

Szymon Kozłowski

A background image of a starfield with many small, colorful stars in shades of yellow, orange, blue, and red, set against a dark grey background.

Difference Image Analysis for MicroFUN

MicroFUN Meeting, NZ
18th December 2008

Szymon Kozłowski

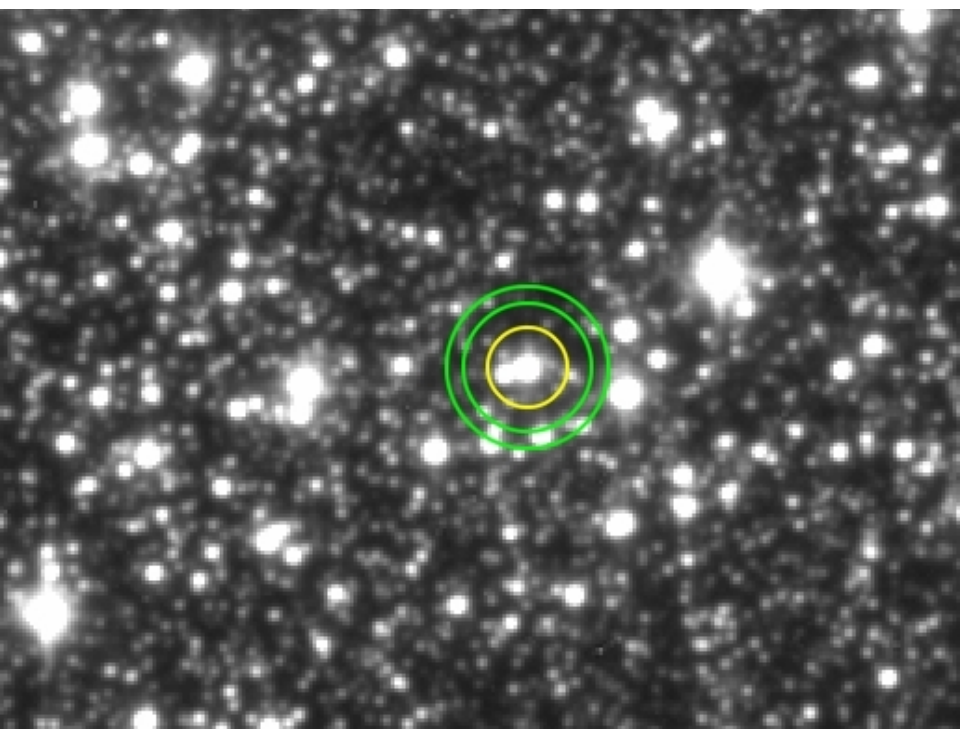
b. 1979, Zielona Góra, Poland



Three steps to a DISCOVERY:

- 1. Data collection** (observations → images)
observations, telescopes, CCDs... clear skies
- 2. Data processing** (images → light curves)
photometry, astrometry, DIA, etc.
- 3. Data interpretation** (light curves → model)
scientific interpretation, publication

Aperture Photometry



Pleiades, Alcyone

Yes

No

MB08310

Profile Photometry

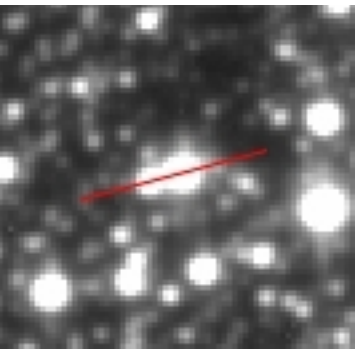
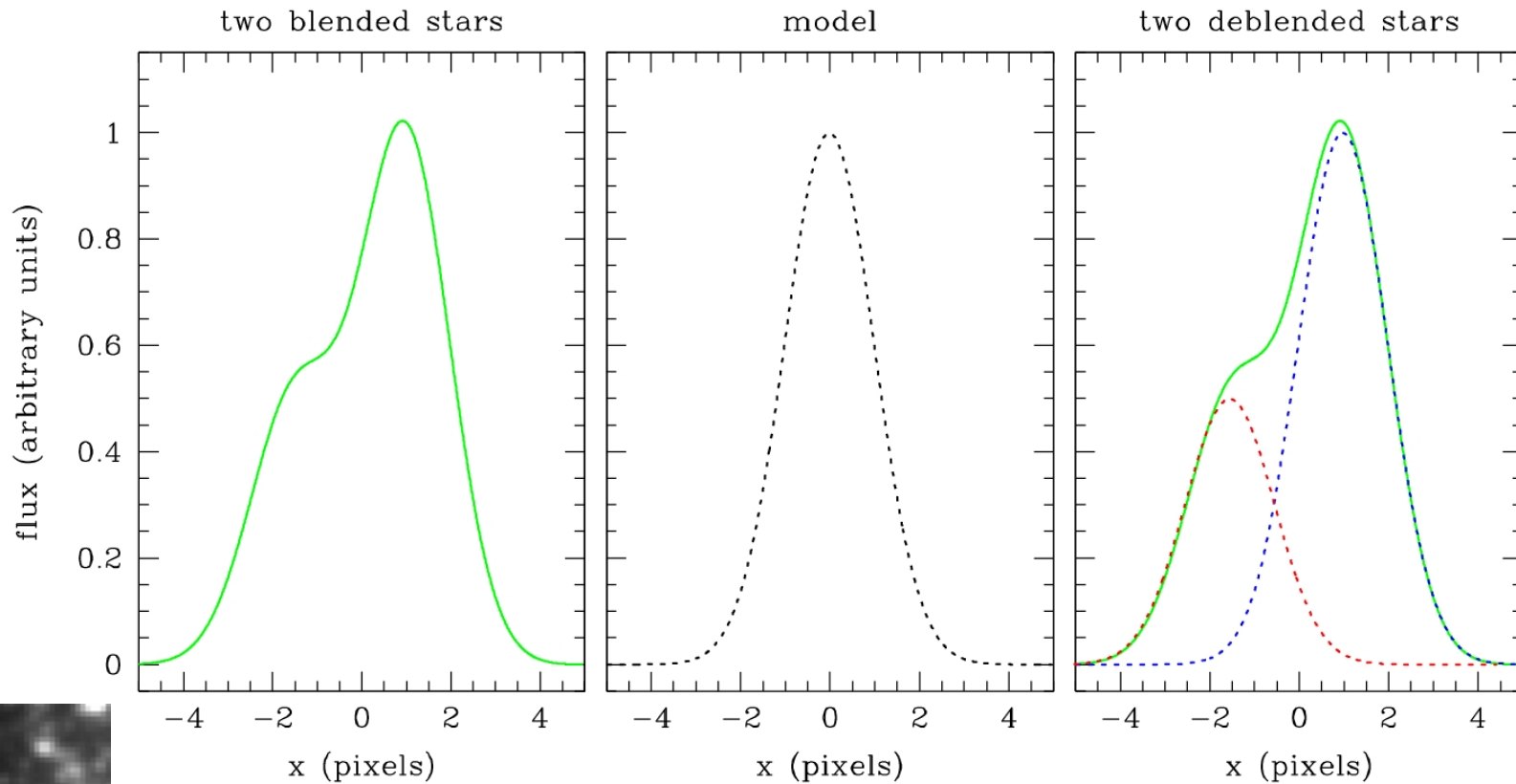
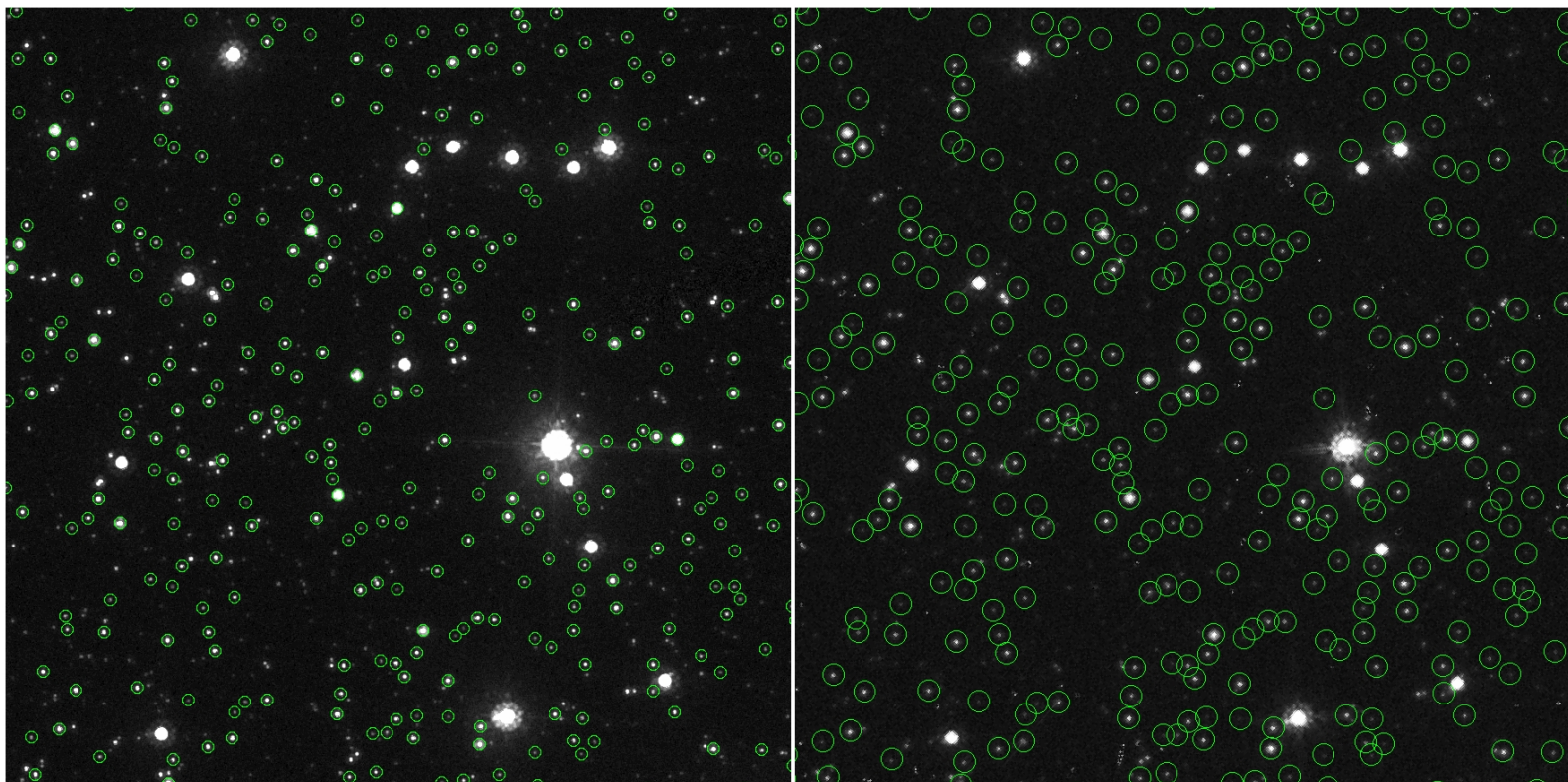


