# DRM Update

Joe Liske

ETC Update

- Bug fix in spectroscopic mode: ETC used to calculate S/N per spectral pixel, not per resolution element.

- Correction and clarification of ETC document.

- In progress: update of AO tables to coincide with latest PSFs as used by the DRM.

- In progress (as part of DRM effort): work on background model, option to include height/temperature of site.
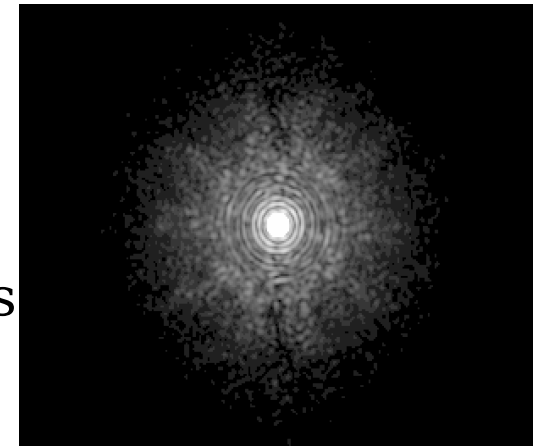
AO Update

- AO group supplies simulated PSFs as a function of:
  - Type of AO
  - Band
  - Seeing
  - FoV
  - Position within FoV
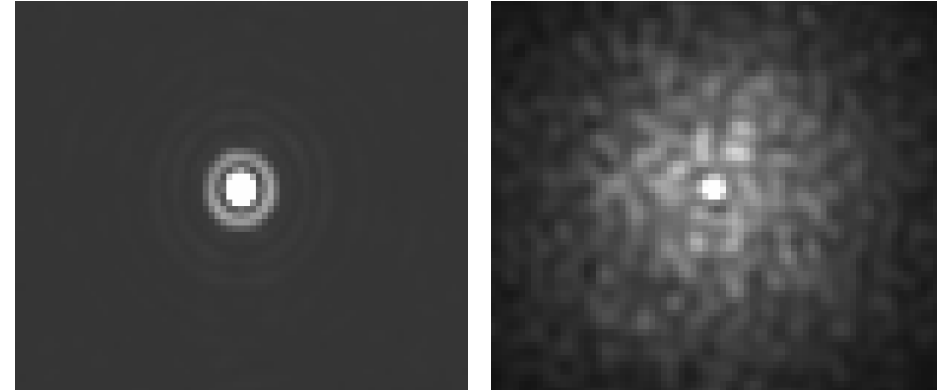
  but for a fixed telescope (diamater, no of actuators, …)
- Two problems:
  - Short integrations (4 s) --> Does not account for longer scale variation of atmosphere
  - Short integrations (4 s) --> Speckle noise
- Solutions:
  - Use measured 'atmosphere time series' to build weighted averages of individual PSFs
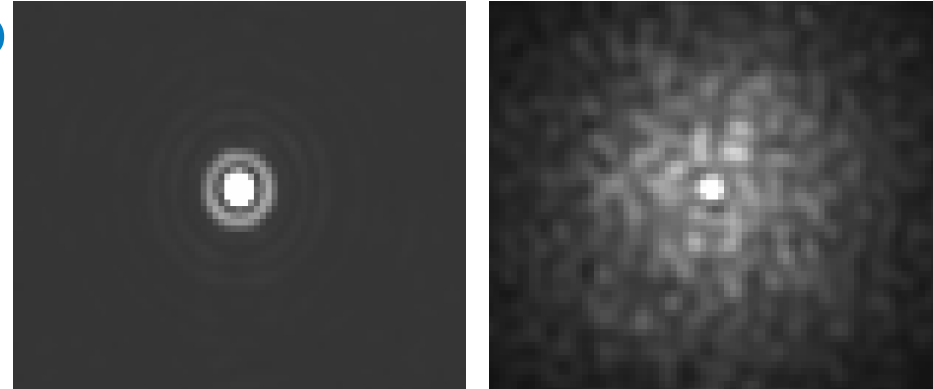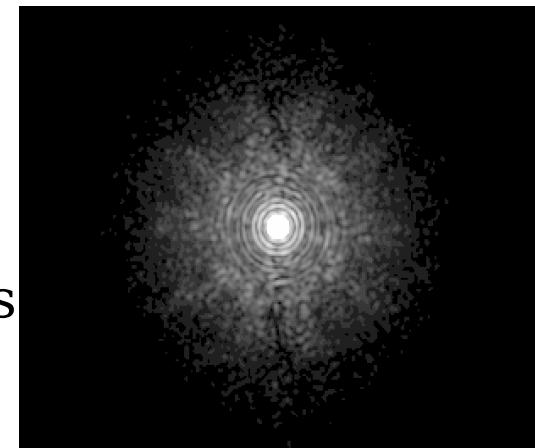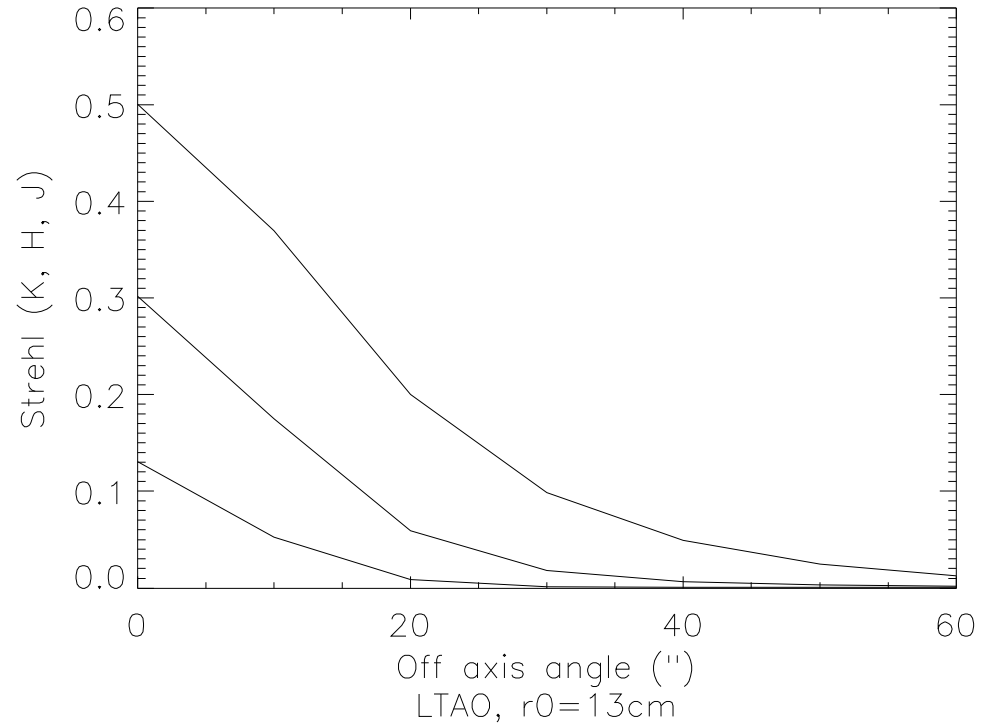 - Fitting of final PSFs and/or multiple realisations of individual PSFs

AO Update

- AO group supplies simulated PSFs as a function of:
  - Type of AO: GLAO, LTAO, MCAO
  - Band: I,J,H,K
  - ~~Seeing~~ (see below)
  - FoV
  - Position within FoV

