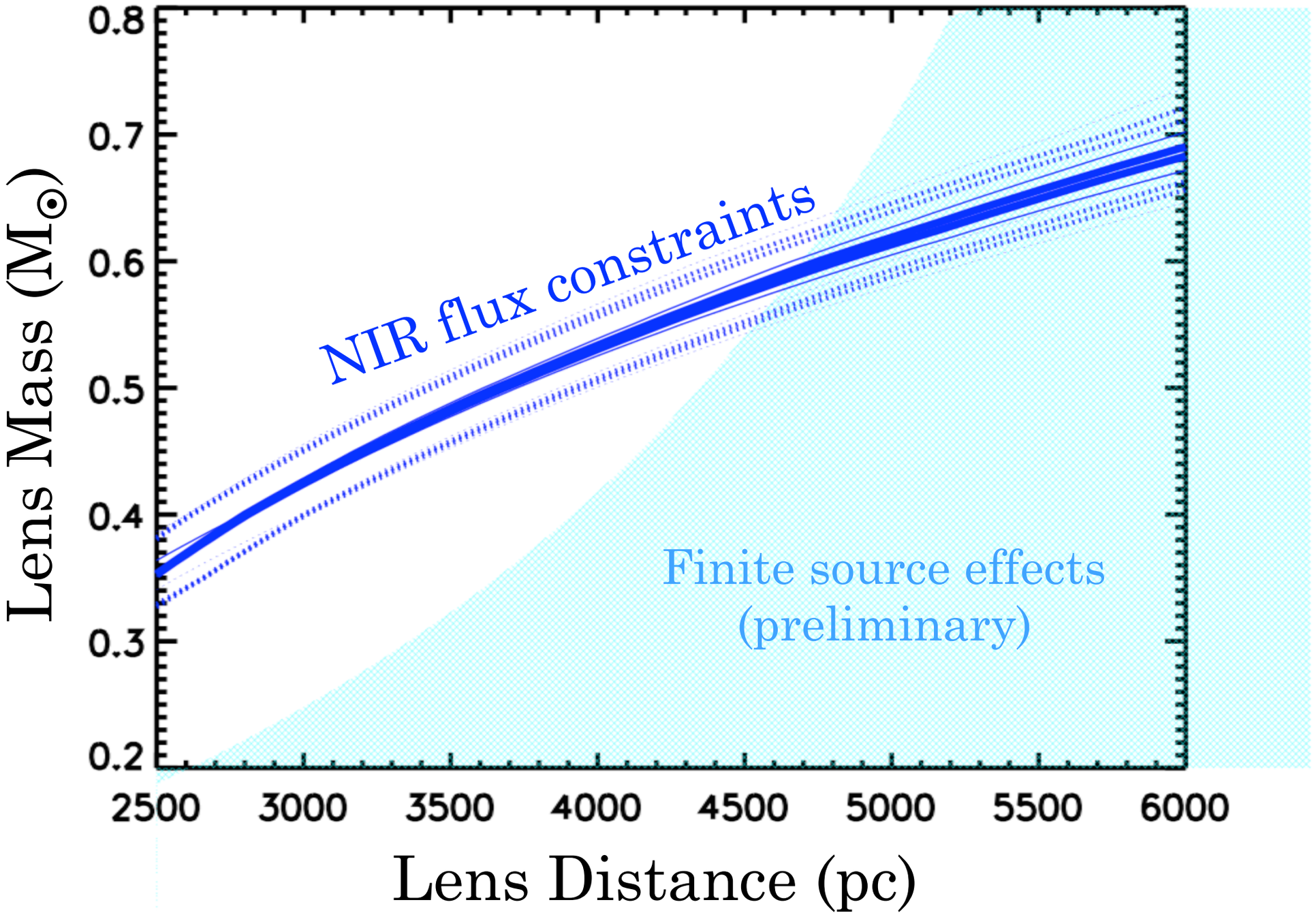
$q \sim 10^{-3}$



Keck AO imaging at baseline ~14 months after the event.

Source+lens are isolated at the sub-arcsecond level: moderately bright neighbour 0.8” to the northeast.