Image Subtraction (step by step)

Data alignment / resampling

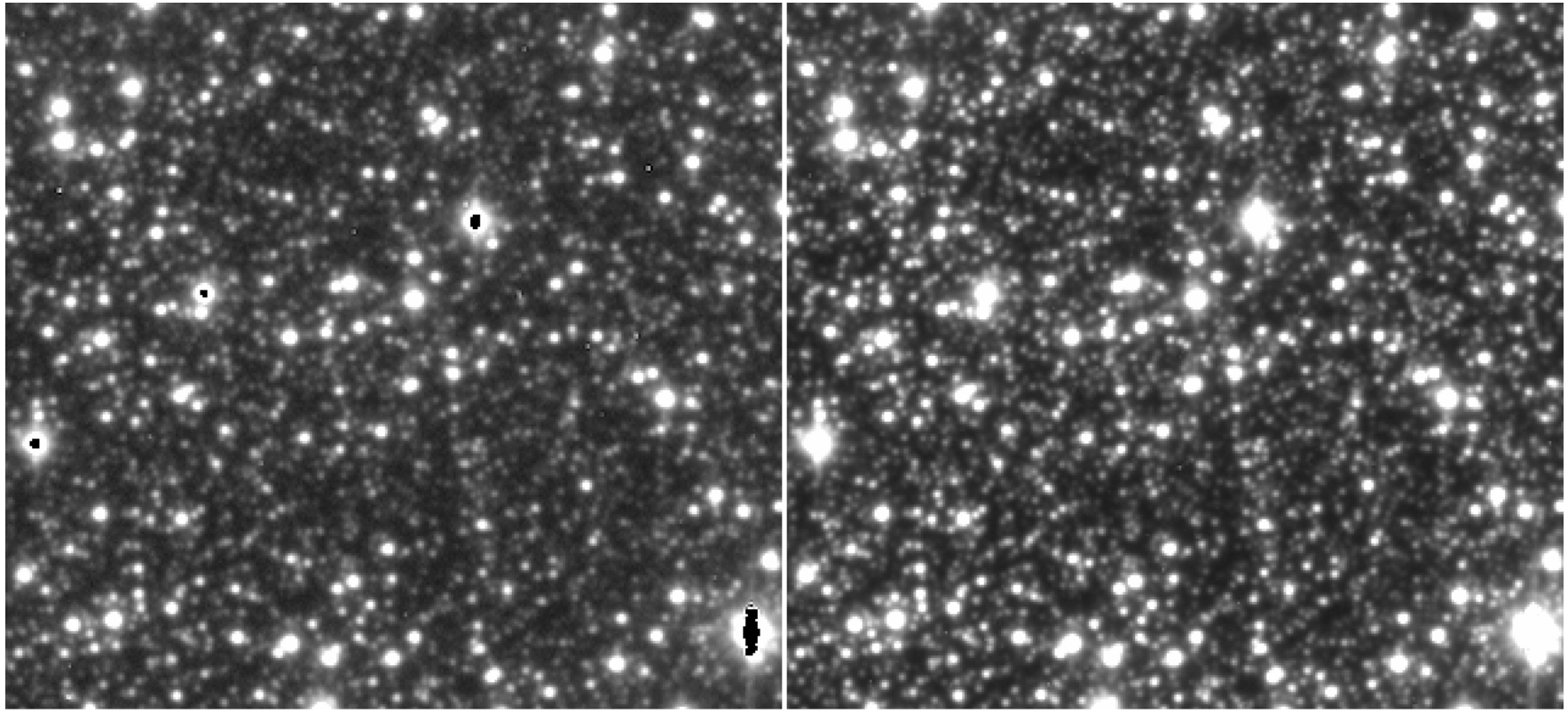


(these are HST images, but the principle is the same)