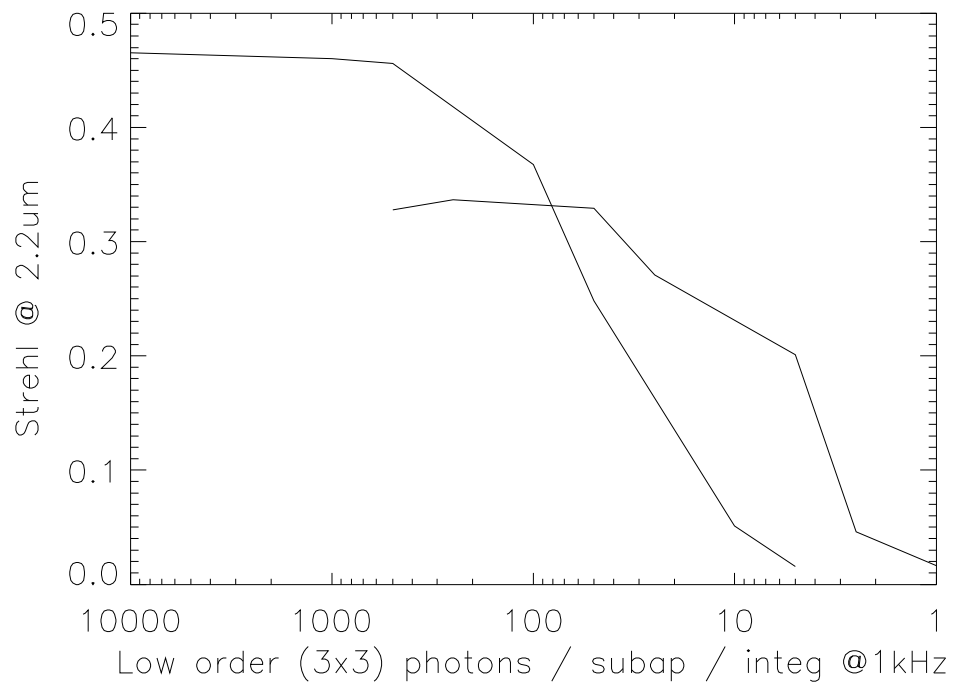 but for a fixed telescope (diamater, no of actuators, ...)
- Two problems:
  - Short integrations (4 s) --> Does not account for longer scale variation of atmosphere
  - Short integrations (4 s) --> Speckle noise
- Solutions:
  - Use measured 'atmosphere time series' to build weighted averages of individual PSFs
  - Fitting of final PSFs and/or multiple realisations of individual PSFs
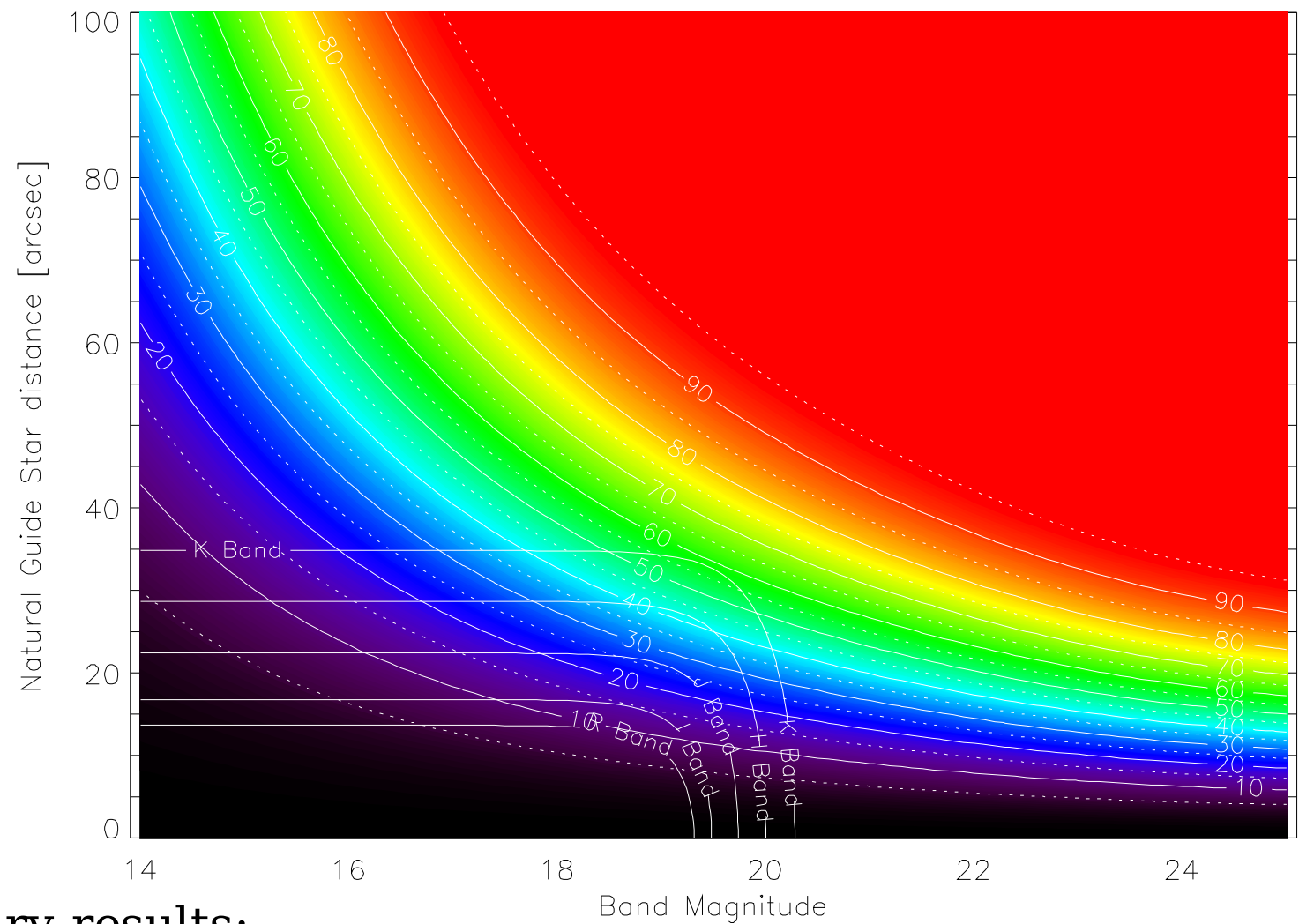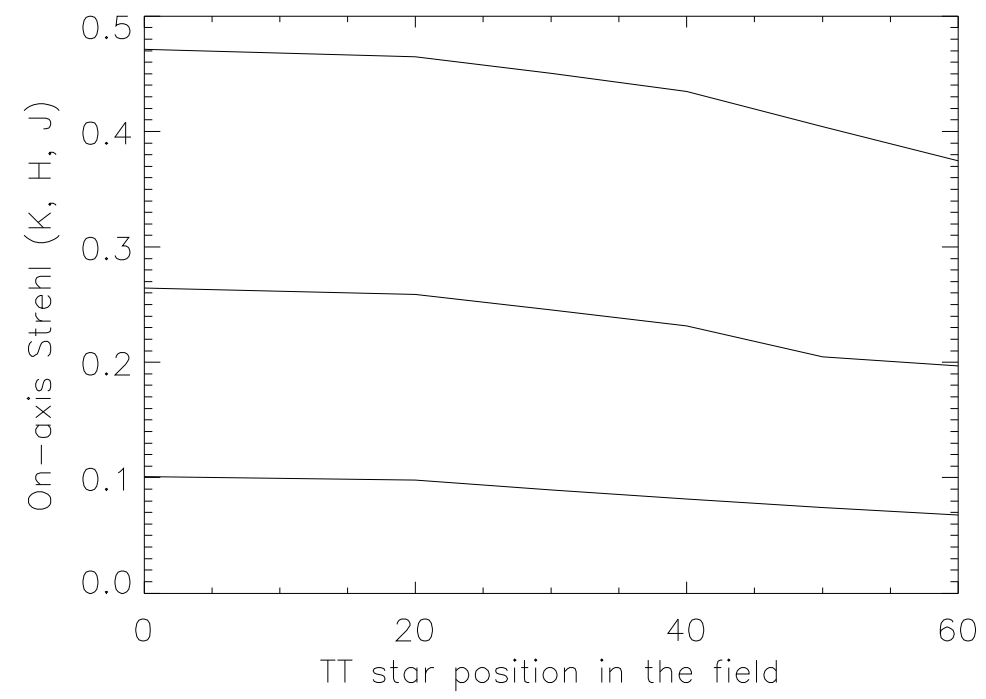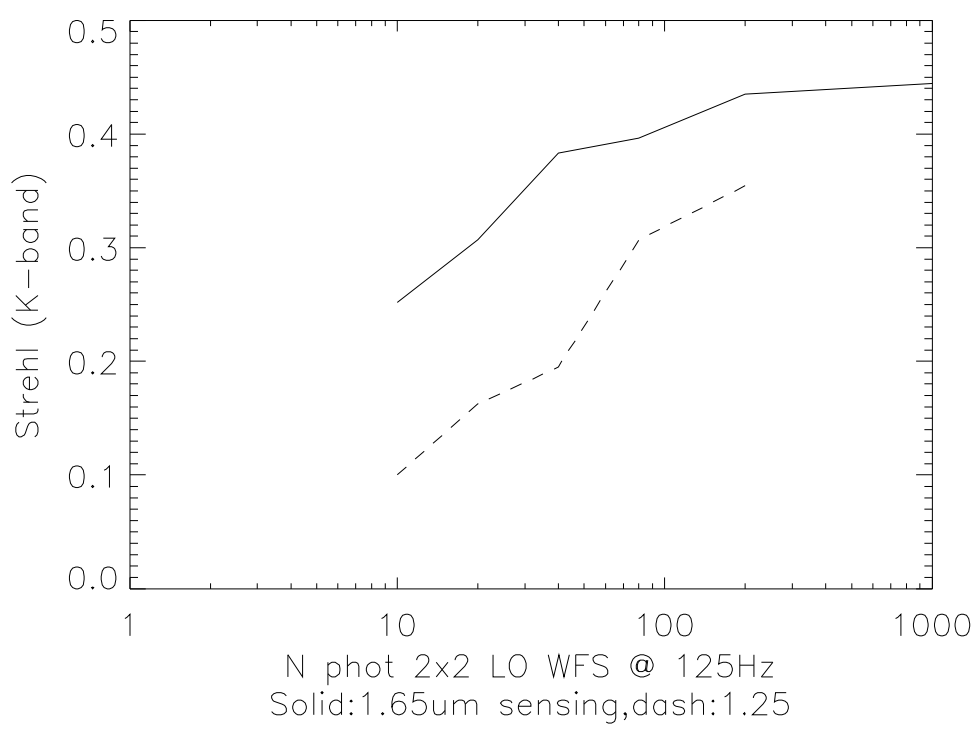
AO Update

Improved LTAO performance:

AO Update

Preliminary results:

In K: sky coverage towards galactic pole ~ 55% for a Strehl loss of 25%

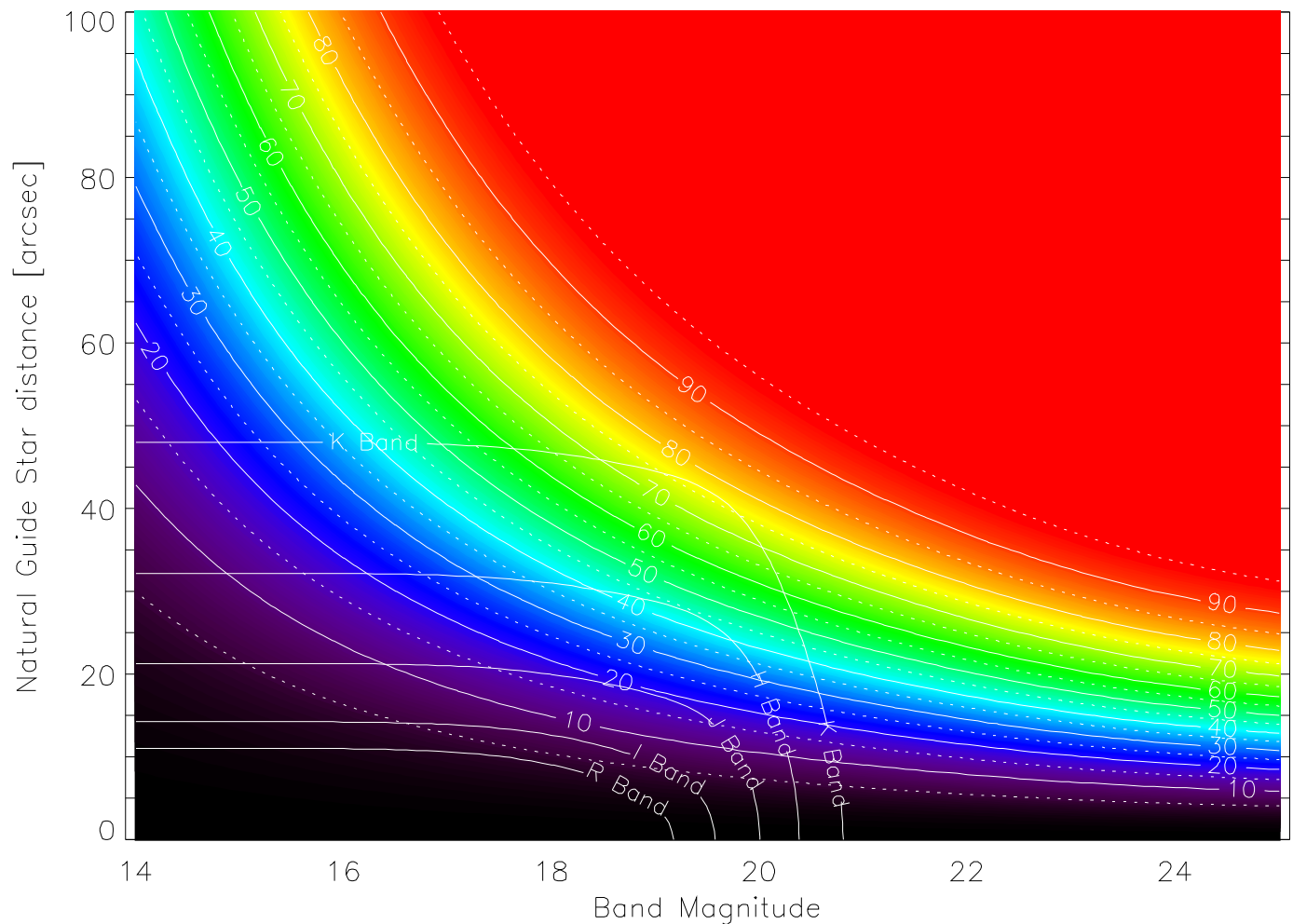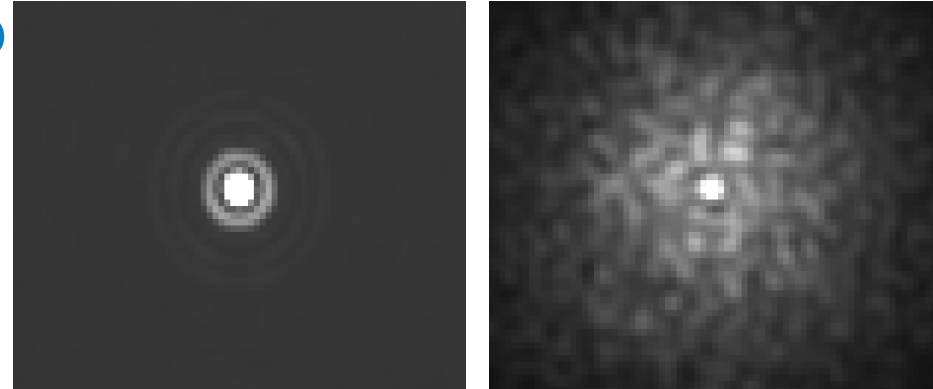In H: 40%