Excess flux from the blend, above the prediction for the source flux. Estimate of the flux H_{lens} = 18.95±0.15; K_{lens} = 18.90±0.15



Mass-distance relations

Summary

- OGLE-2015-BLG-1395 = MOA-2015-BLG-284 was observed intensively over the peak during commissioning of the University of Tasmania 1.3m "H127" telescope at Greenhill Observatory.

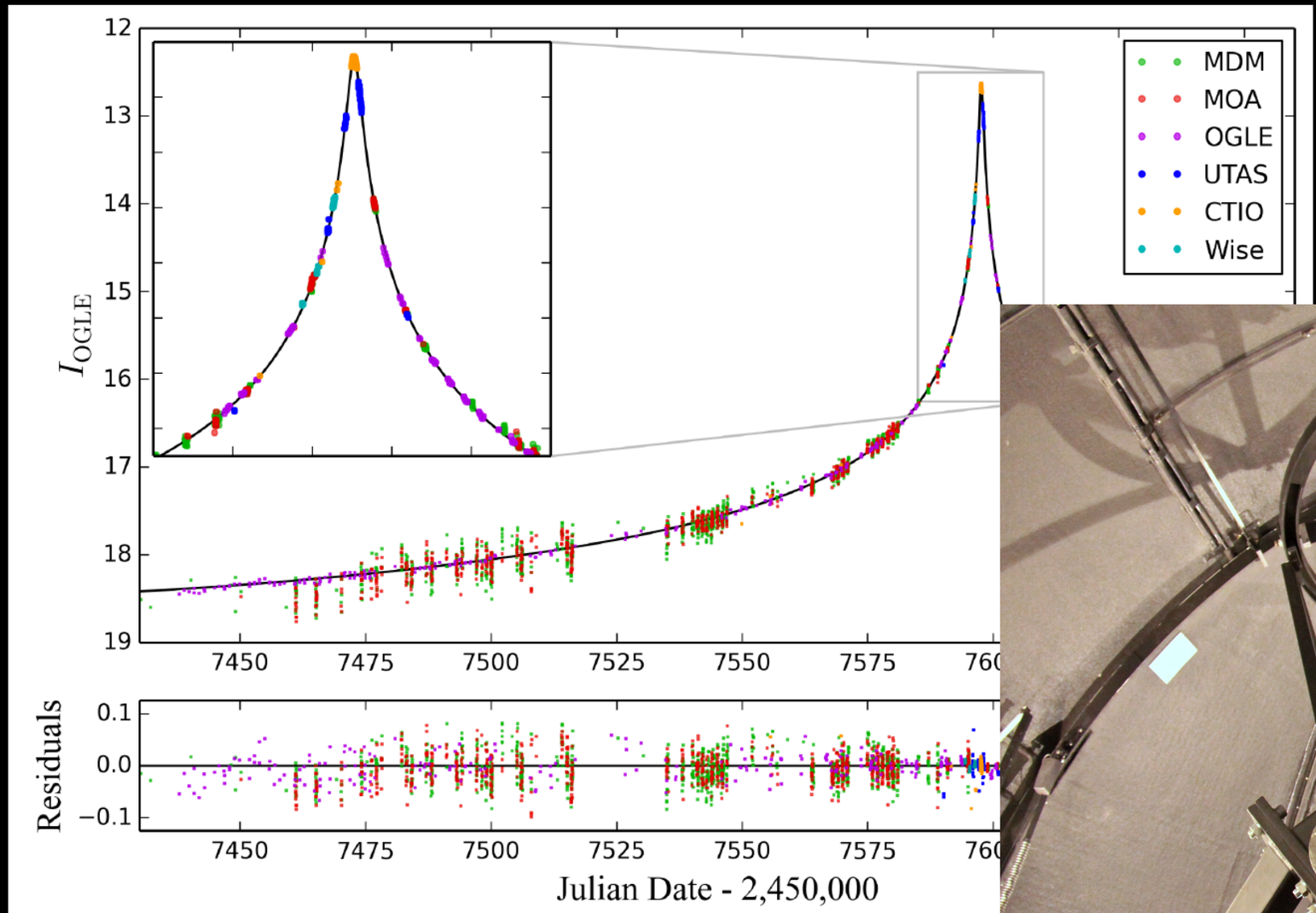
- Deviations from finite source model with parallax immediately after the peak fit by a binary with mass ratio between 4×10^{-4} and $\sim 10^{-2}$.