Bulding a Template

single image

template

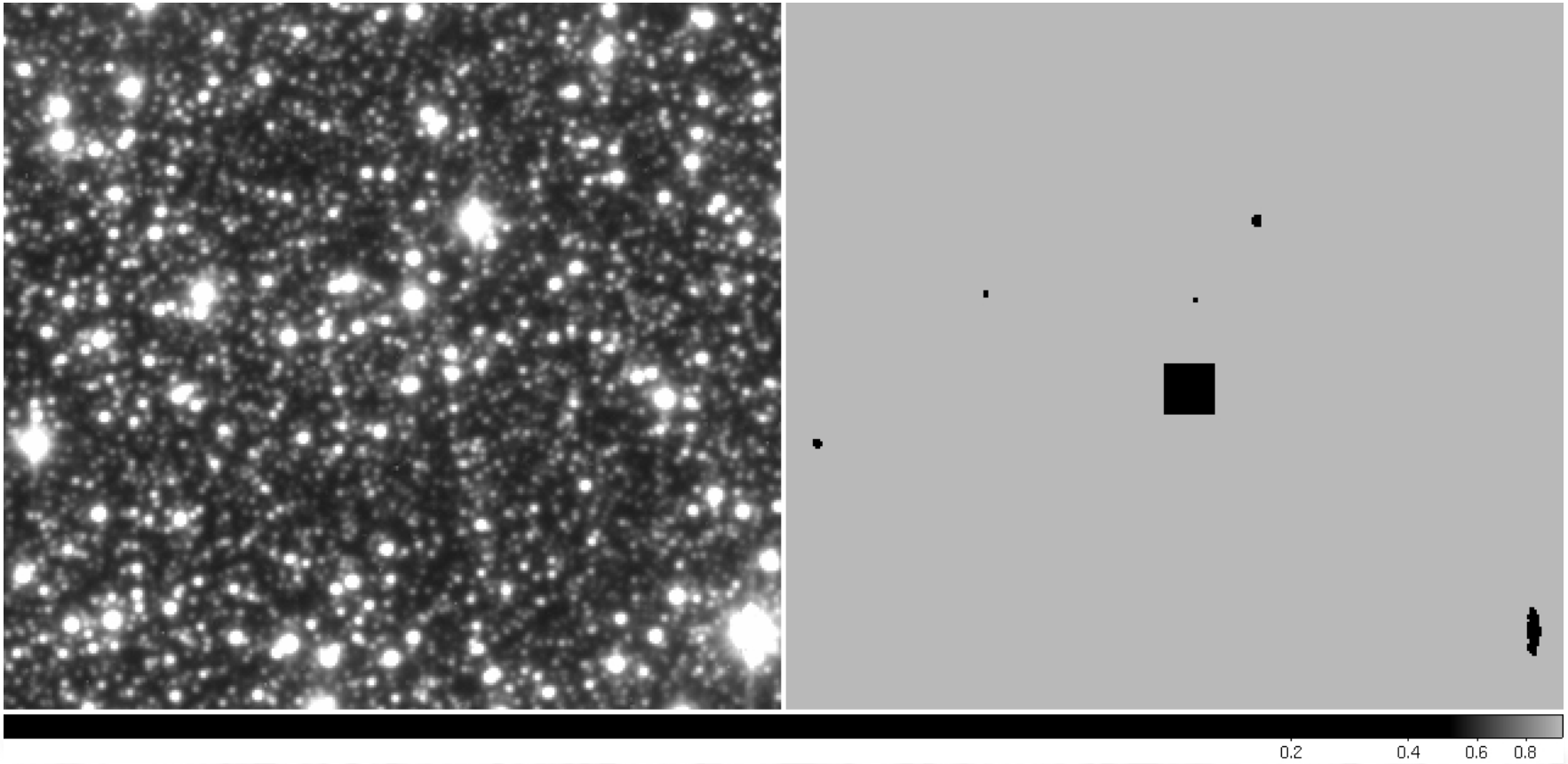


1E+04 3E+04

Masking “Bad” Stuff

template

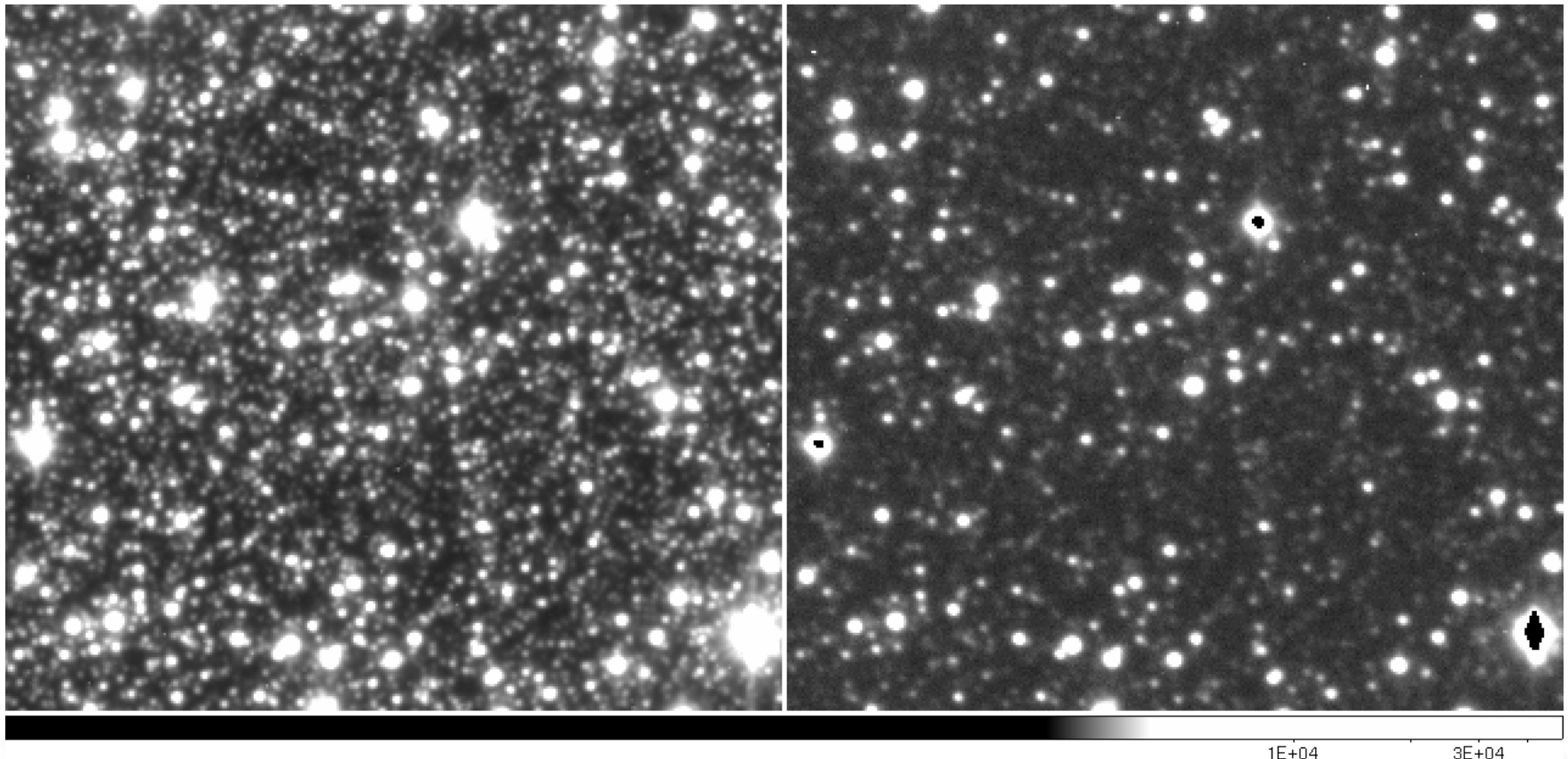
mask



Template vs. Image no. X

template

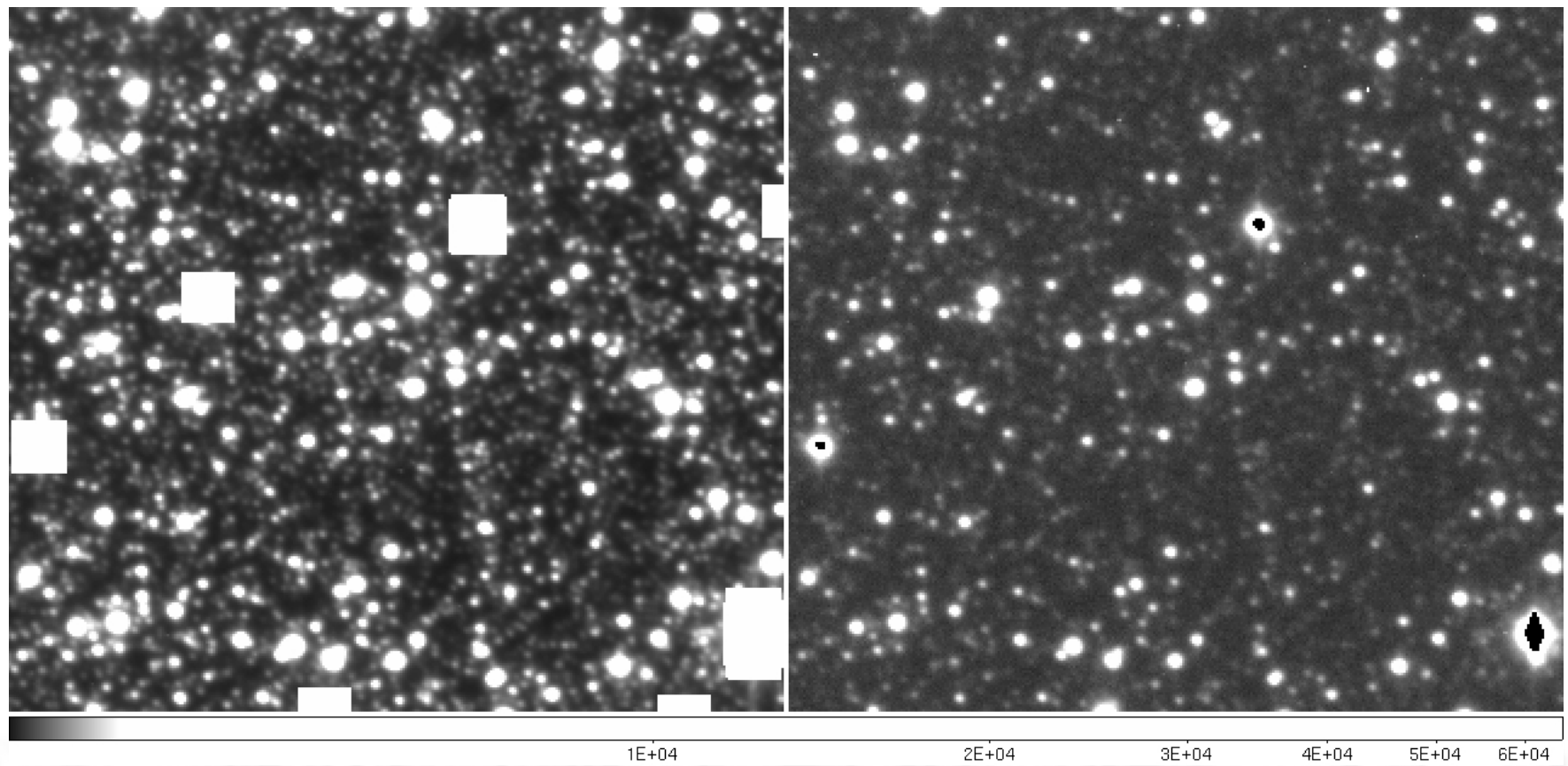
image no. X



Convolution (blurring)

