NIR Photometry of GCs with MAD

G. Bono (INAF-OAR), **A. Calamida (→ DRM) + Romans +**

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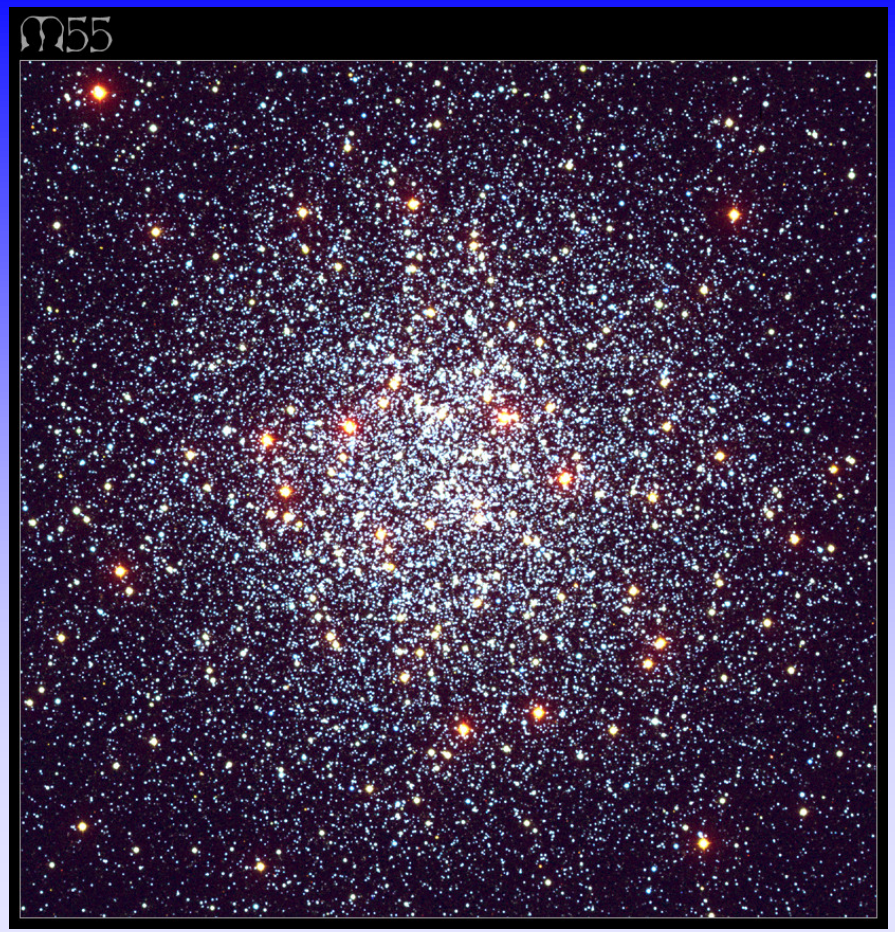
P. Amico, S. D'Odorico, E. Marchetti