- Flux constraints from Keck and Subaru NIR measurements at baseline, combined with weak finite source effects constrain the mass distance relation.

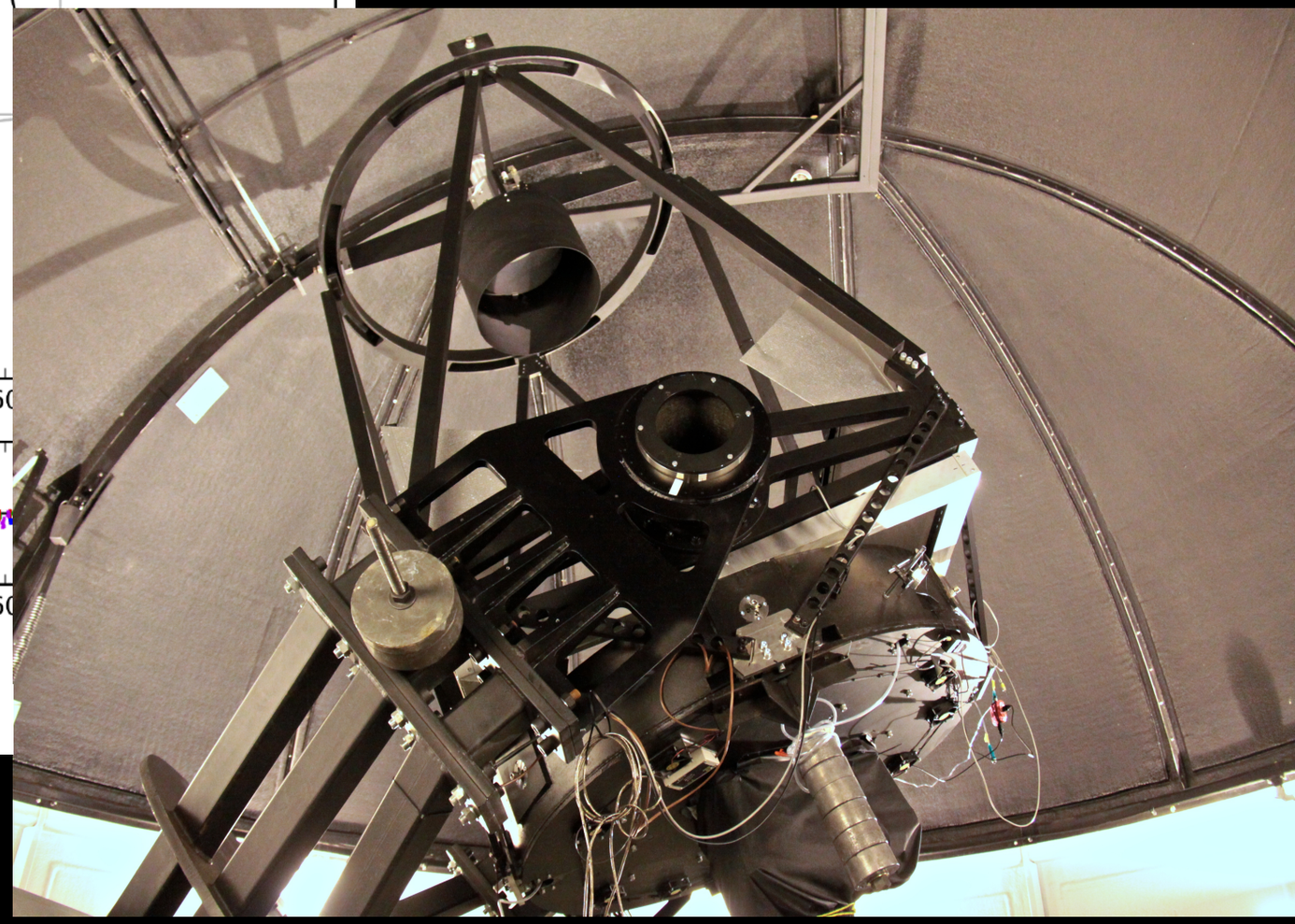
- Likely disk K or M dwarf with ~Saturn mass (up to brown dwarf) at ~1 or ~5 AU, at or beyond the snow line.