convolved template

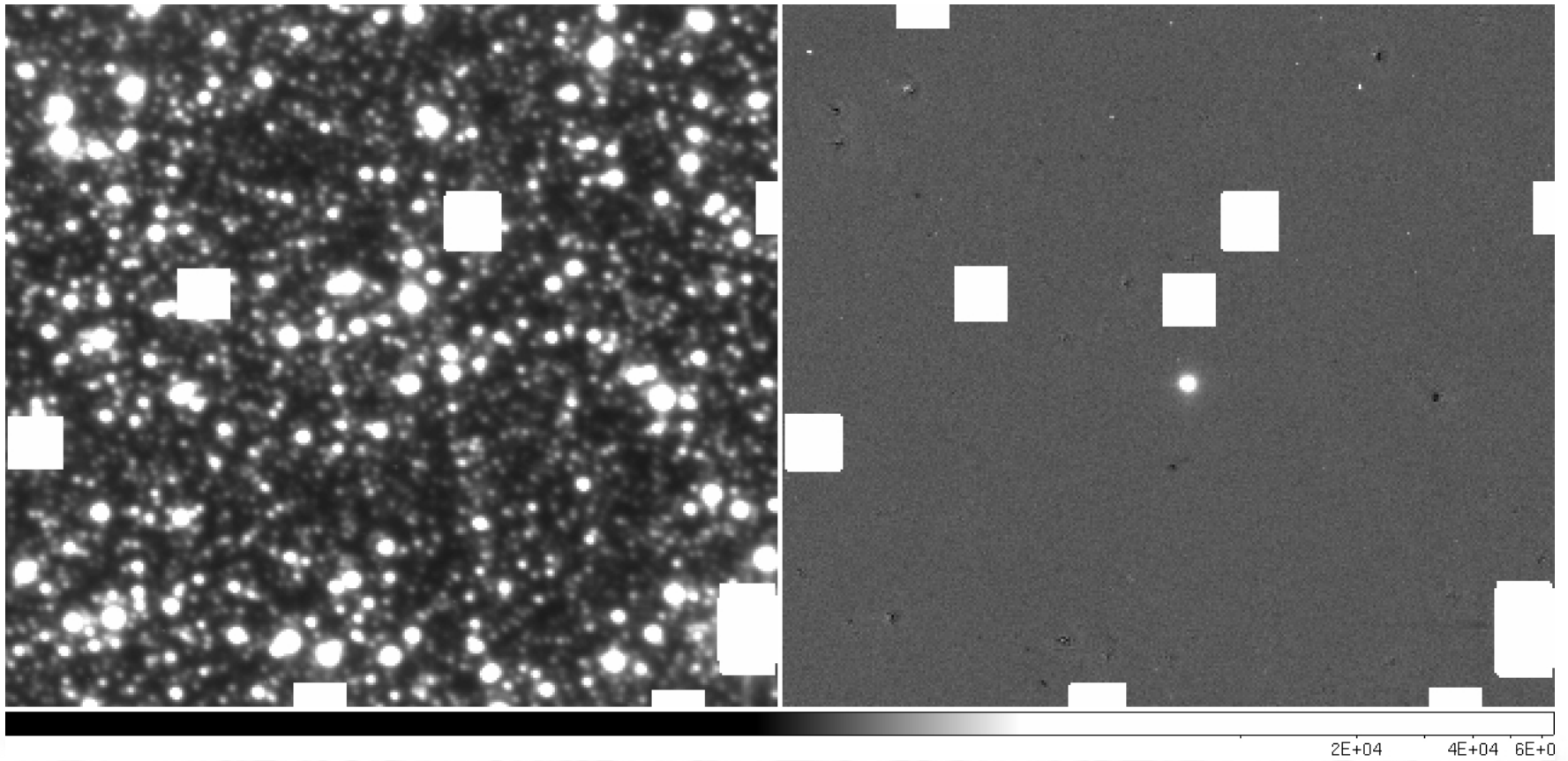
image no. X



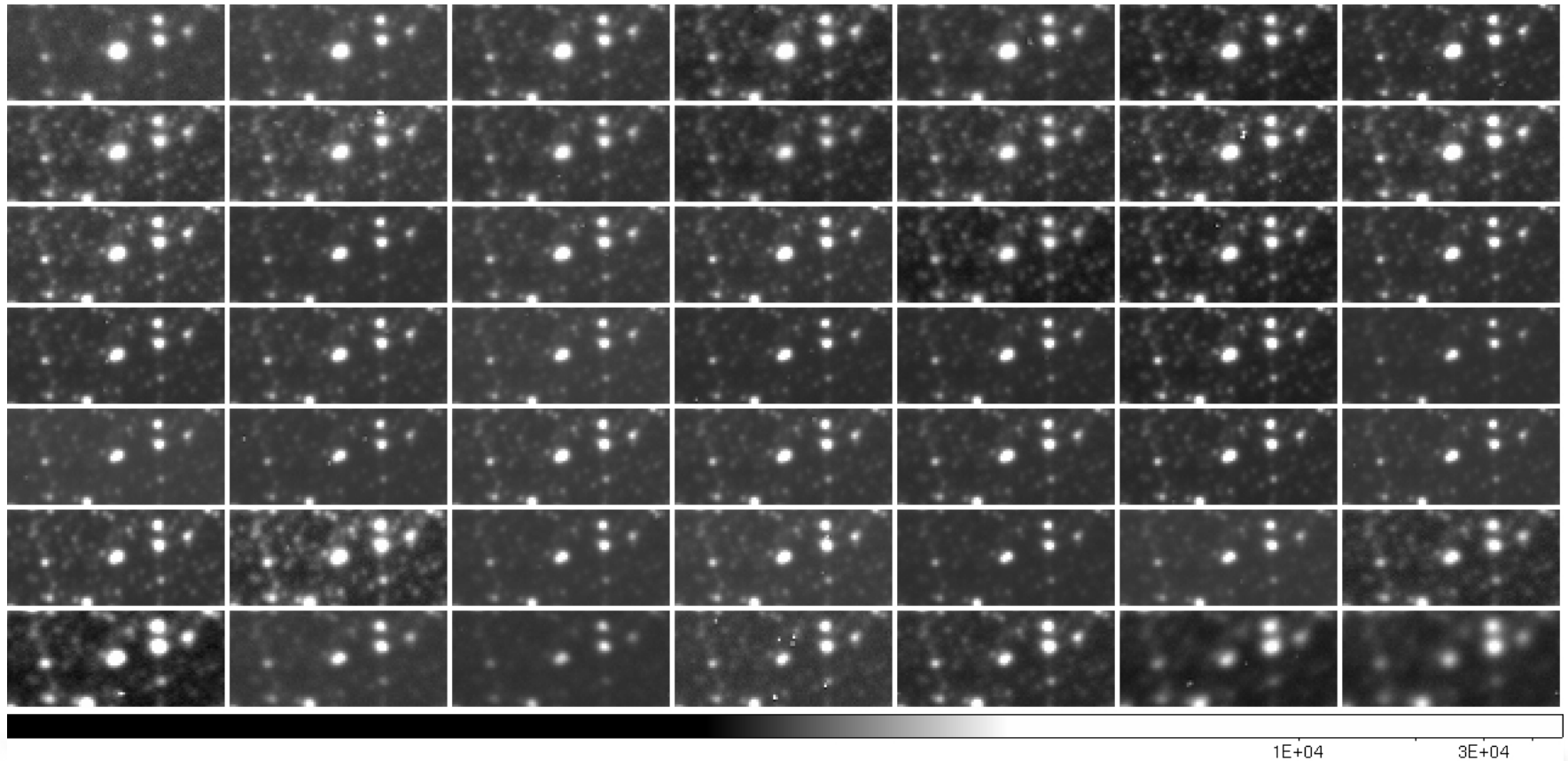
Subtraction

convolved template

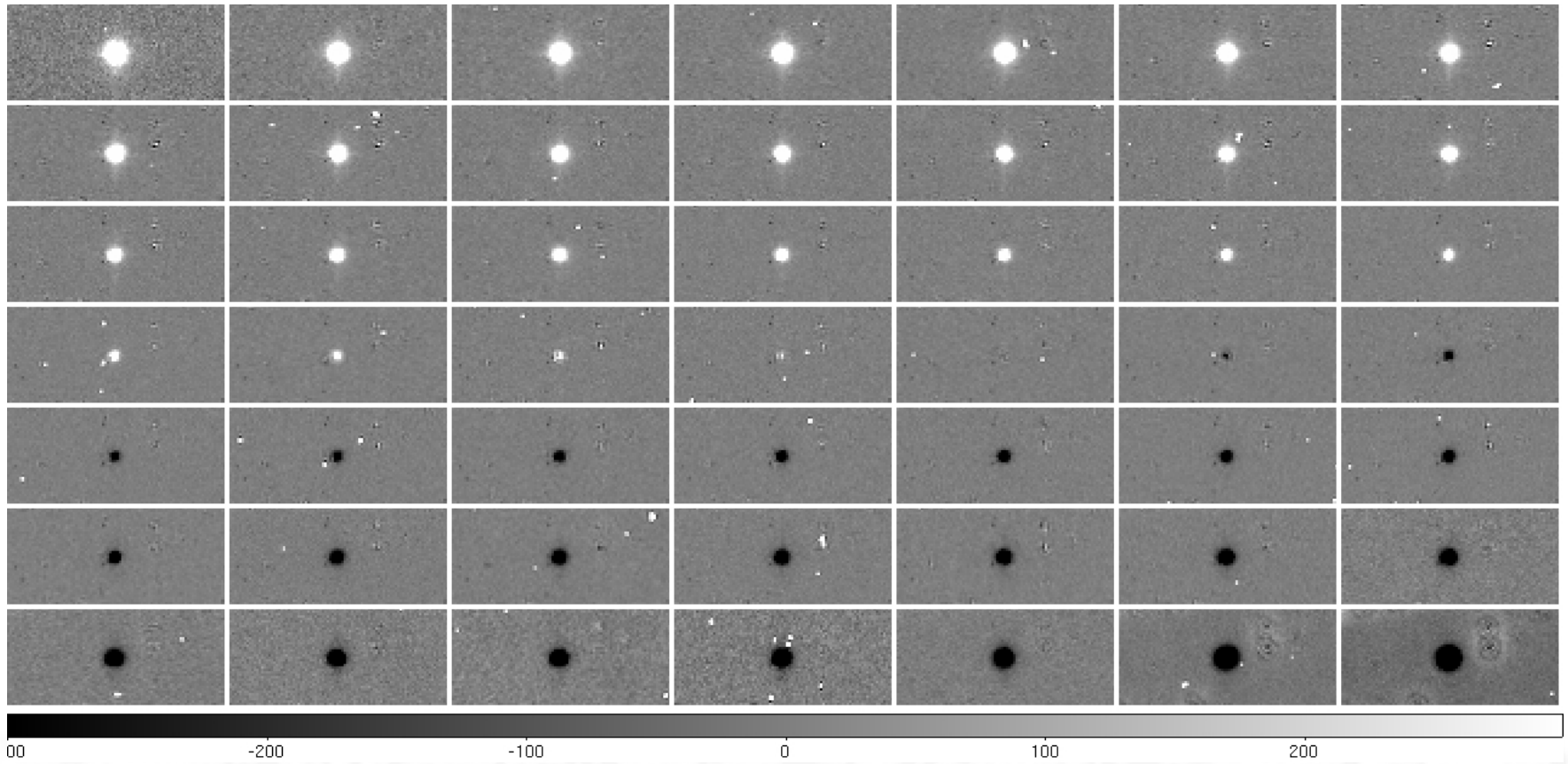