Summary

→ Reduction strategy

→ Optical-NIR in ω Cen

→ NIR in NGC3201

→ Circumstantial evidence

→Conclusions

Reduction Strategy

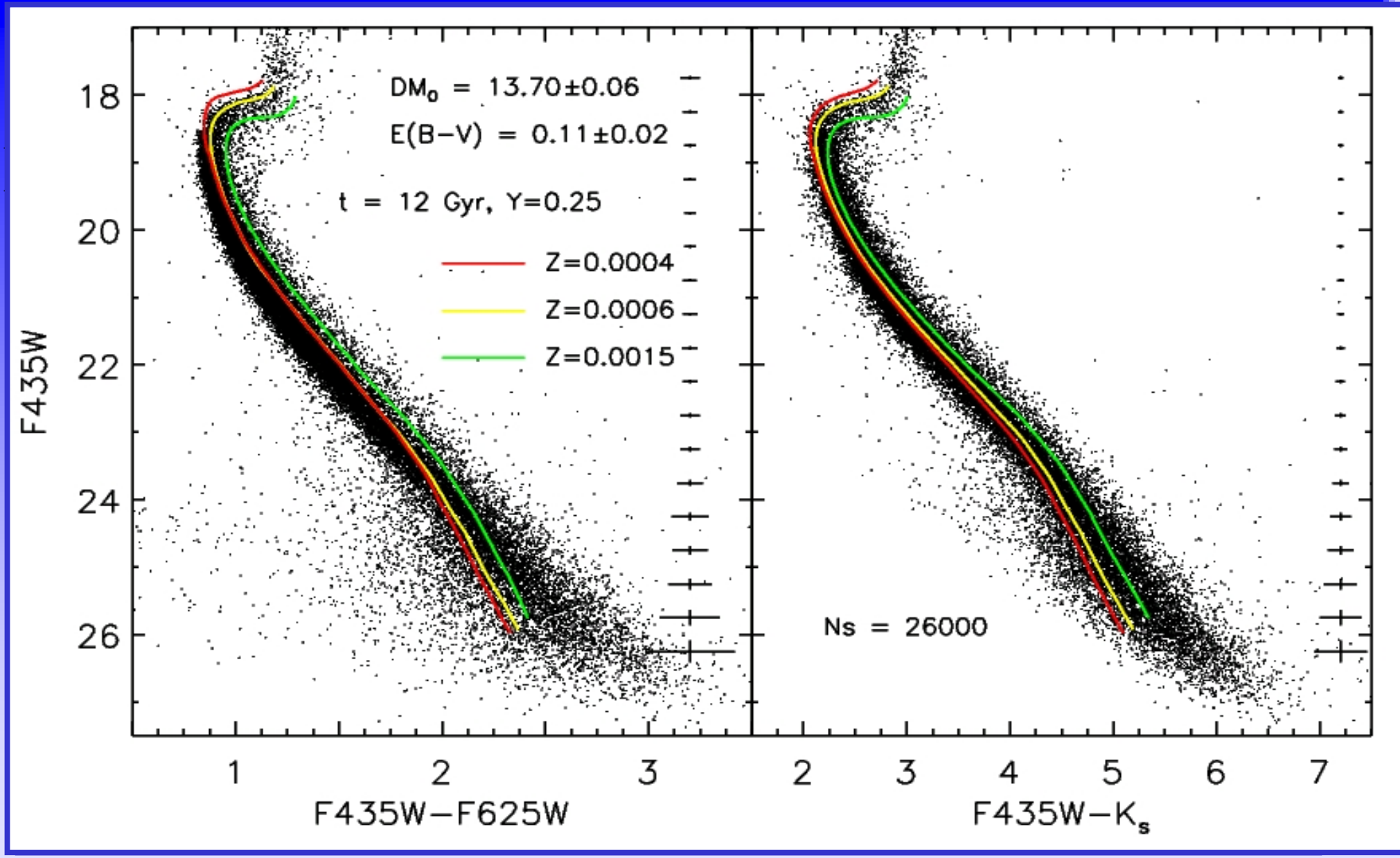
PSF Photometry on Individual Images

Simultaneous reduction of NIR and optical images

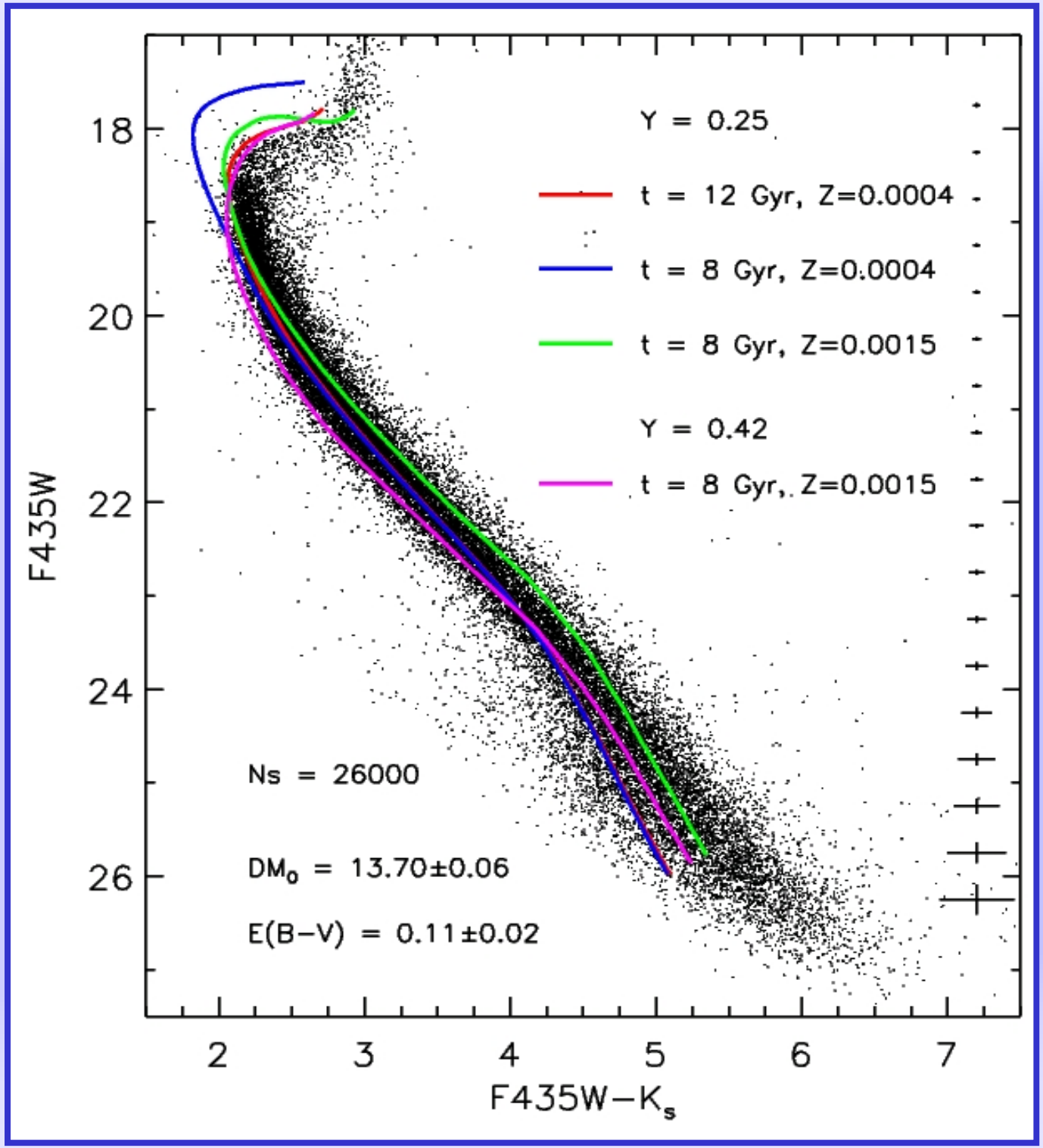
DAOPHOT → ALLSTAR → DAOMASTER → ALLFRAME

Specific Targets (WDs) → ROMAFOT →
visual check one-by-one

Optical-NIR photometry → Cluster age



Absolute calibration using our own local standards collected with ISAAC@VLT and SOFI@NTT


Y = 0.25
t = 12 Gyr, Z=0.0004
t = 8 Gyr, Z=0.0004
t = 8 Gyr, Z=0.0015
Y = 0.42
t = 8 Gyr, Z=0.0015
Ns = 26000
DM0 = 13.70±0.06
E(B−V) = 0.11±0.02
F435W
F435W−Ks
18
20
22
24
26
2
3
4
5
6
7

Comparison between theory and observations

Absolute age estimates of GCs affected by:

OPTICAL

→Distance
→Reddening
→Degeneracy between reddening and metallicity
→Photometric zero-points