In J: 25%

AO Update

Improved MCAO performance:

AO Update

Preliminary results:

In K: sky coverage towards galactic pole ~ 75% for a Strehl loss of 25%

In H: 45%

In J: 20%

AO Update

- AO group supplies simulated PSFs as a function of:
  - Type of AO: GLAO, LTAO, MCAO
  - Band: I,J,H,K
  - ~~Seeing~~ (see below)
  - FoV
  - Position within FoV

  but for a fixed telescope (diamater, no of actuators, ...)
- Two problems:
  - Short integrations (4 s) --> Does not account for longer scale variation of atmosphere
  - Short integrations (4 s) --> Speckle noise
- Solutions:
  - Use measured 'atmosphere time series' to build weighted averages of individual PSFs
  - Fitting of final PSFs and/or multiple realisations of individual PSFs
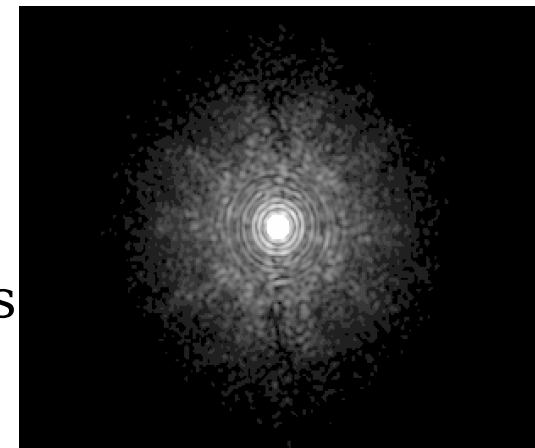
AO Update

- GLAO is very sensitive to:
  - C_n^2 profile
  - Seeing $= \lambda/r_0$, where $r_0(\lambda) = \left[0.423\, k^2 \sec(z) \int C_n^2(h)\, dh \right]^{-3/5}$
- We have a (small) database of time-series of profiles from Paranal.
- How do we convert this to a small number of representative cases? How should these be defined (and labelled)?
  - 'Good', i.e. 20% best (but in what sense)?
  - 'Median'
  - 'Bad'
- Operational issue: in an AO world, how do we quantify the quality of the atmospheric conditions?
  - ETC
  - Proposal (Phase I)
  - Constraint set (Phase II)
  - On the mountain

AO Update

eltpsffit:

New, interactive/ automated PSF fitting tool to generate 2D fits.
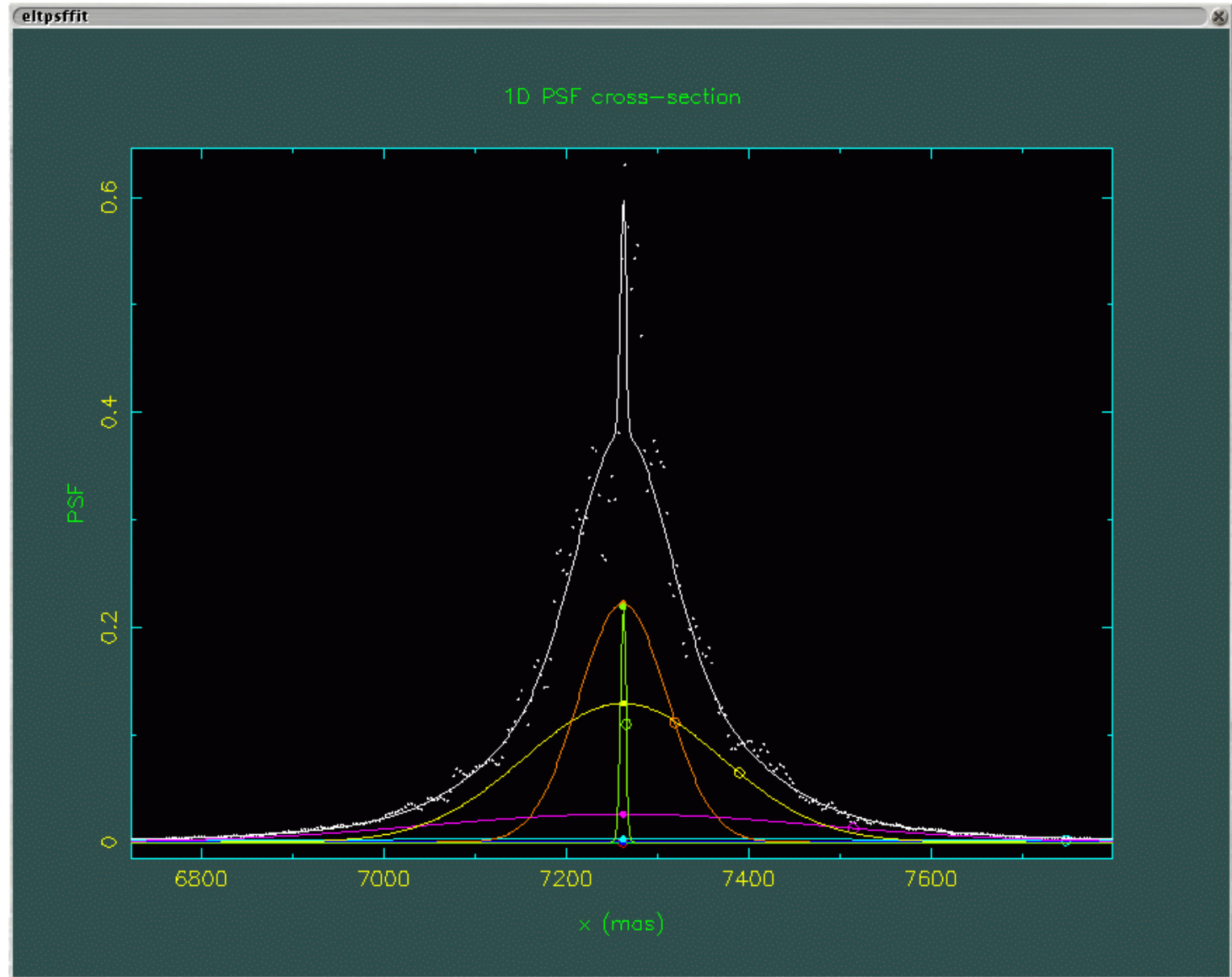
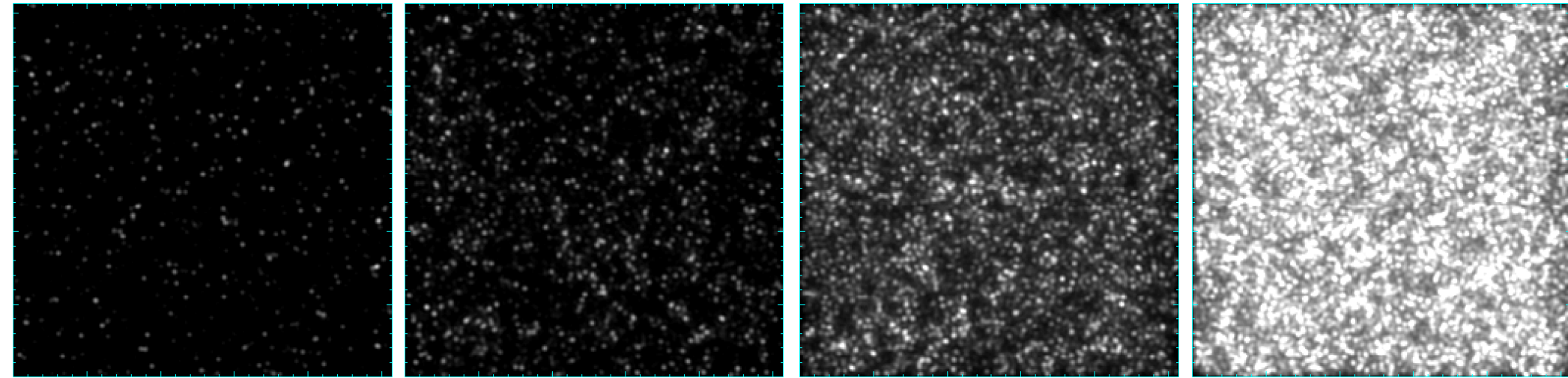# Resolved stellar populations
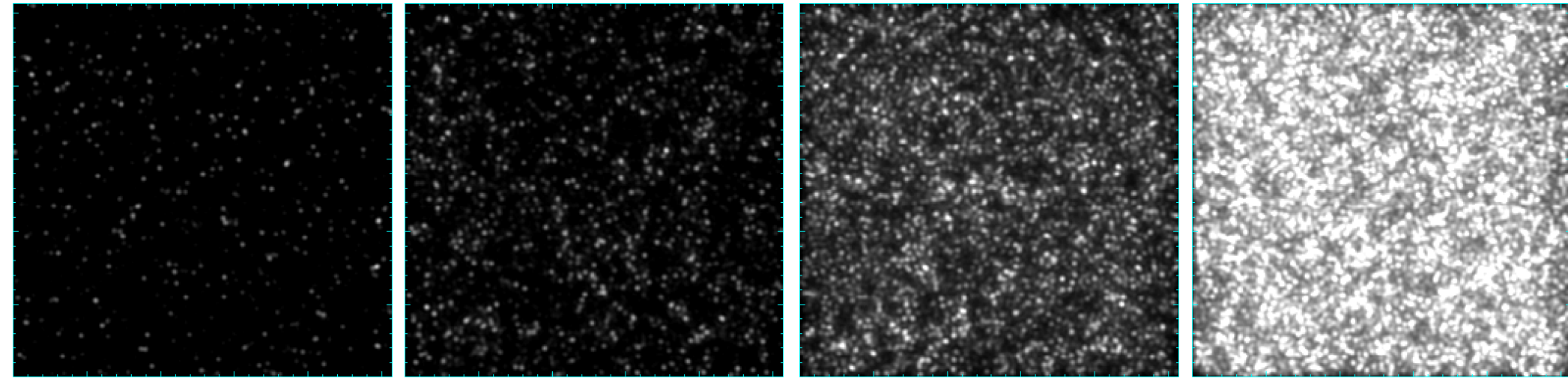
$\langle\mu_V\rangle = 29$ 28   27   26 mag/arcsec^2
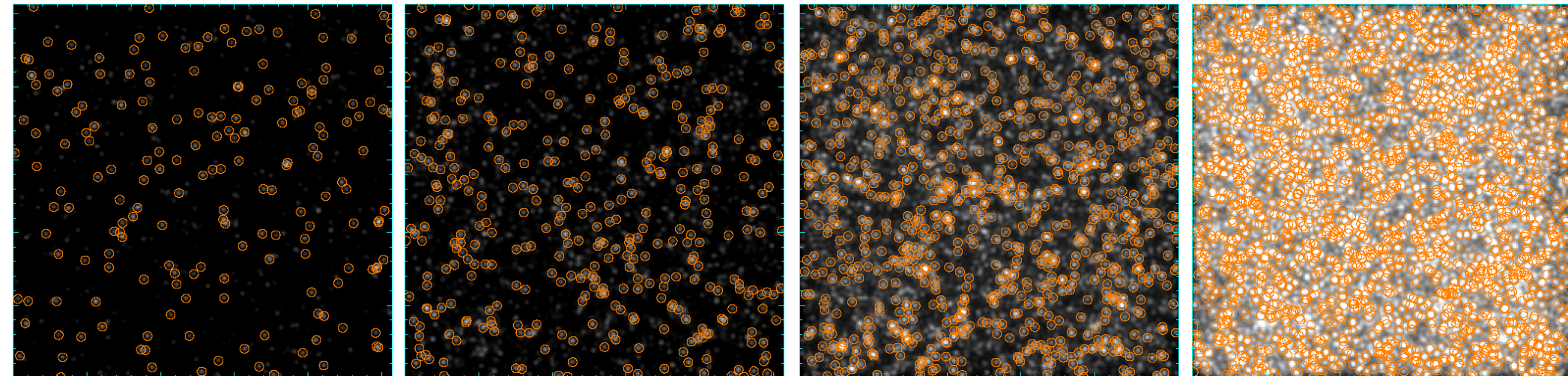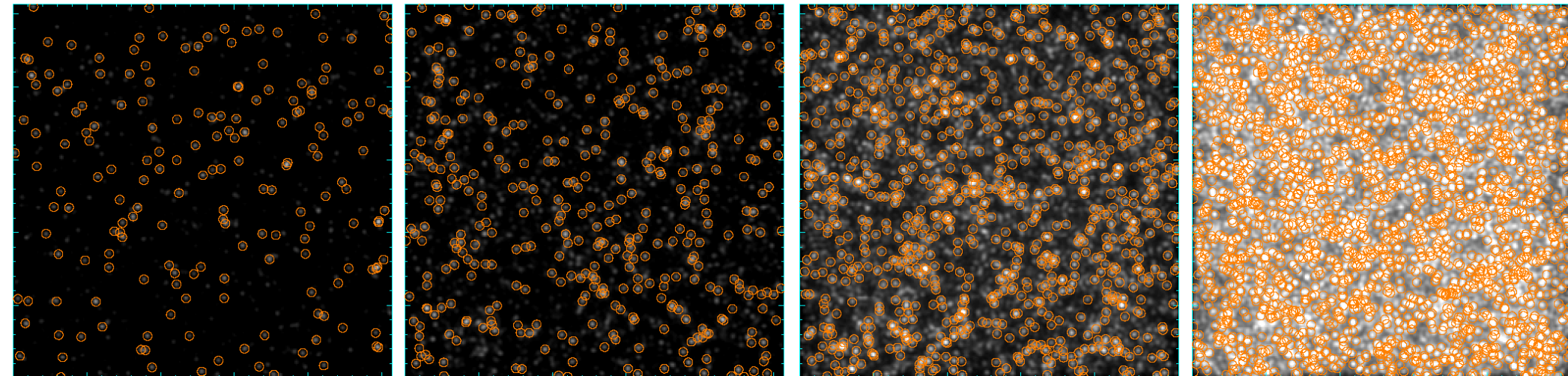
Resolved stellar populations

