Needles in a haystack: Globular clusters in Maffei 1

Ricardo Salinas
FINCA, University of Turku

A. Romanowsky (UCO/Lick), Pasi Hakala (FINCA)

Outline

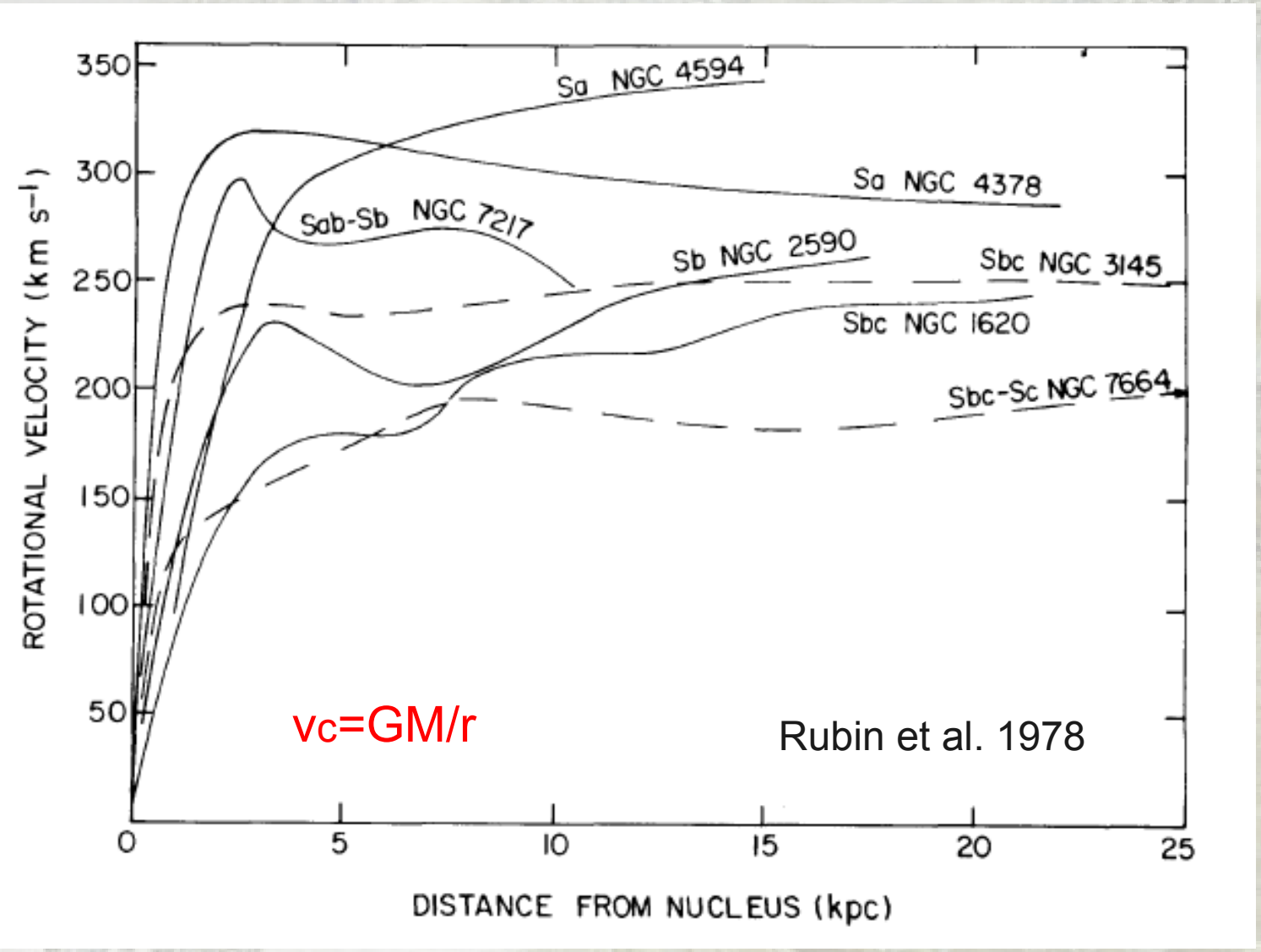
I. Introduction: Dark matter in elliptical galaxies