NIR

→Distance
→Photometric zero-points

MAD J,K Images of NGC3201

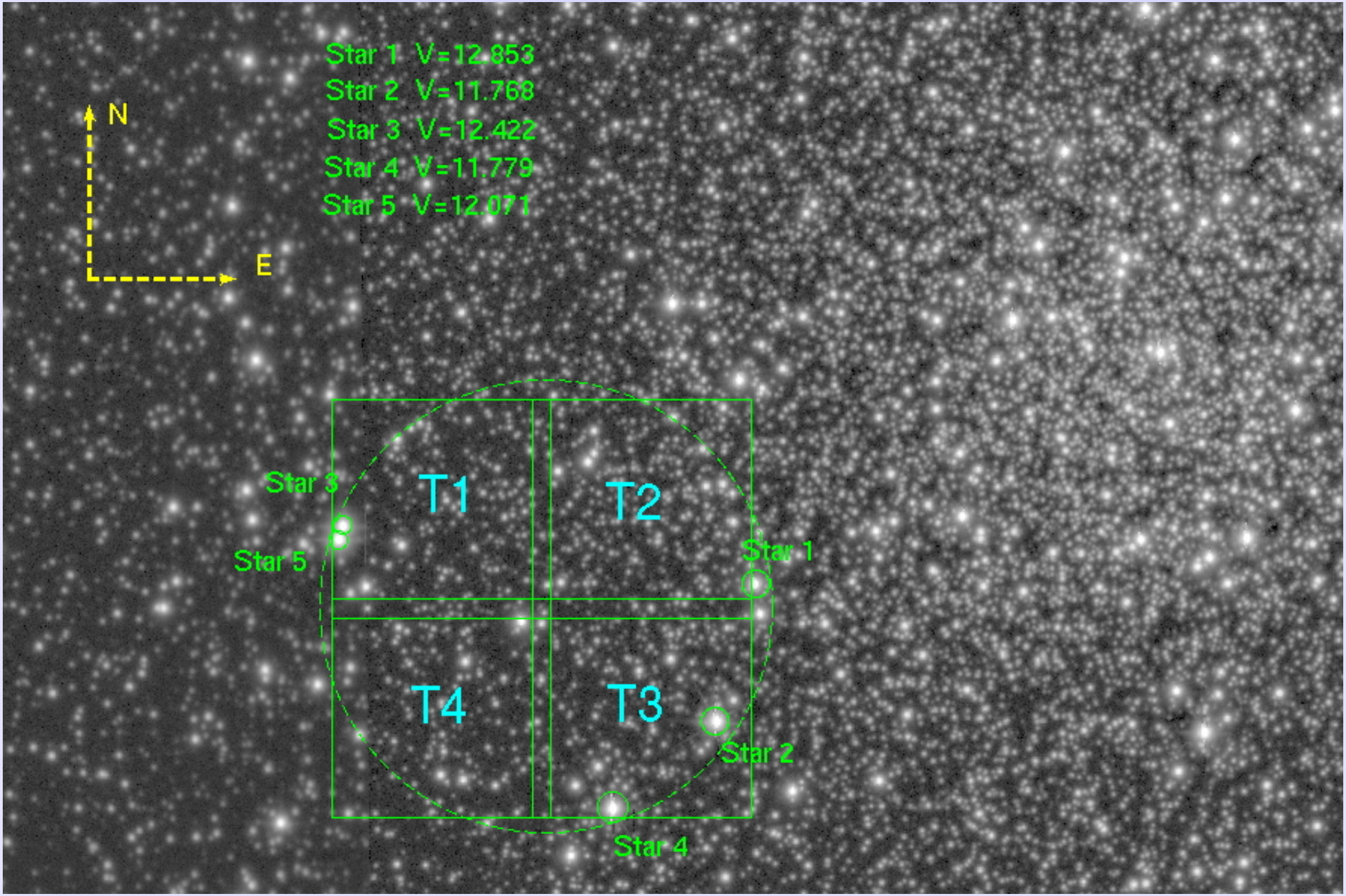
Four pointings (O1,O2,O3,O4):
J-band: seeing from 0.5” to 0.8”
Ks-band: seeing from 0.8” to 1.6” (O3)
3J+5Ks per pointing = 32 min

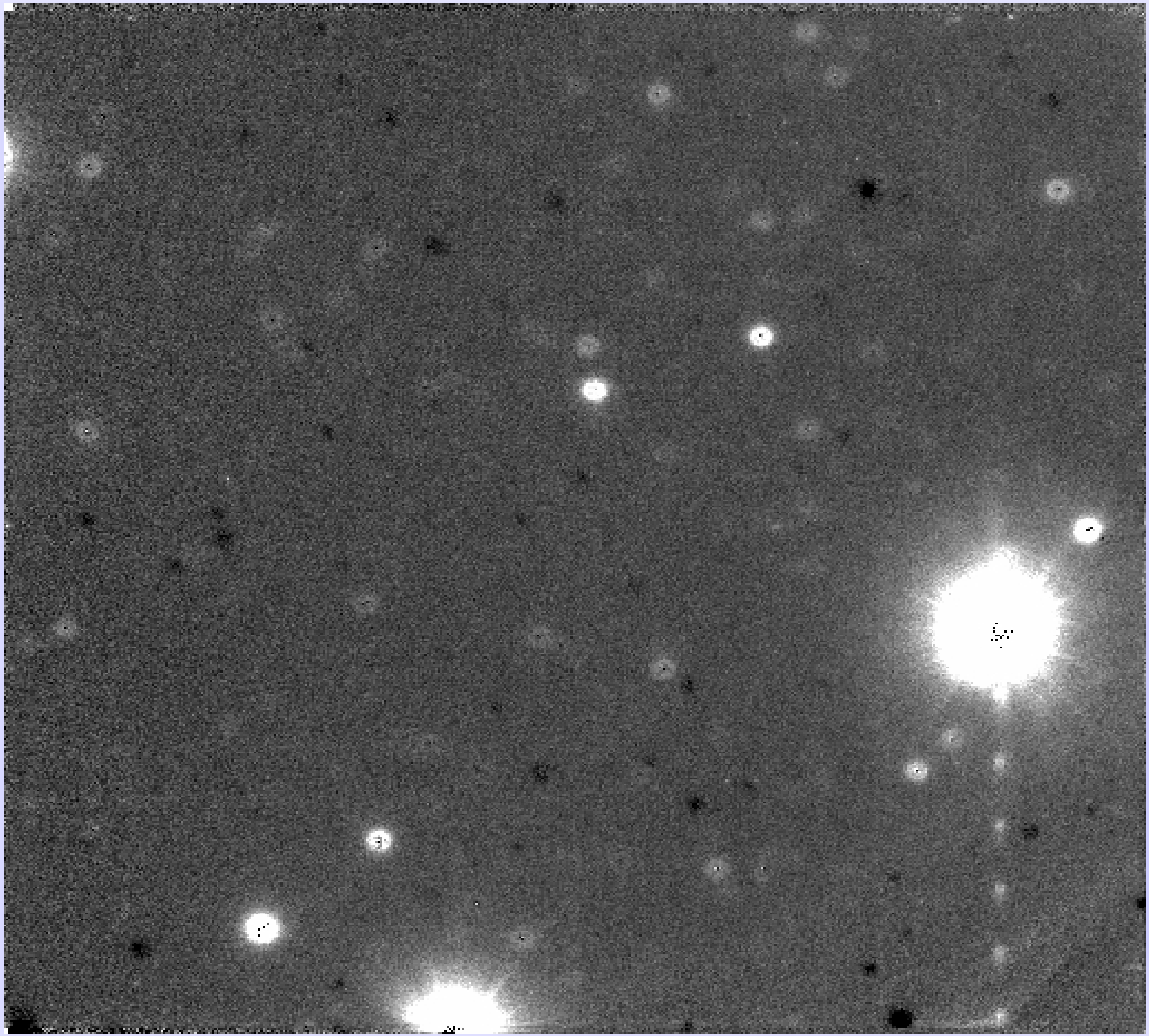
→FoV 2’x2’, 5 guide stars V~11.7-12.9

→FWHM on images ≤0.1-0.15” [Ks, J]