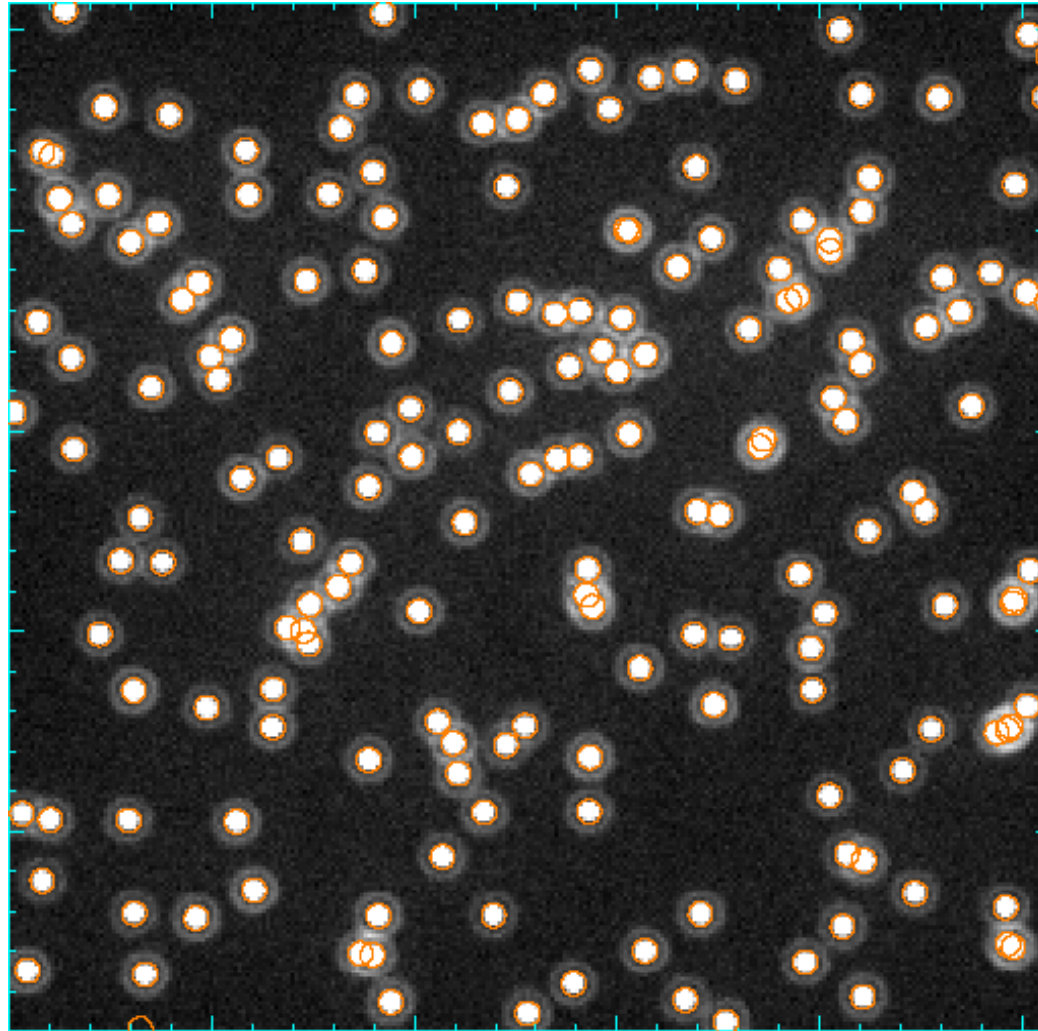$\langle \mu_V \rangle = 21 \qquad 20 \qquad 19 \qquad 18 \ \mathrm{mag/arcsec^2}$