differential image no. X



Images before subtraction

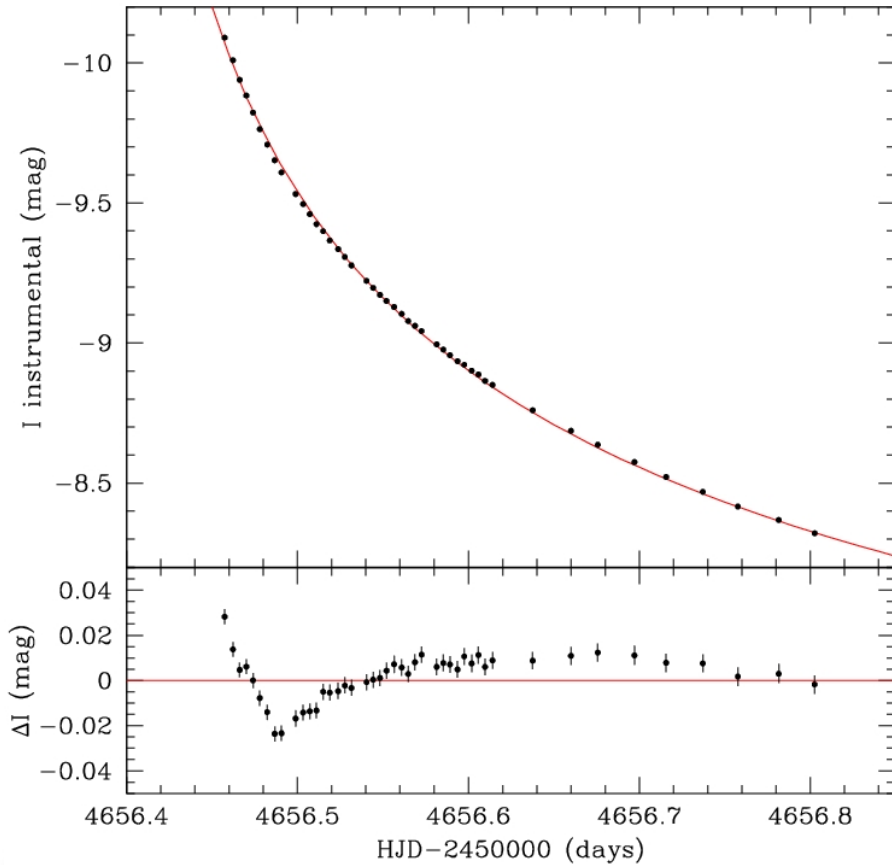


... and after

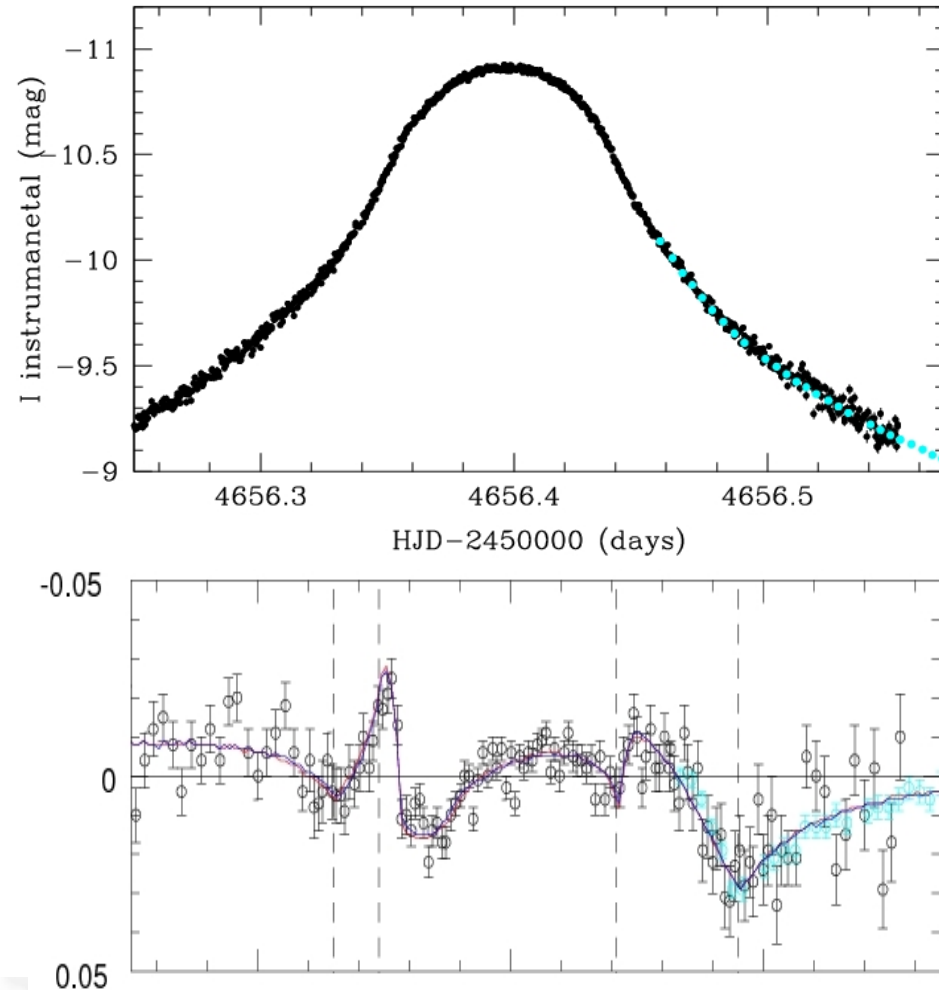


Light Curves