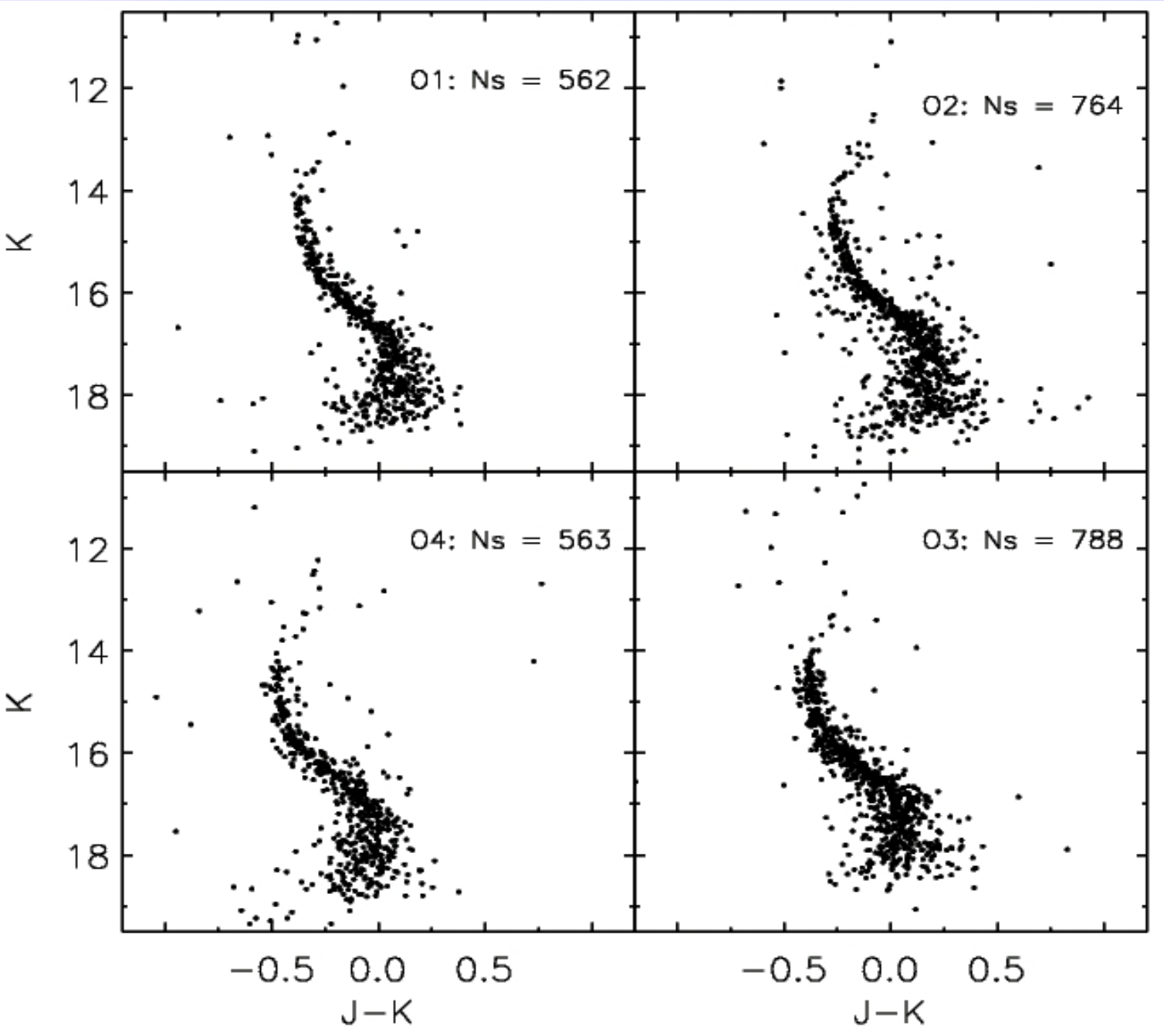
[Marchetti et al. 2007, The Messenger, 129, 8]