Resolved stellar populations

Dumb aperture photometry…

Resolved stellar populations
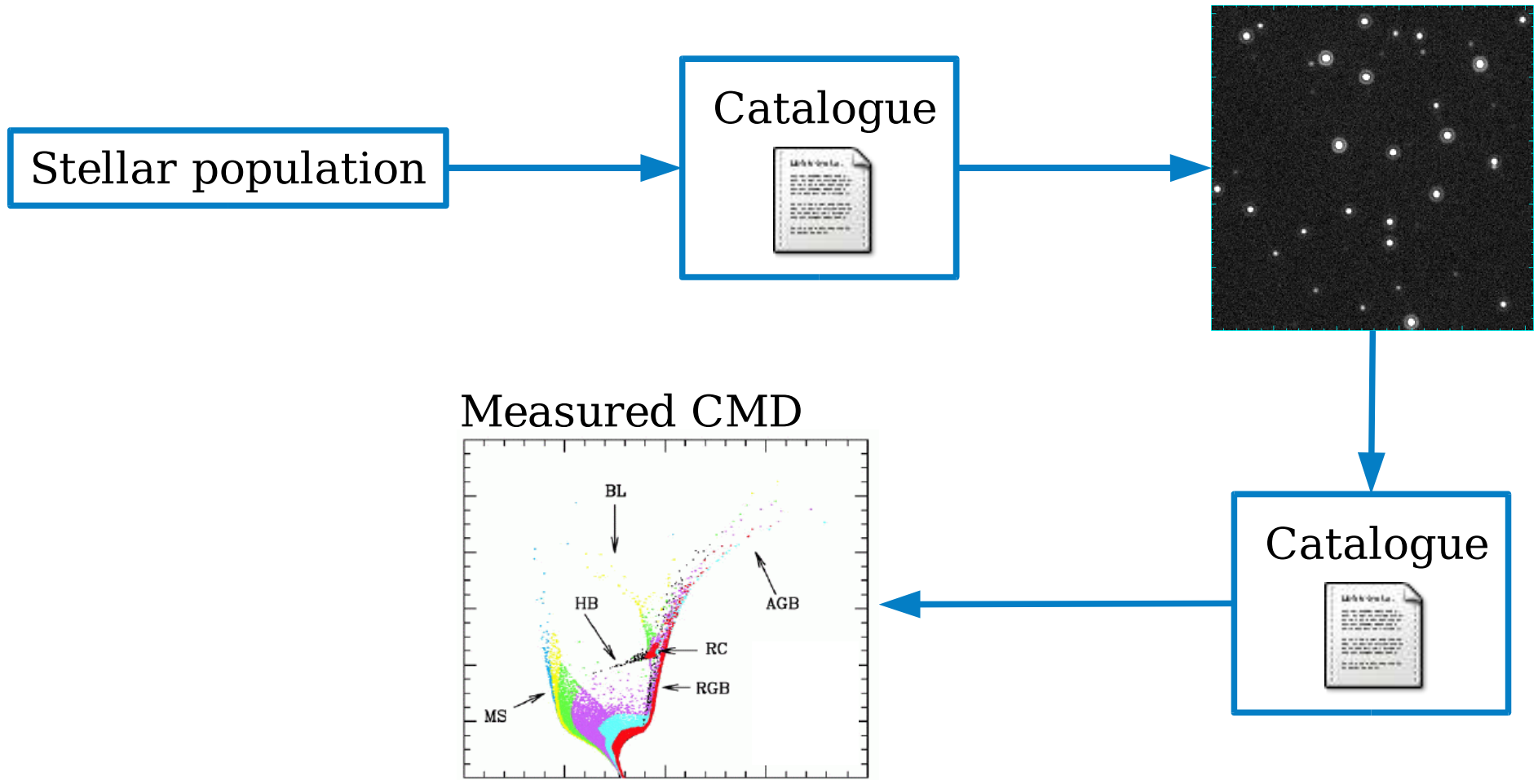
PSF photometry – StarFinder (Diolaiti et al. 2000):
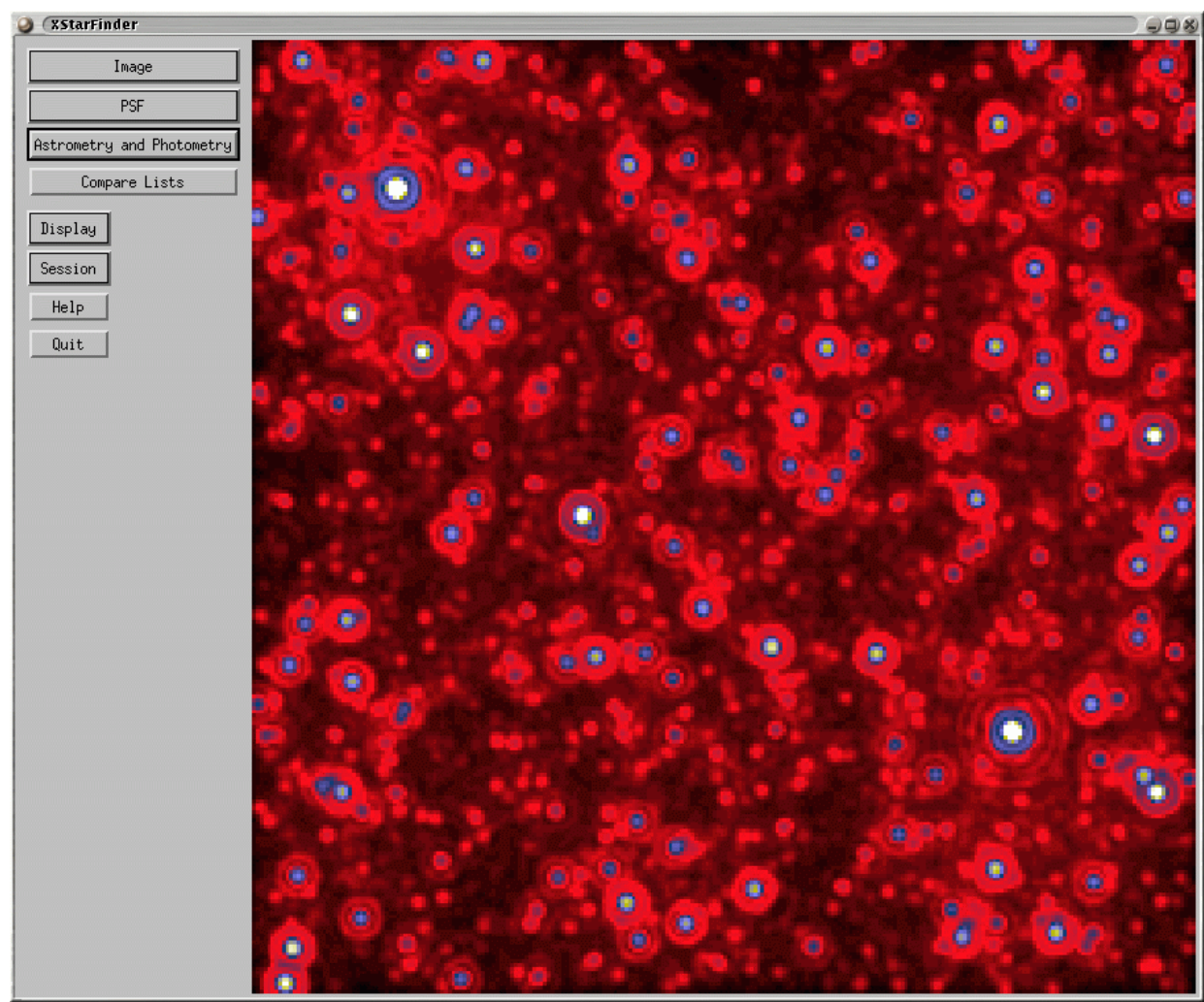
- Interactive
- Can determine PSF from image
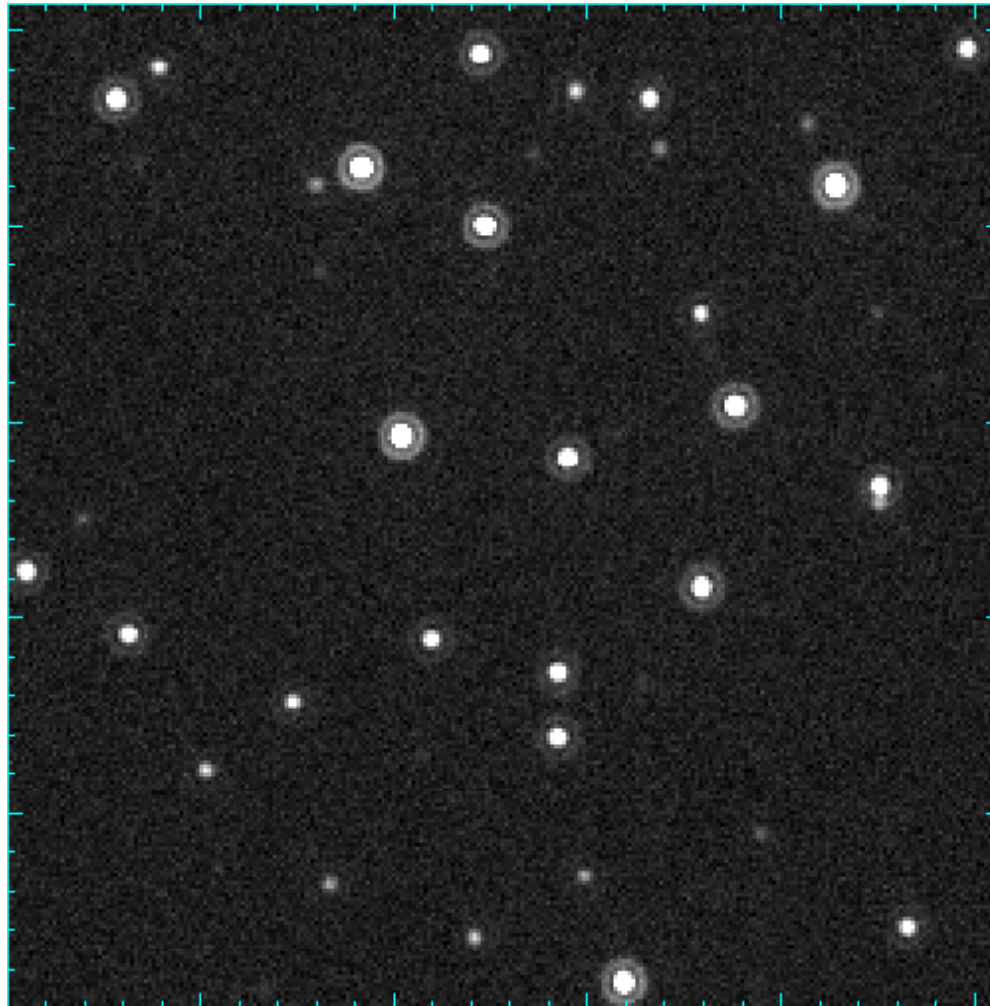- Iterative procedure:
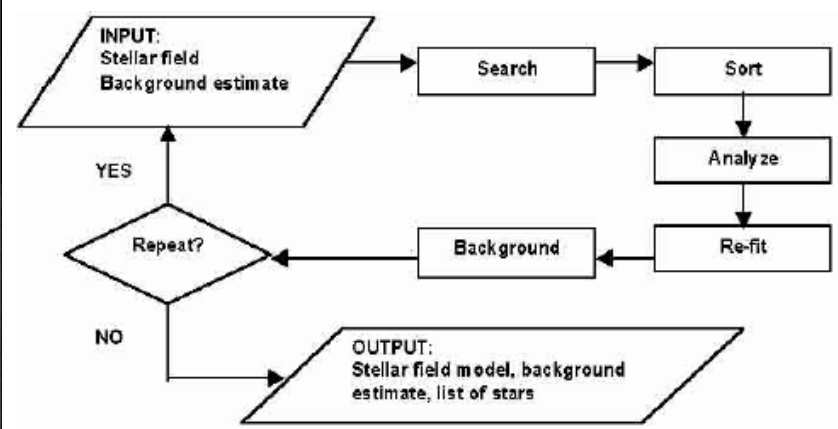
Resolved stellar populations