Szymon's DIA of CTIO I-band MB08310

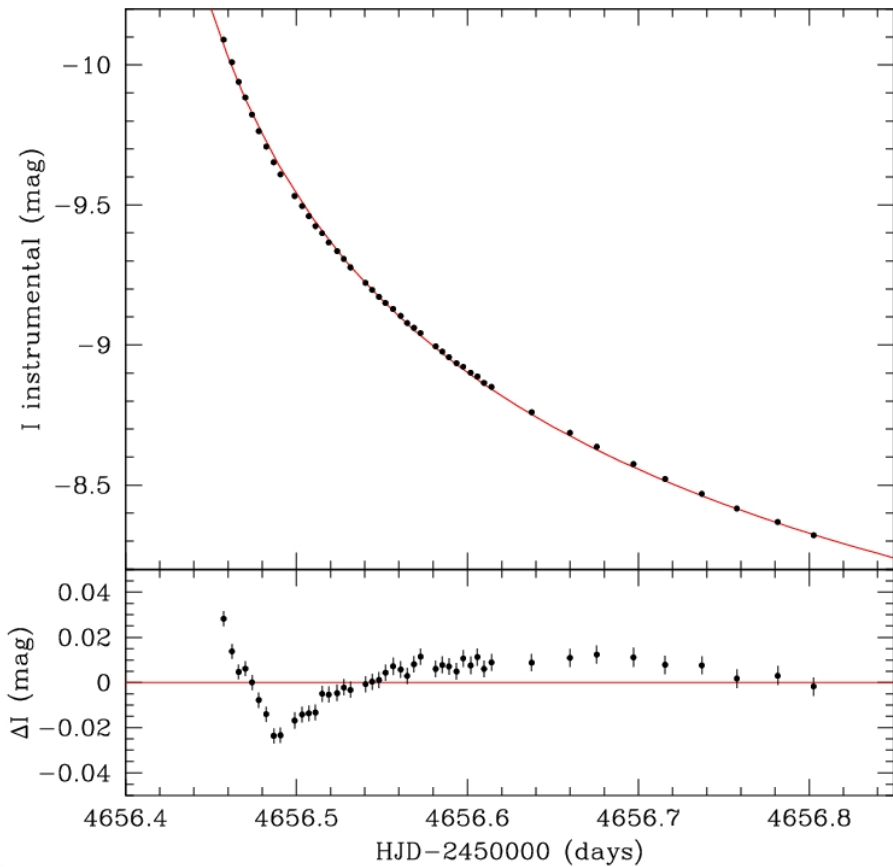


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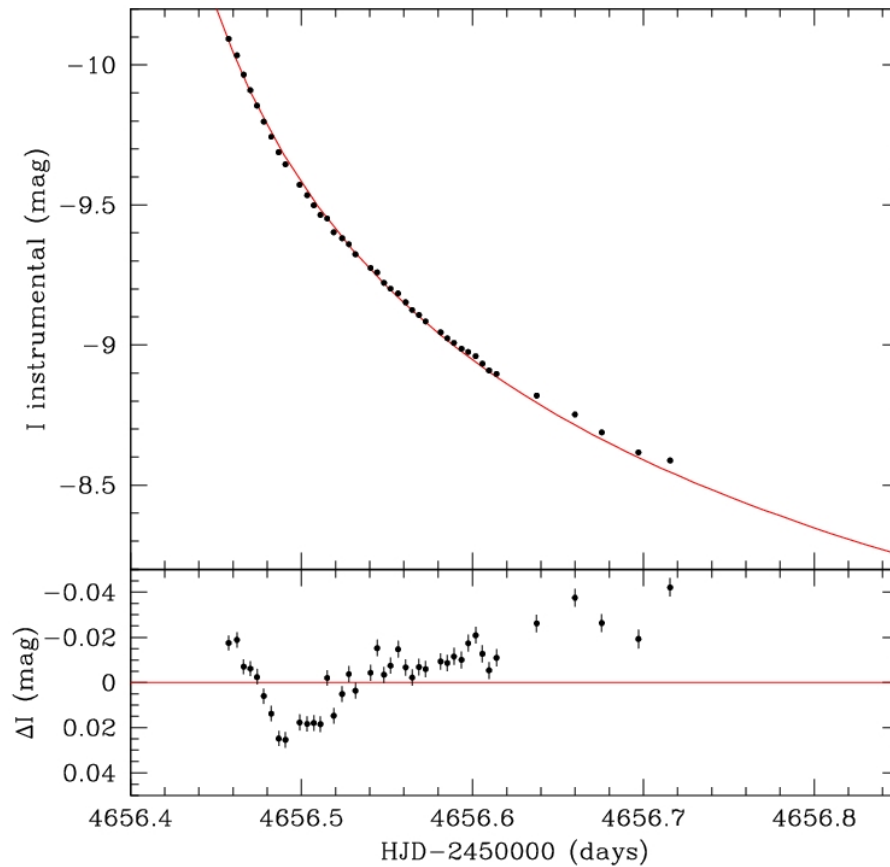