- Still working on understanding how to break degeneracies and apply Spitzer data to independently constrain θ_E

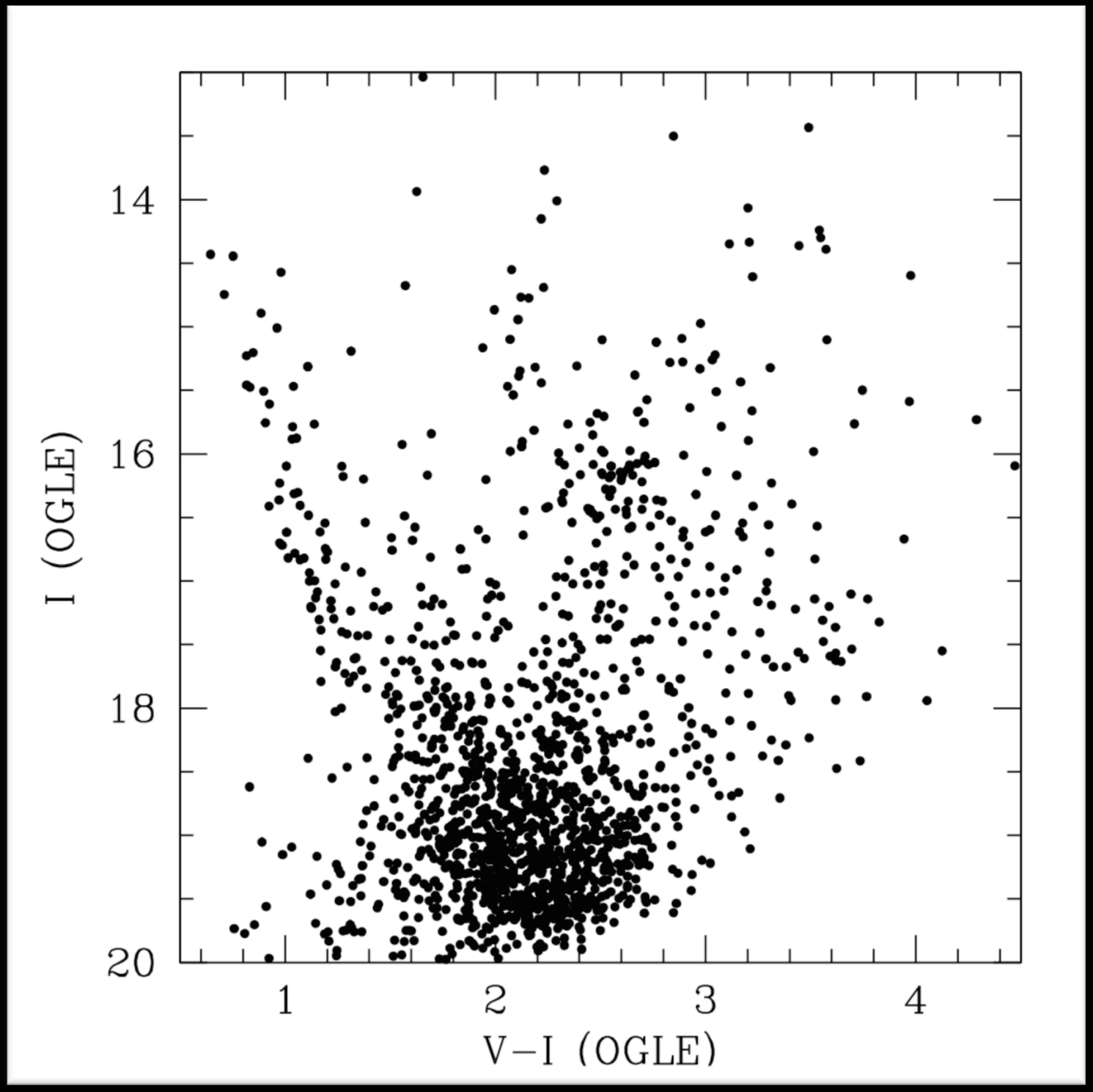
2017 Prospects



OGLE-2016-BLG-0289 McRae, Cole & Hill



- 2017: working in reactive, follow-up mode for high-priority events.
- 8’x8’ field, UBVRI, typical seeing ~2”, 0.4”/pix, masked to ~1.15m aperture



OGLE CMD and CTIO stuff for source radius