Created automated version of StarFinder
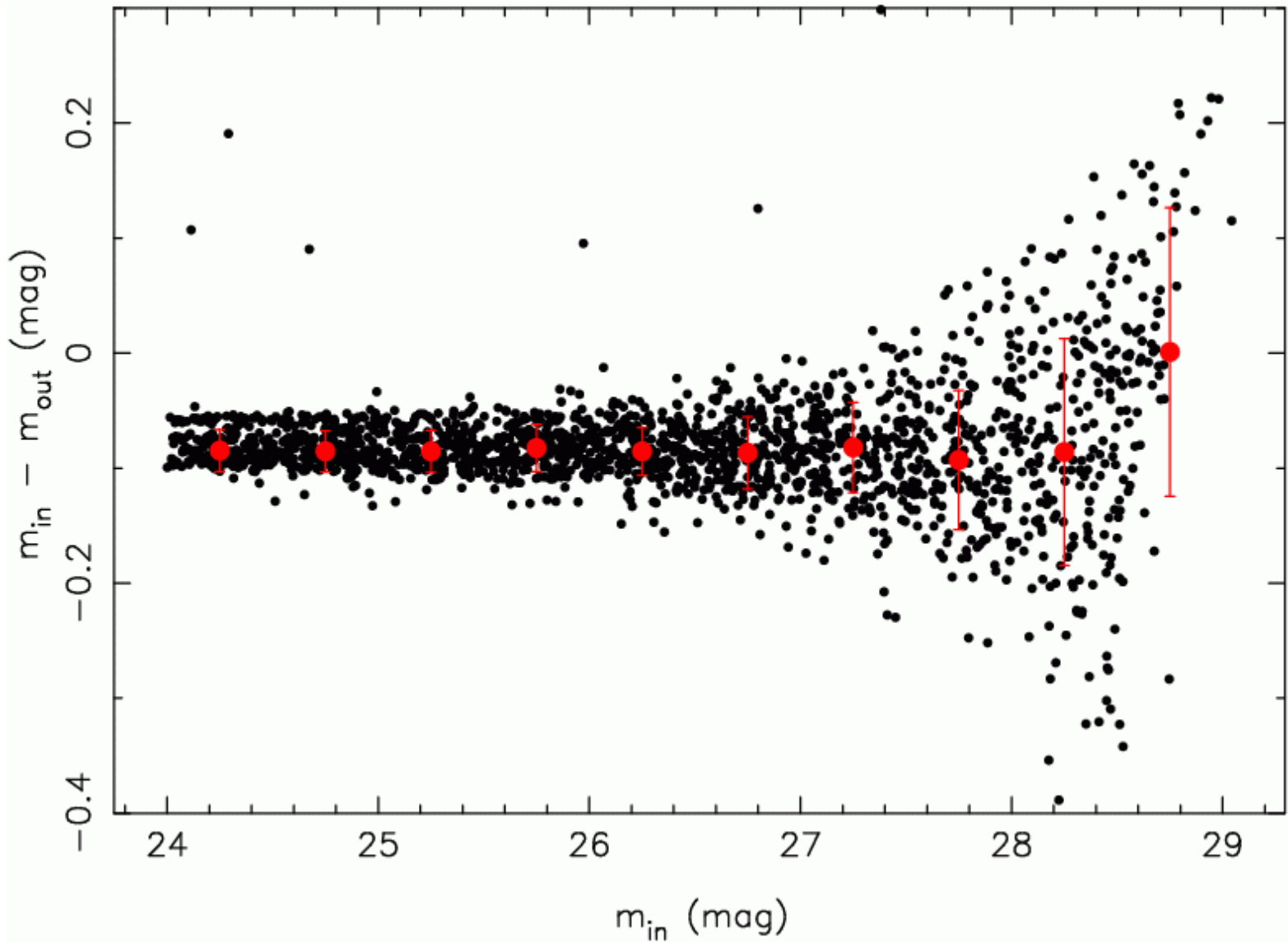→ construction of 'pipeline':

Resolved stellar populations

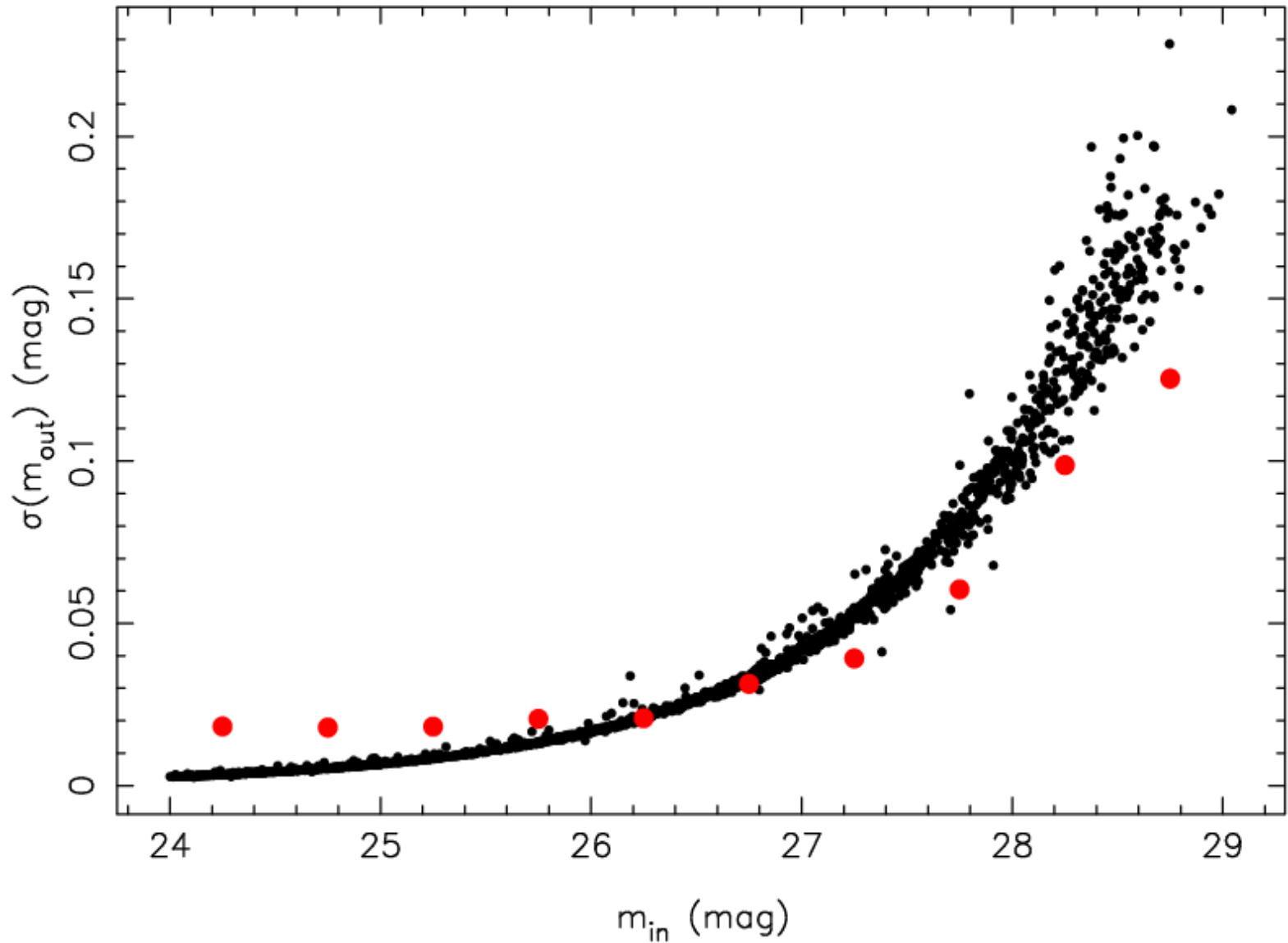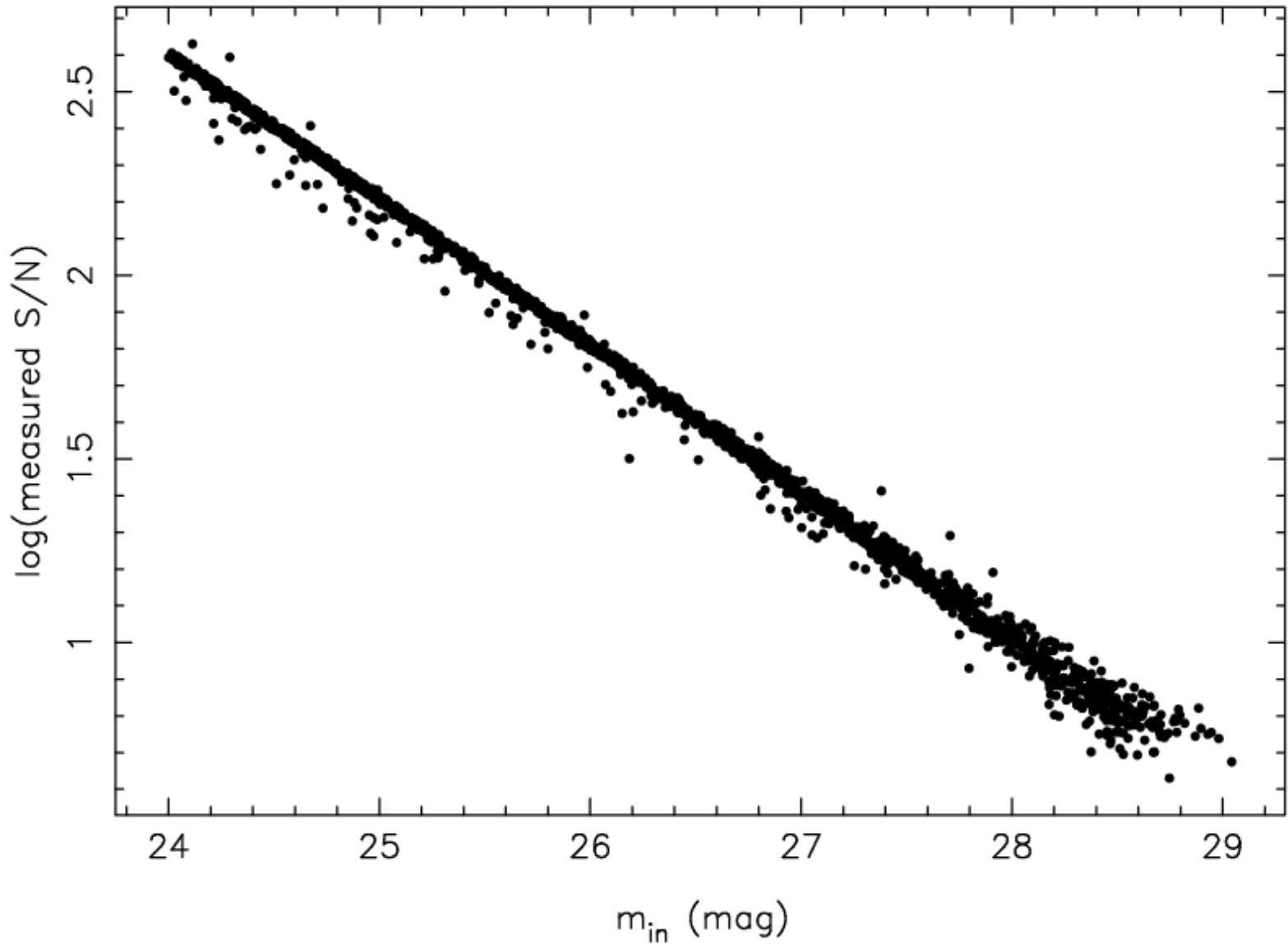Photometry of uncrowded fields:

Resolved stellar populations

Photometry of uncrowded fields, 10h integration:

Resolved stellar populations

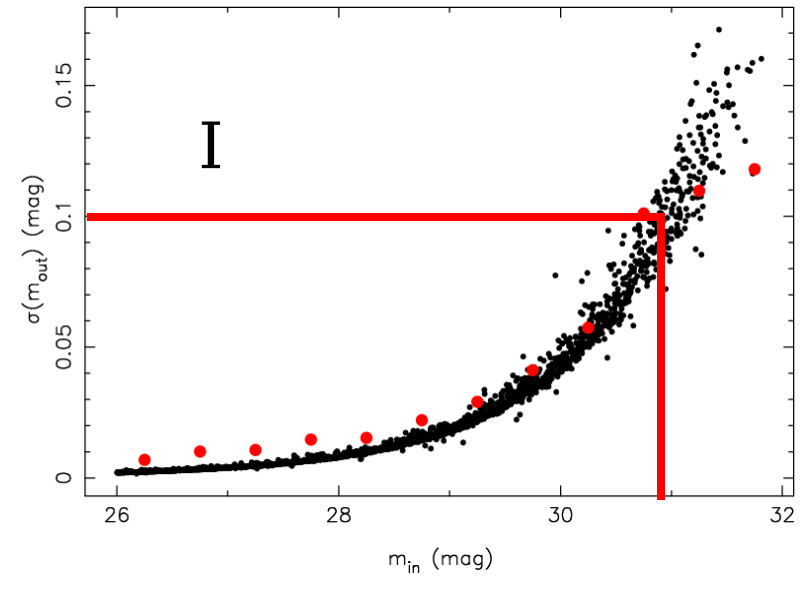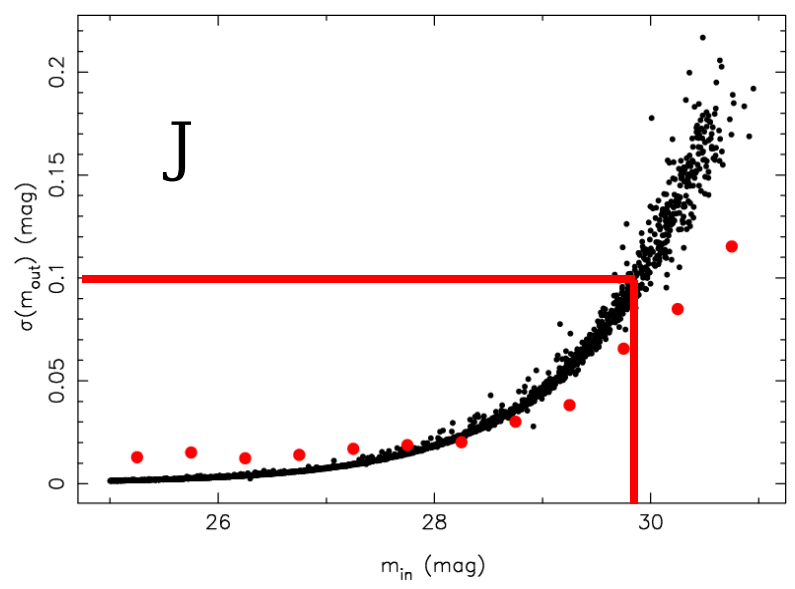Photometry of uncrowded fields, 10h integration:

Resolved stellar populations
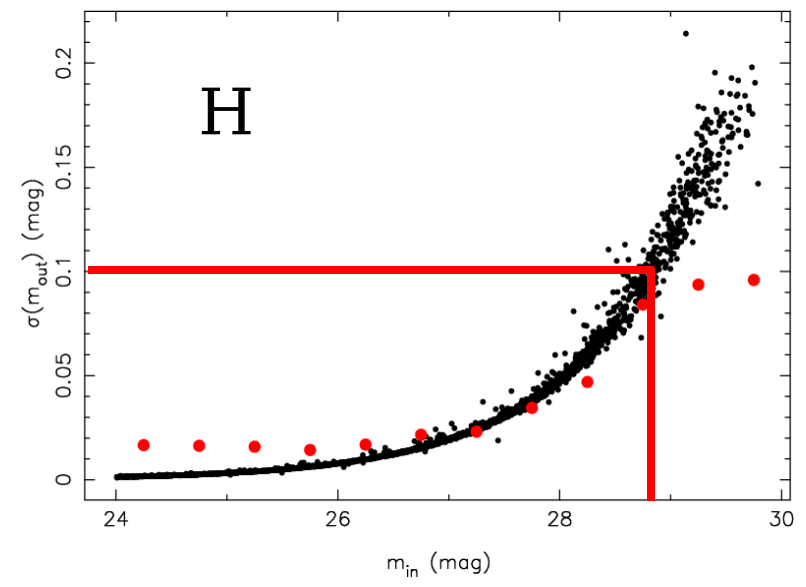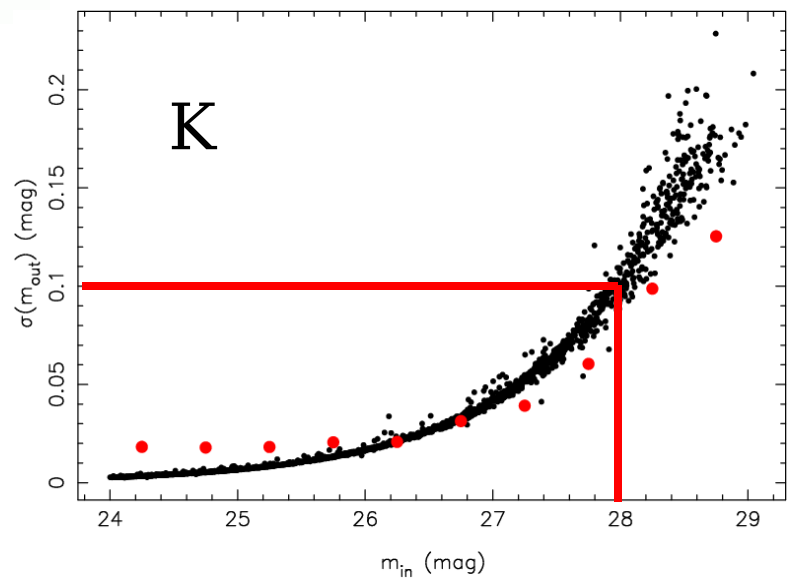
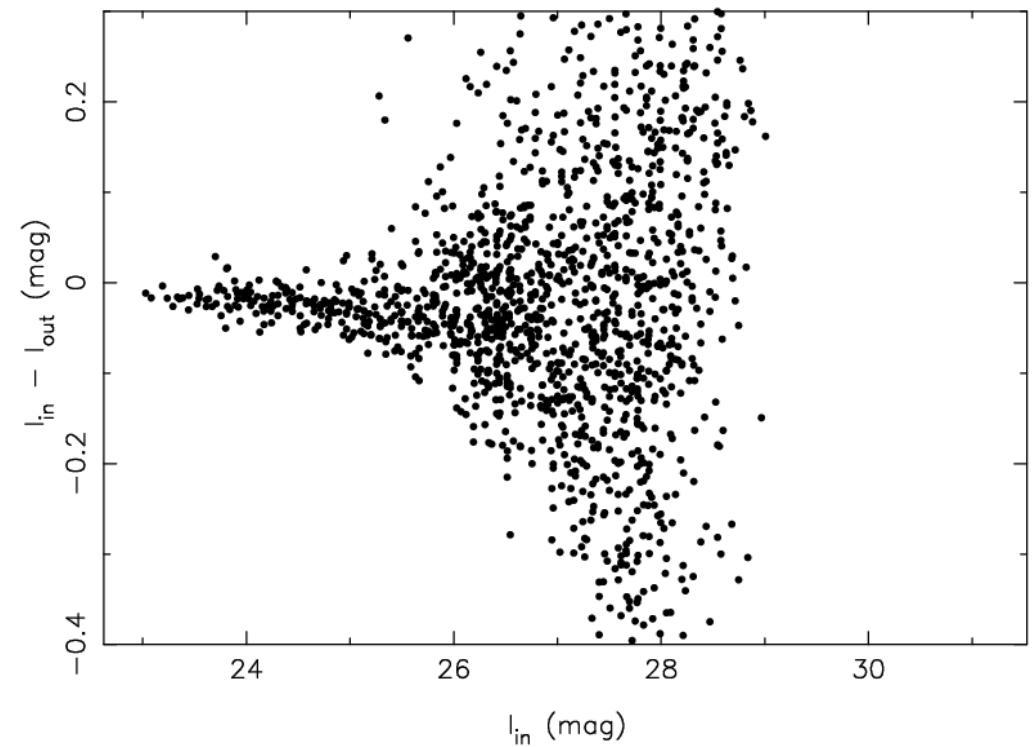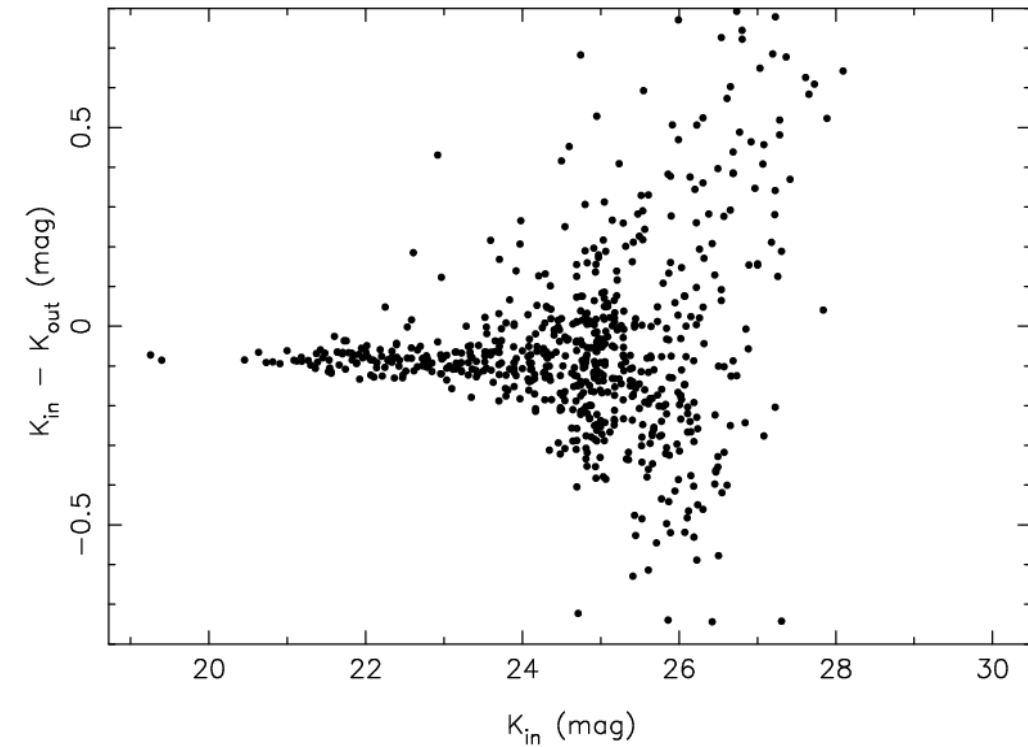Photometry of uncrowded fields, 10h integration:
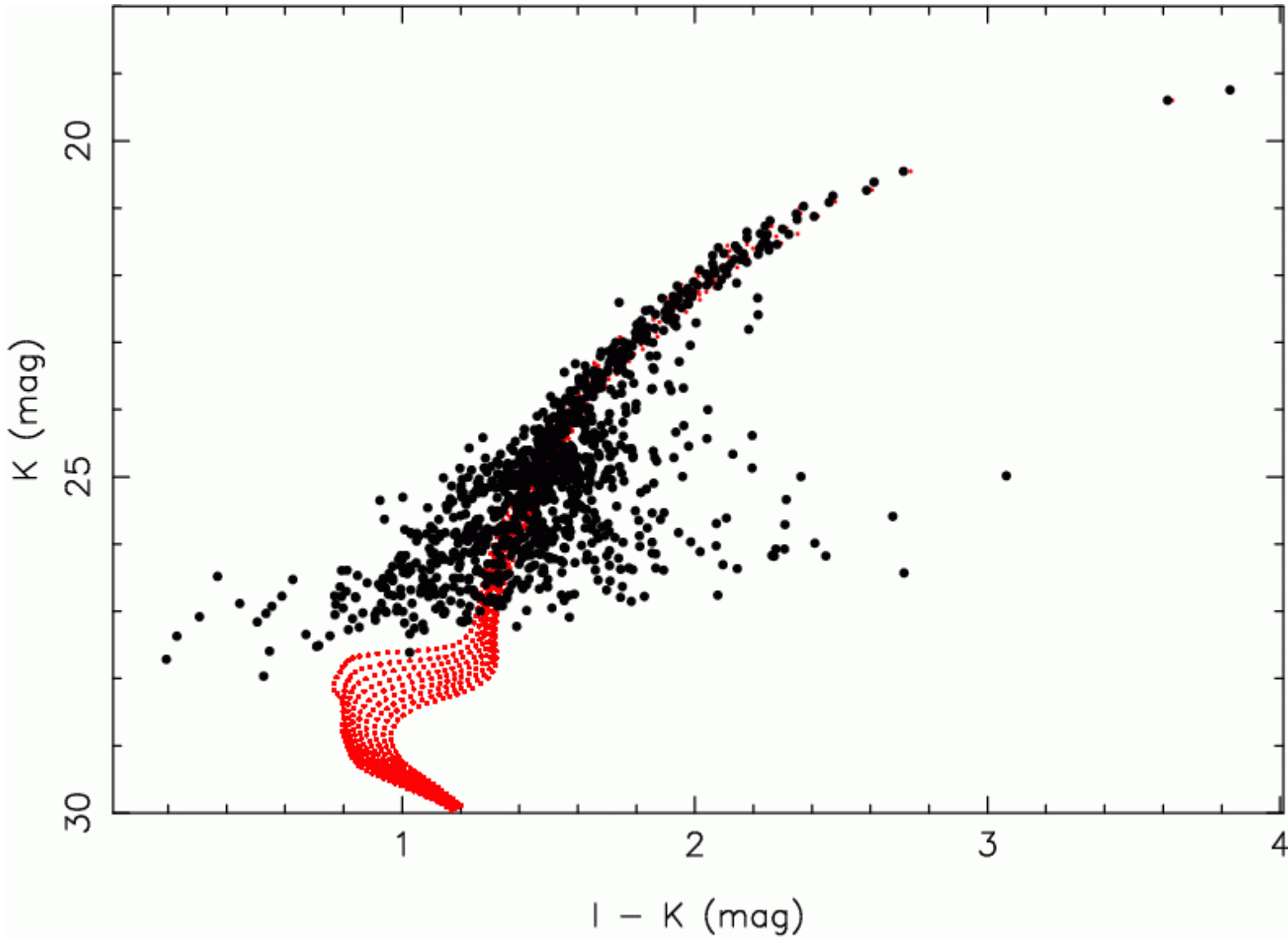
Resolved stellar populations