Light Curves

Szymon's DIA of CTIO I-band MB08310

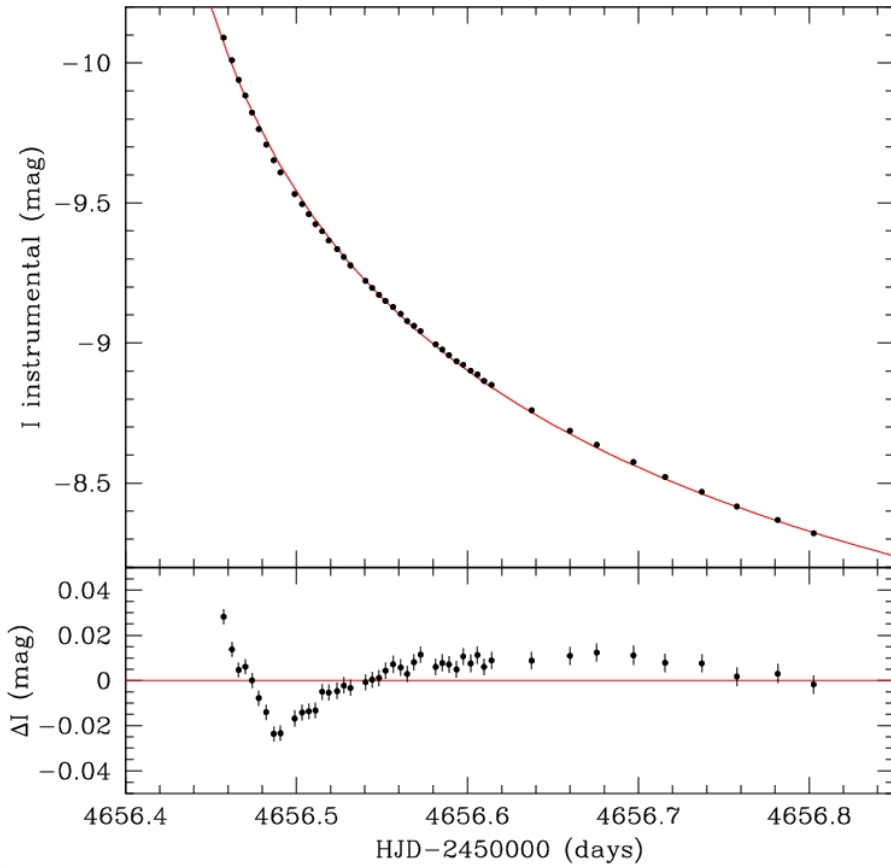


PSF Photometry of CTIO I-band MB08310

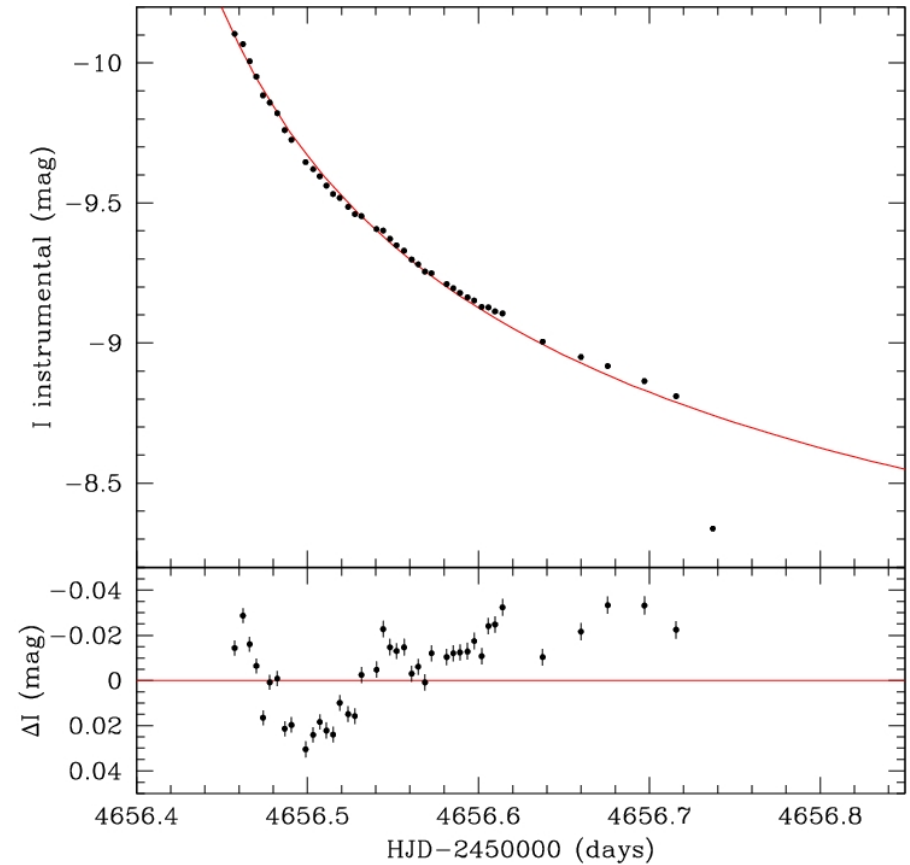


Light Curves

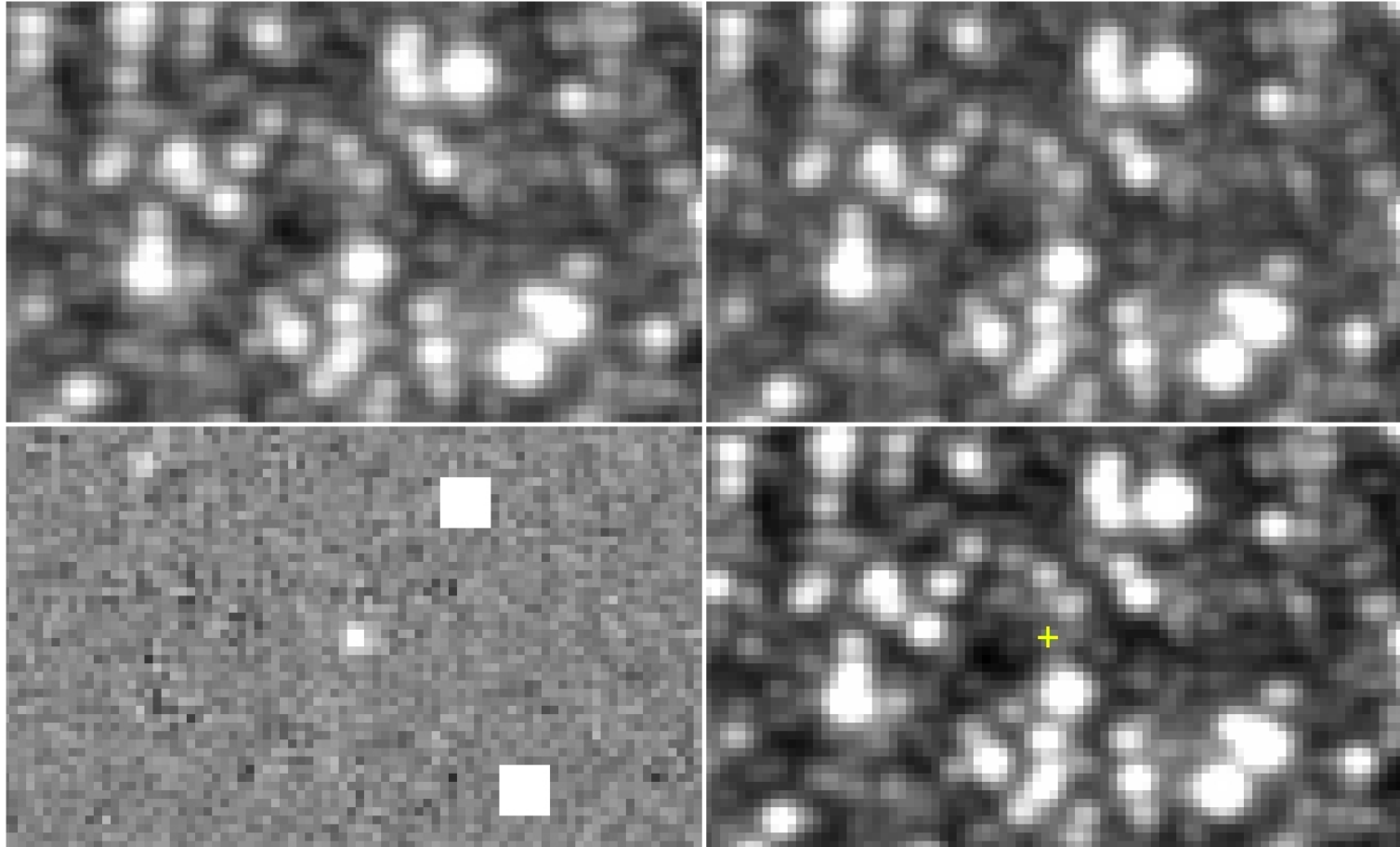
Szymon's DIA of CTIO I-band MB08310



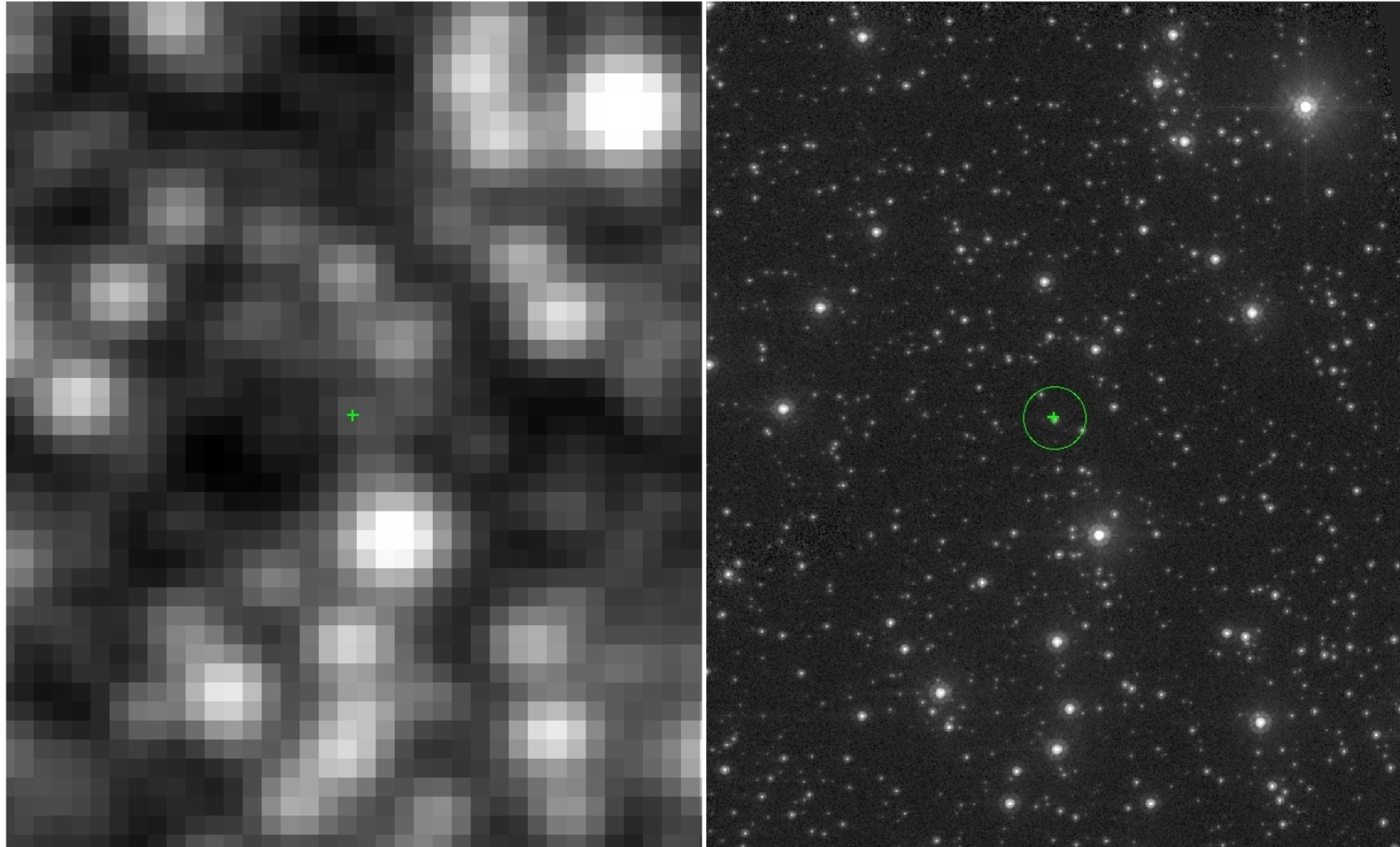
Aperture Photometry of CTIO I-band MB08310