MAD J,K Images of NGC3201

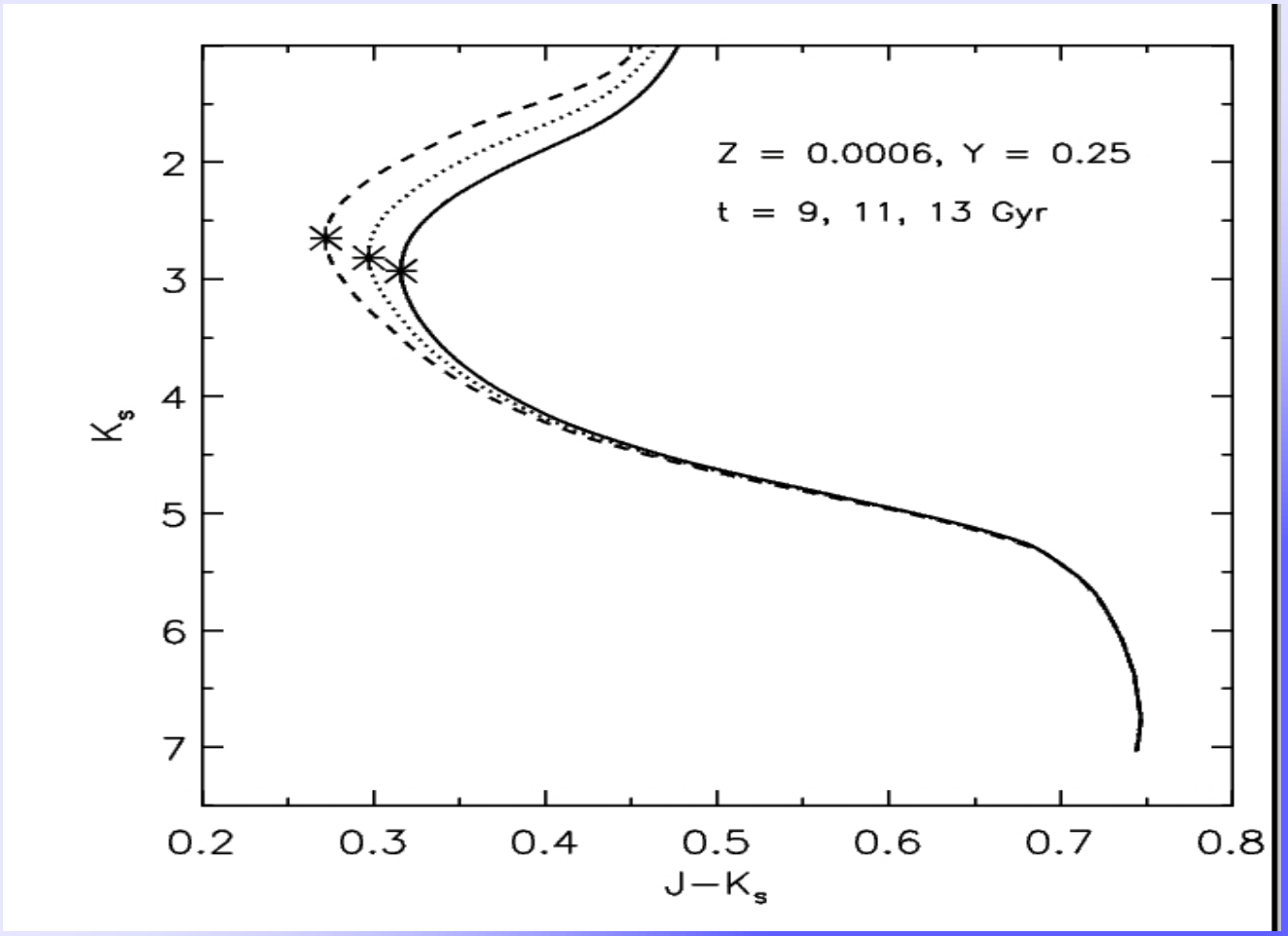




NGC3201 MAD 4 chips

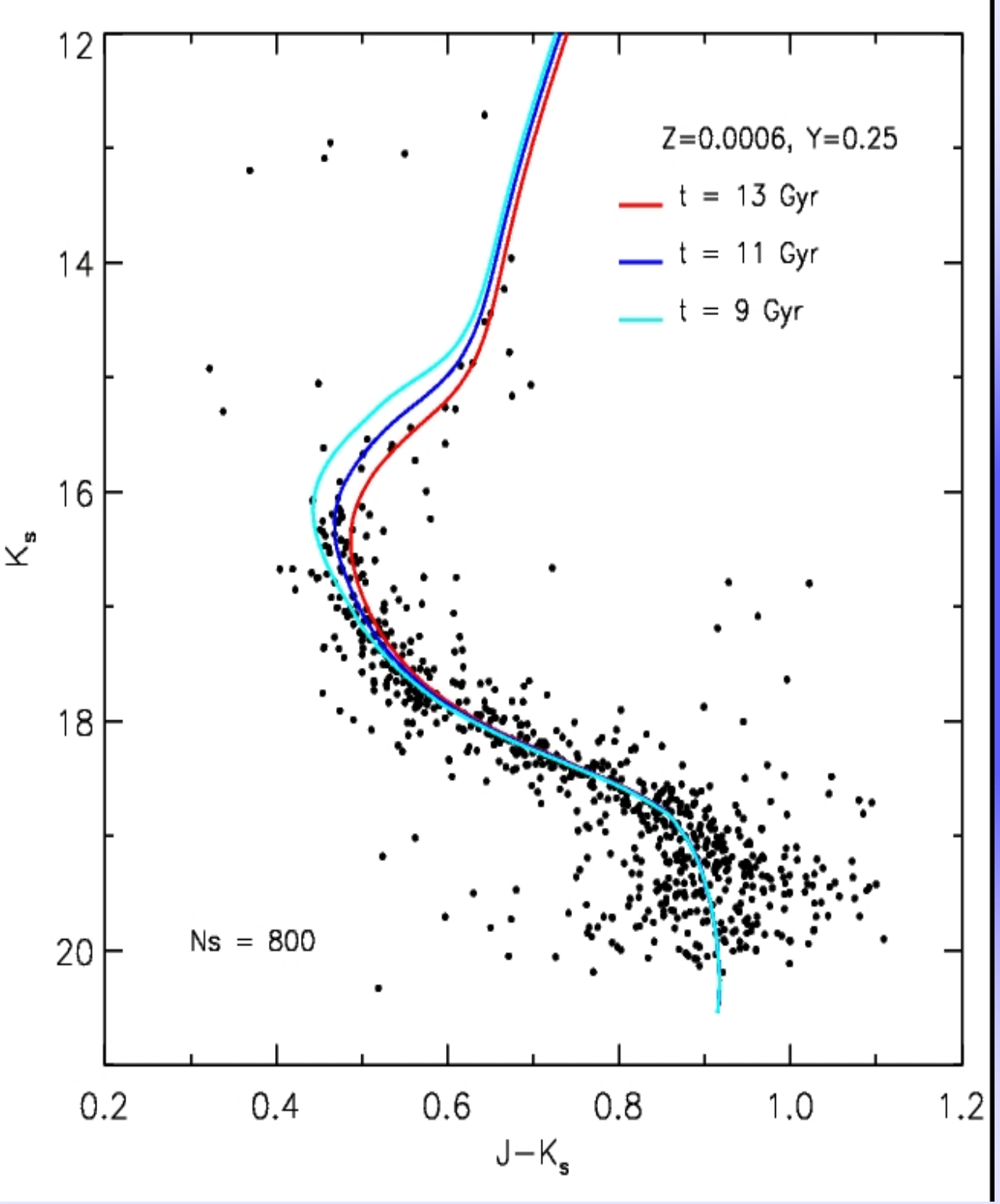


Annalisa Fecit!



CULPRIT:
H2 opacity

Stellar **structures for M~0.4 become completely convective**
but
Convection, due to the increase in density, is adiabatic !!!!!!


Z=0.0006, Y=0.25
t = 13 Gyr
t = 11 Gyr
t = 9 Gyr
Ns = 800
12
14
16
18
20
K_s
0.2
0.4
0.6
0.8
1.0
1.2
$J-K_s$

RO. SI. CA.