Resolved stellar populations

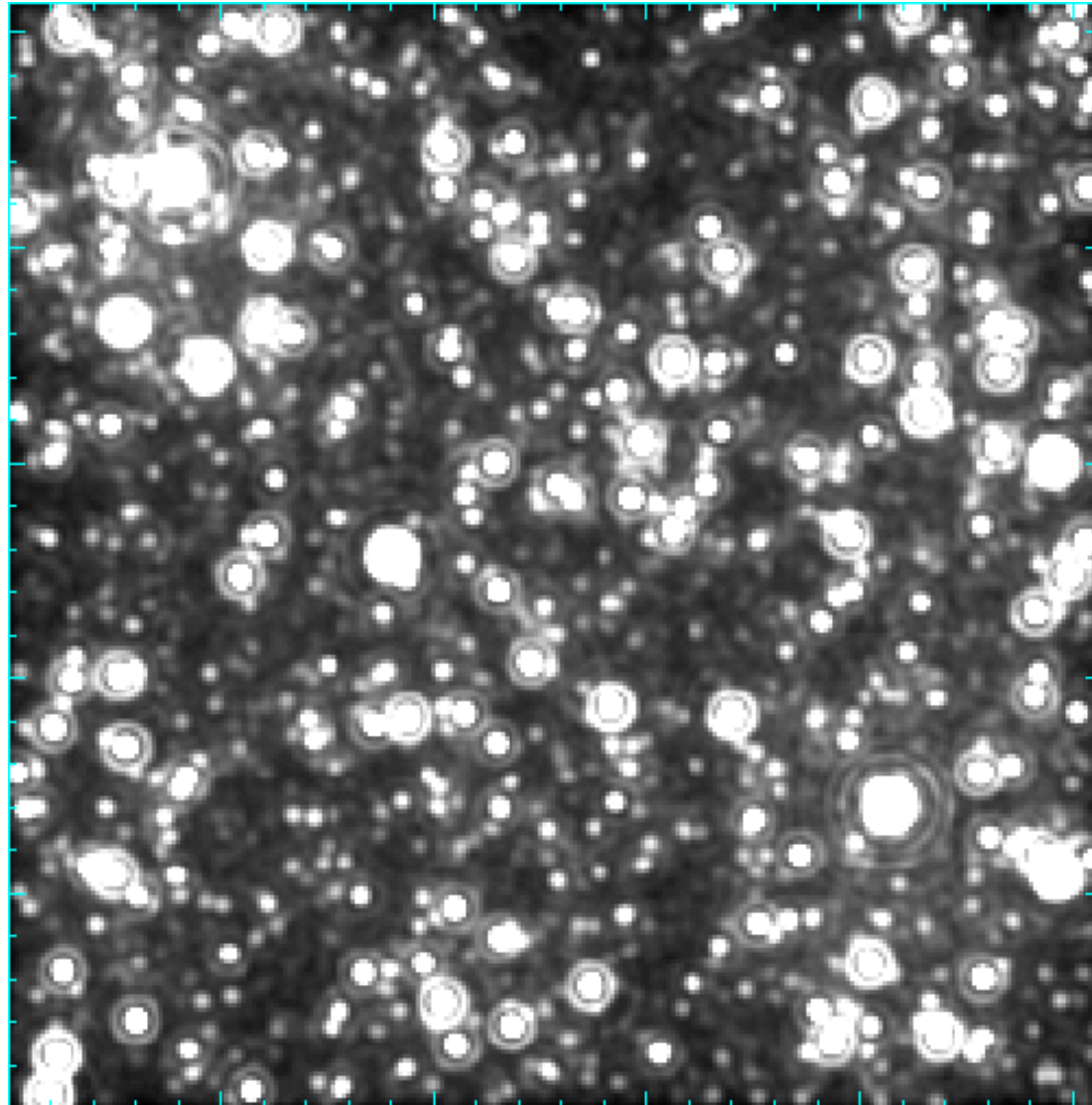Photometry of crowded fields, 10h integration:

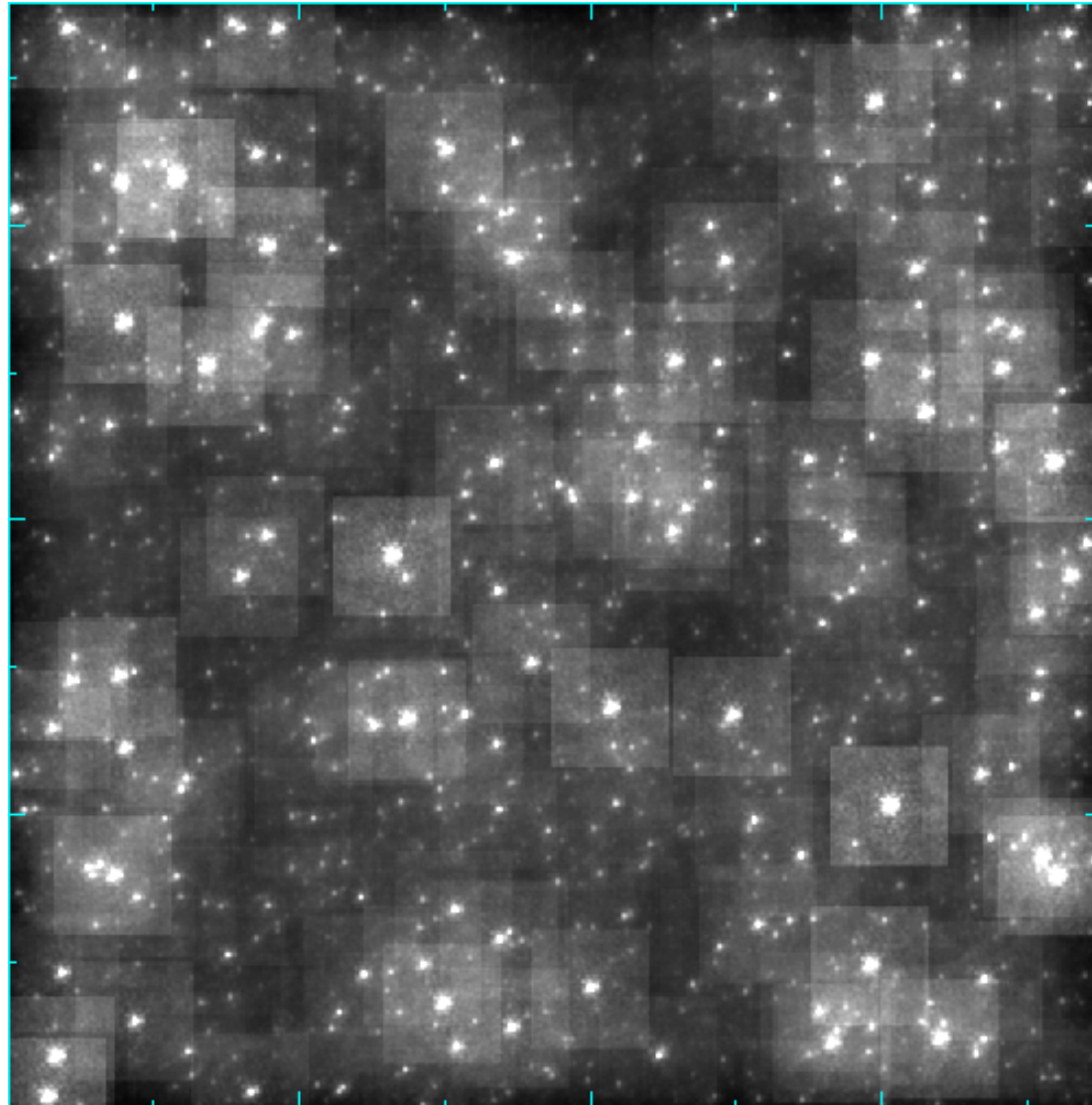# Resolved stellar populations

Resolved stellar populations

K-band:

Resolved stellar populations

I-band:

Resolved stellar populations

- Sort out details and loose ends.

- Systematically characterize the deterioration of mag limit as a function of crowding (i.e. surface brightness).

- Need to define a science metric!

- Detailed investigation of trade-offs between bands.

- … between survey area and crowding.

- Investigate dependence on SFH.

- tbc…