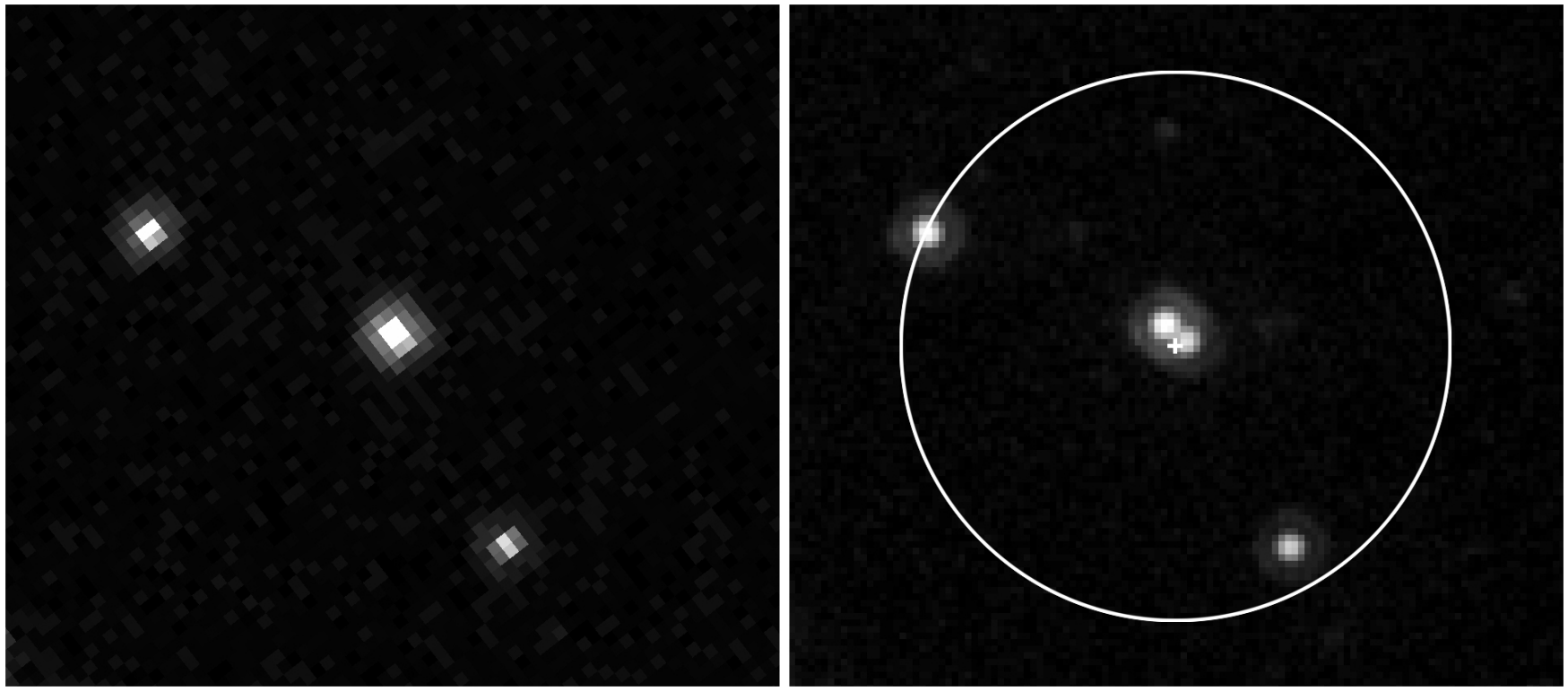
Astrometry



Astrometry

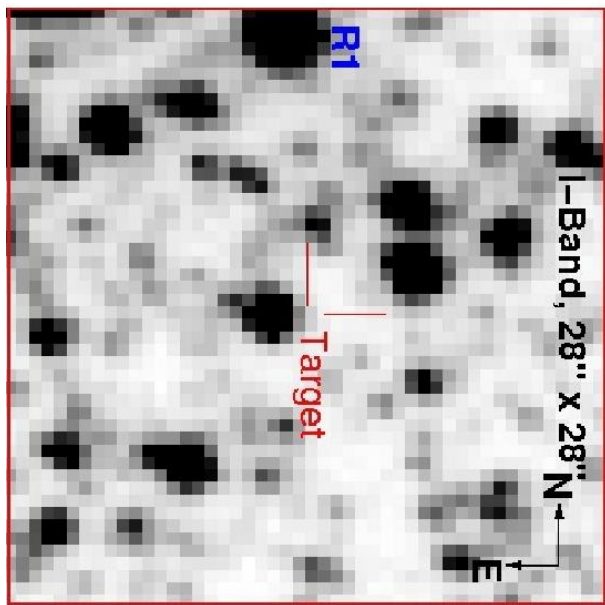


MACHO-95-BLG-37

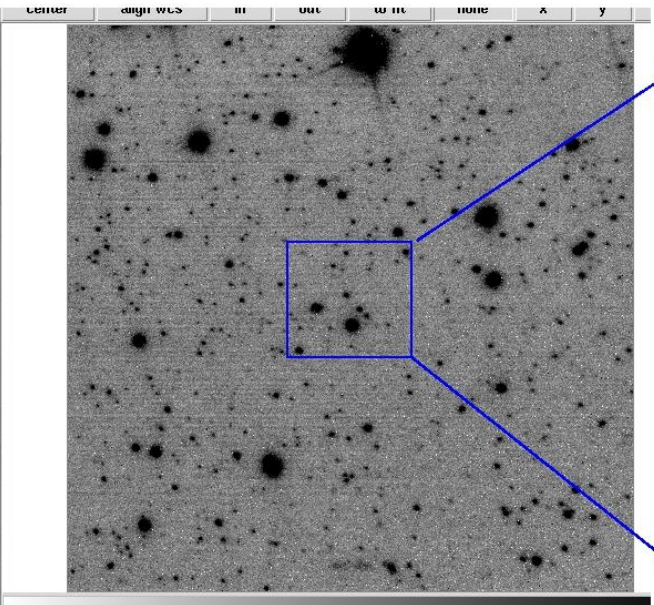


MOA-2008-BLG-310

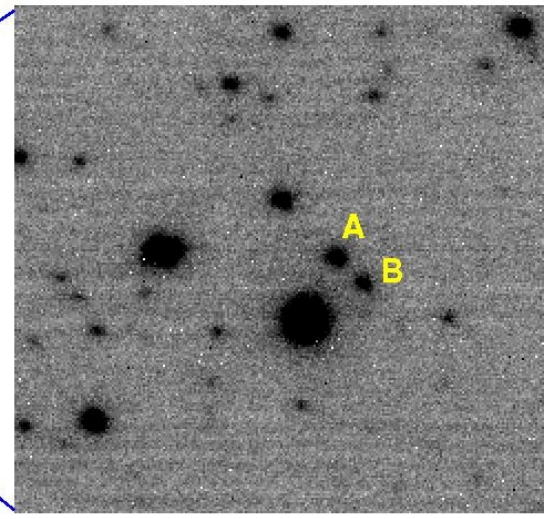
MOA, 28" x 28"



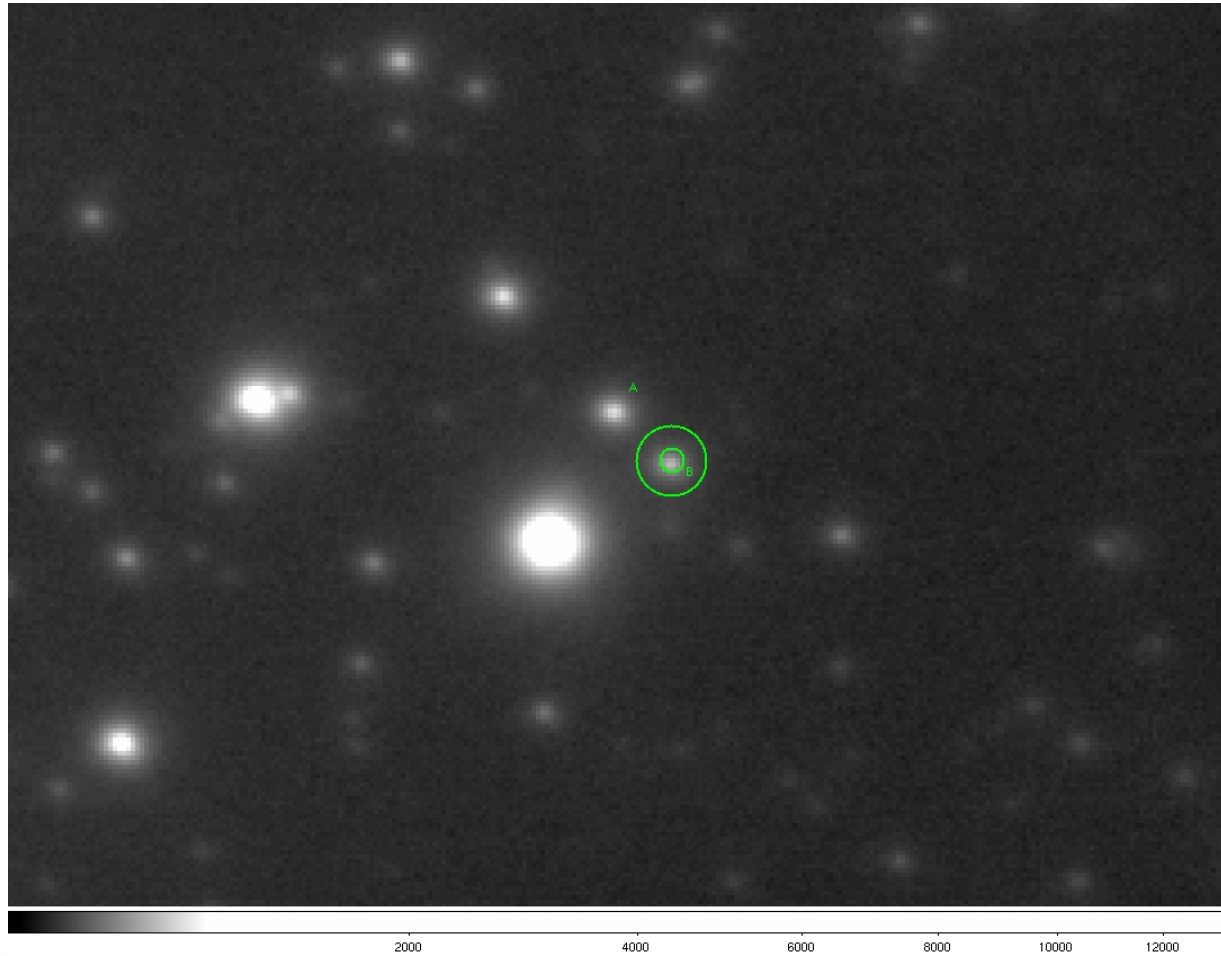
NACO, 28" x 28", Ks



MOA-08-BLG-310



MOA-2008-BLG-310



Papers on DIA:

Alard & Lupton 1998, *The Astrophysical Journal*, 503, 325

Wozniak 2000, *Acta Astronomica*, 50, 421

DIA codes:

ISIS

DIA by Wozniak (a copy available from Szymon)

etc.

Thank you!

(and I am looking forward to analyzing some new data next season)