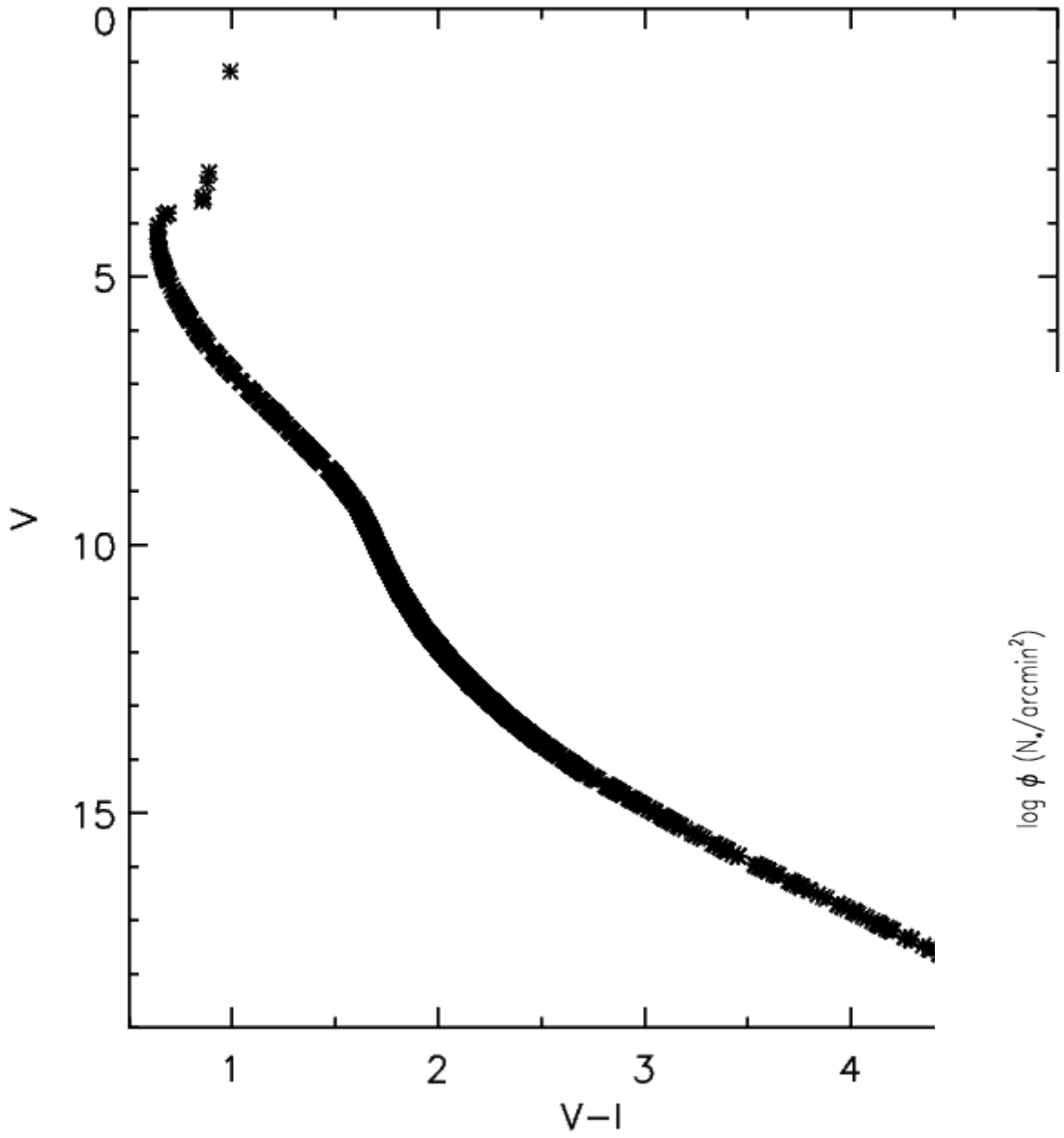
ROmafot Simulator & Cluster Analyzer

King profile → real density distribution
Synthetic CMD including from the Pre-MS to WDs
Field stars → Pisa Galactic model
Analytical PSF
CCD features

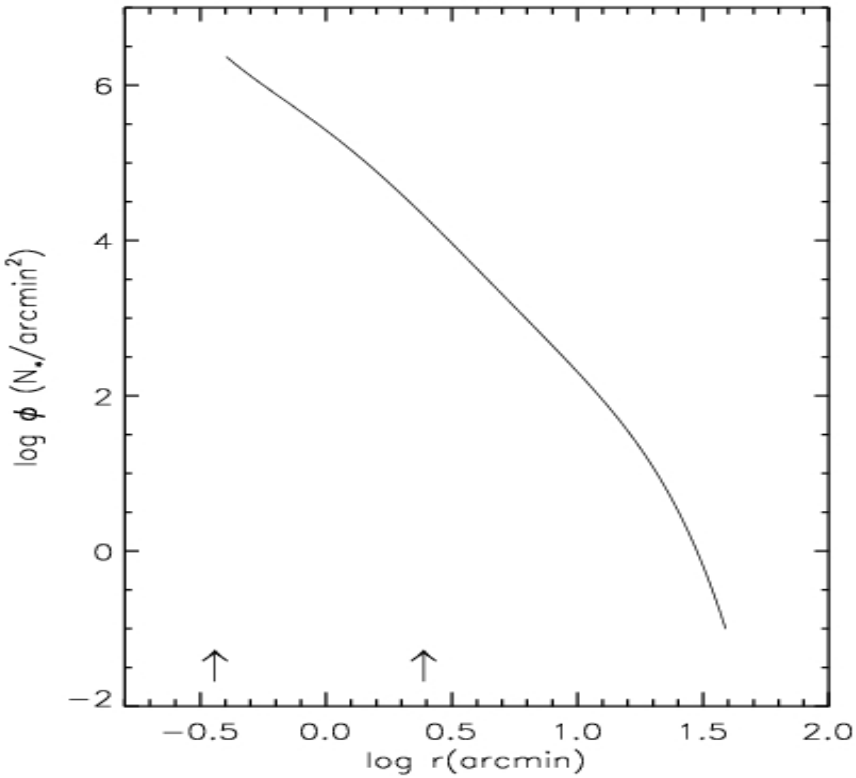
To be done

Sky background
Blooming of saturated stars
Trash [galaxies]
CCD defects

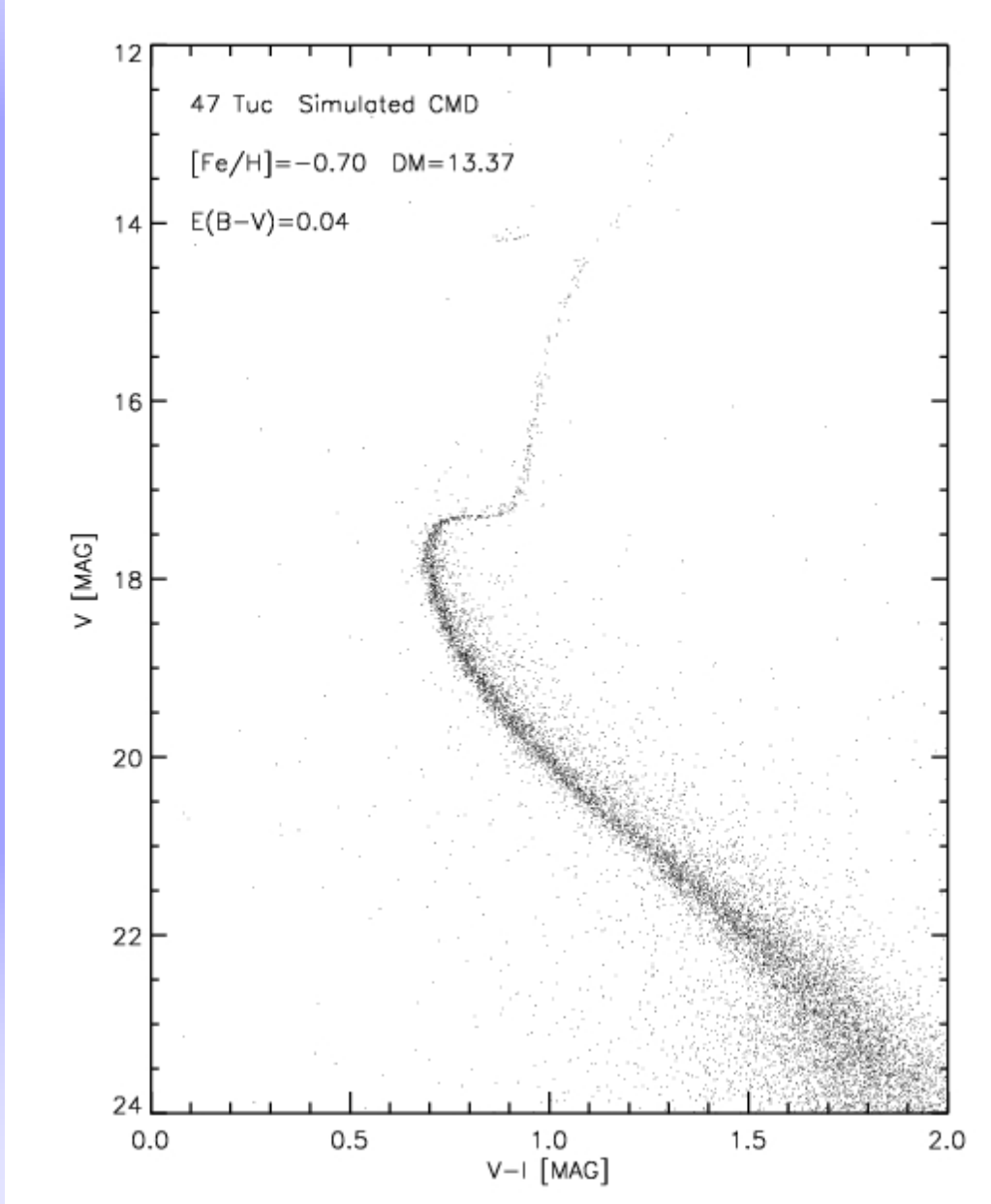
Synthetic CMD based on evolutionary tracks



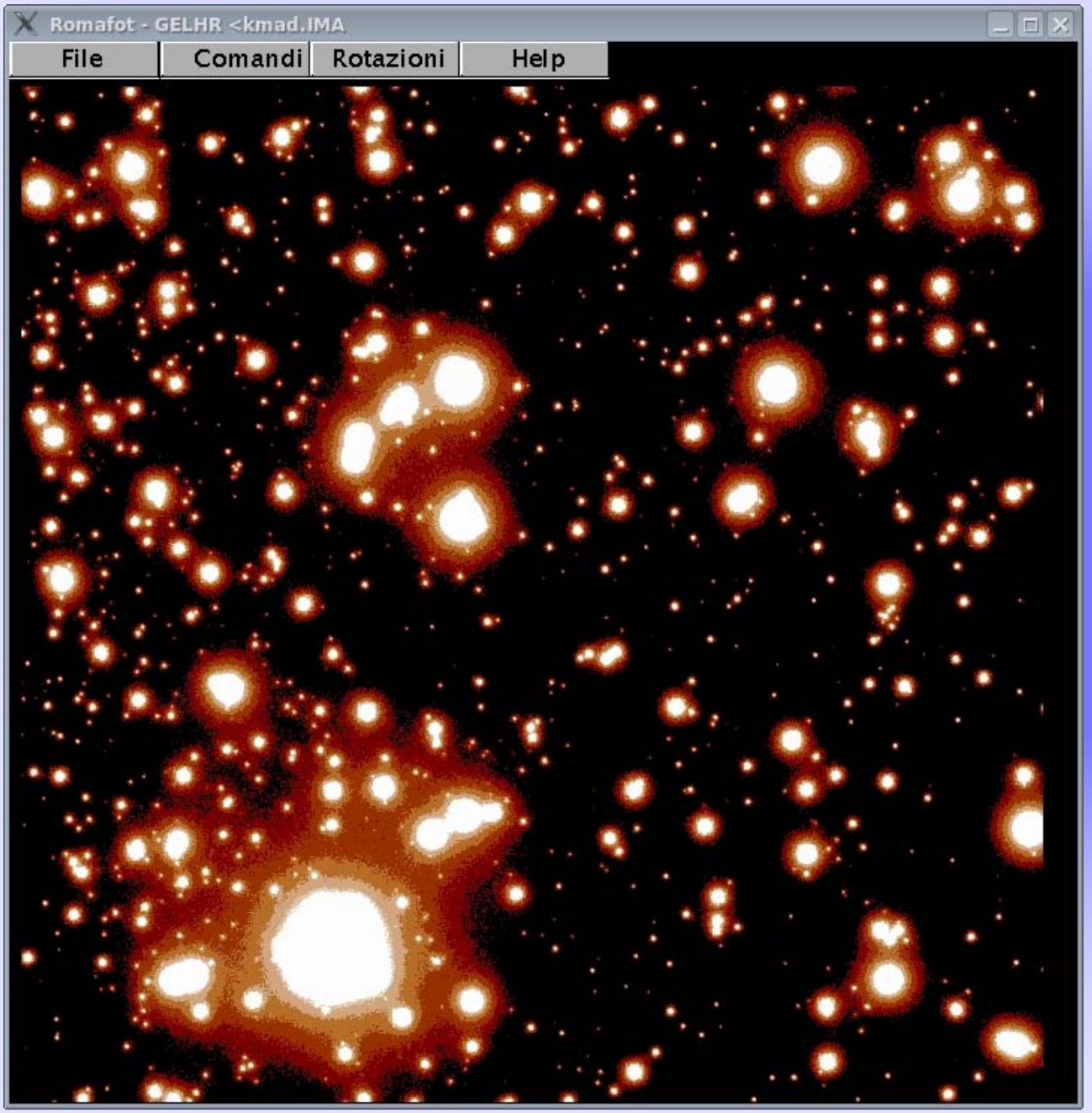
Homogeneous evolutionary tracks (10^6 stars) by Pietrinferni et al. (2006)



Recovered CMD from Synthetic Images

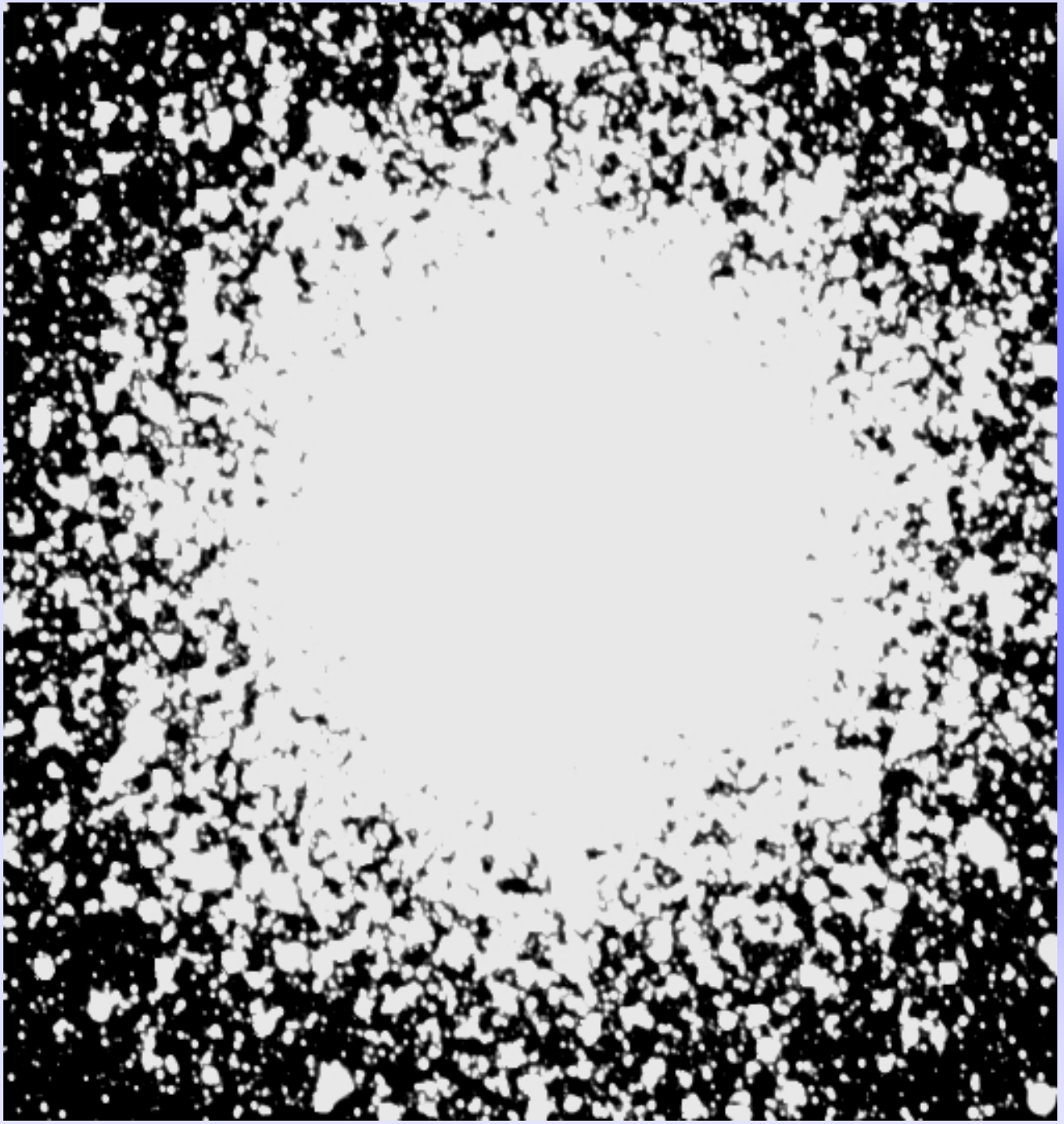


Synthetic K-band Image (MAD) for 47 Tuc



Off center field
FOV=1X1 arcmin^2
FWHM=0.1 arcsec
t_exp=5 sec
1500 stars

Synthetic K-band Image (MAD) for 47 Tuc



Central field
630,000 stars

Conclusions

→MAD is very successful experiment and we really hope that ESO will offer it for the next two years.

→Excellent gymnasium for testing and improving stellar simulations for E-ELT

→JWST vs. E-ELT
at 2μ FOV~2X2 sp. res.=0.03”/px like MAD!!!

→RO.SI.CA. working in progress

Καιρός Ψύχη Πραγματος !!!

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ADVANCED STELLAR EVOLUTIONARY PHASES

Chair: G. Bono

TECHNOLOGIES FOR THE NEXT GENERATION OF GROUND-BASED TELESCOPES

Chair: R. Ragazzoni

Scientific Organizing Committee G. Bertin (Univ. of Milan) › G. Bono (INAF-OAR) › A. Carusi (INAF-IFS), Rome) › A. Celotti (SISSA, Trieste) › C. Chiosi (Univ. of Padova) › L. Moscardini (Univ. of Bologna) *Local Organizing Committee* A. Calamida (INAF-OAR) › M. Castellani (INAF-OAR) › G. Giobbi (INAF-OAR) › P.G. Prada Moroni (Univ. of Pisa) *Organized by* Istituto Nazionale di Astrofisica › Astronomical Observatory of Rome › Astronomical Observatory of Padova › Società Astronomica Italiana *Sponsored by* Comune di Tarquinia

Lecturers

L.G. Althaus – Evolutionary Properties of Single and Binary White Dwarfs › G. Bono – Cluster White Dwarfs › A. Glindemann – High angular resolution and Interferometry › T. Herbst – Infrared instrumentation › D. Koester – White Dwarf Spectra - Observation and Analysis › B. Marano – Ground-based instrumentations in the next decade › S. Moehler – Hot stars in Globular Clusters › P.G. Prada Moroni – White Dwarfs and fundamental physics › R. Ragazzoni – Wide Field Cameras › F. Rigaut – Wide Field Adaptive Optics With Artificial Stars › H. Ritter – Formation and Evolution of Cataclysmic Variables › P.R. Wood – Evolutionary and Pulsation Properties of AGB stars

Credits

A. Calamida, M. Monelli,

P. Amico, S. D'Odorico, E. Marchetti

R. Buonanno, C. E. Corsi, S. Degl'Innocenti,

I. Ferraro, L. Freyhammer, G. Iannicola,

P. Prada Moroni, L. Pulone