The cases of NGC 3311, NGC 4636 and NGC 7507

II. Our unknown neighbor: Maffei 1

III. Globular clusters in Maffei 1:
First results and outlook

Dark matter in elliptical galaxies



Dark matter in elliptical galaxies

Main observable is stellar velocity dispersion.

Kronawitter et al. (2000): 3 out of 21 ellipticals need DM

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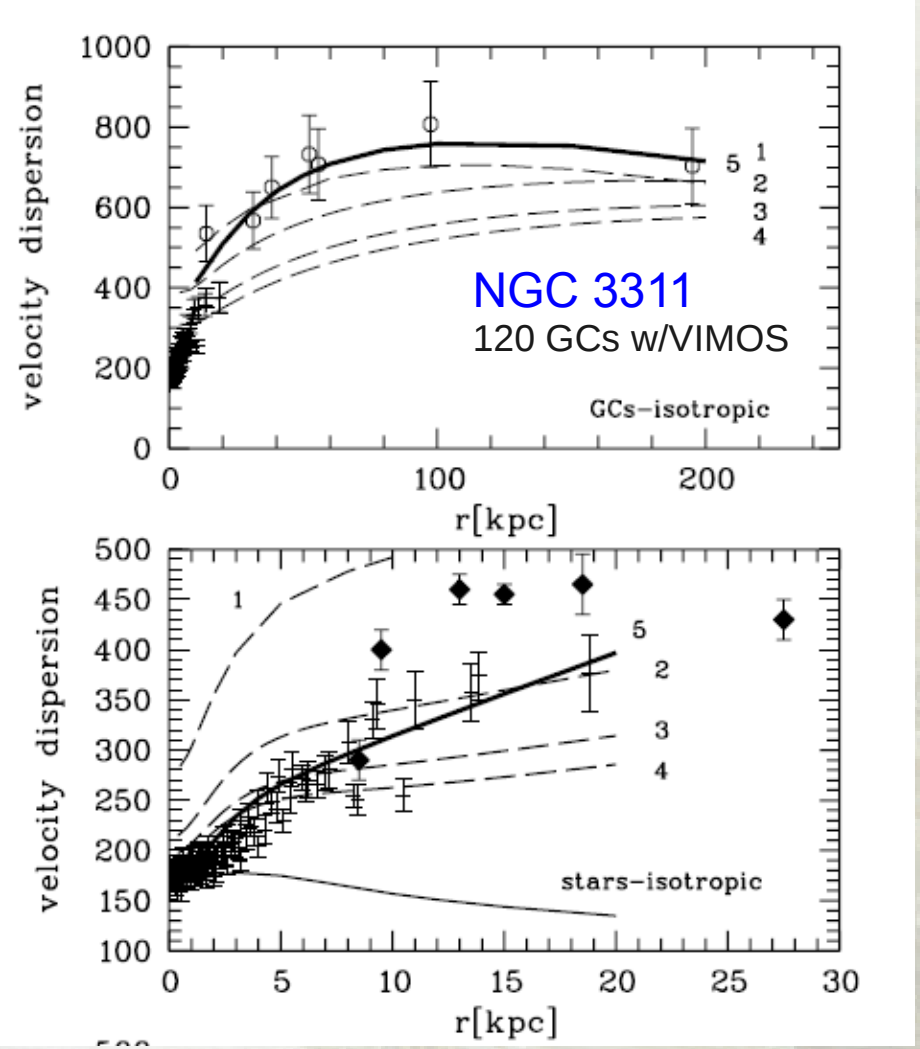
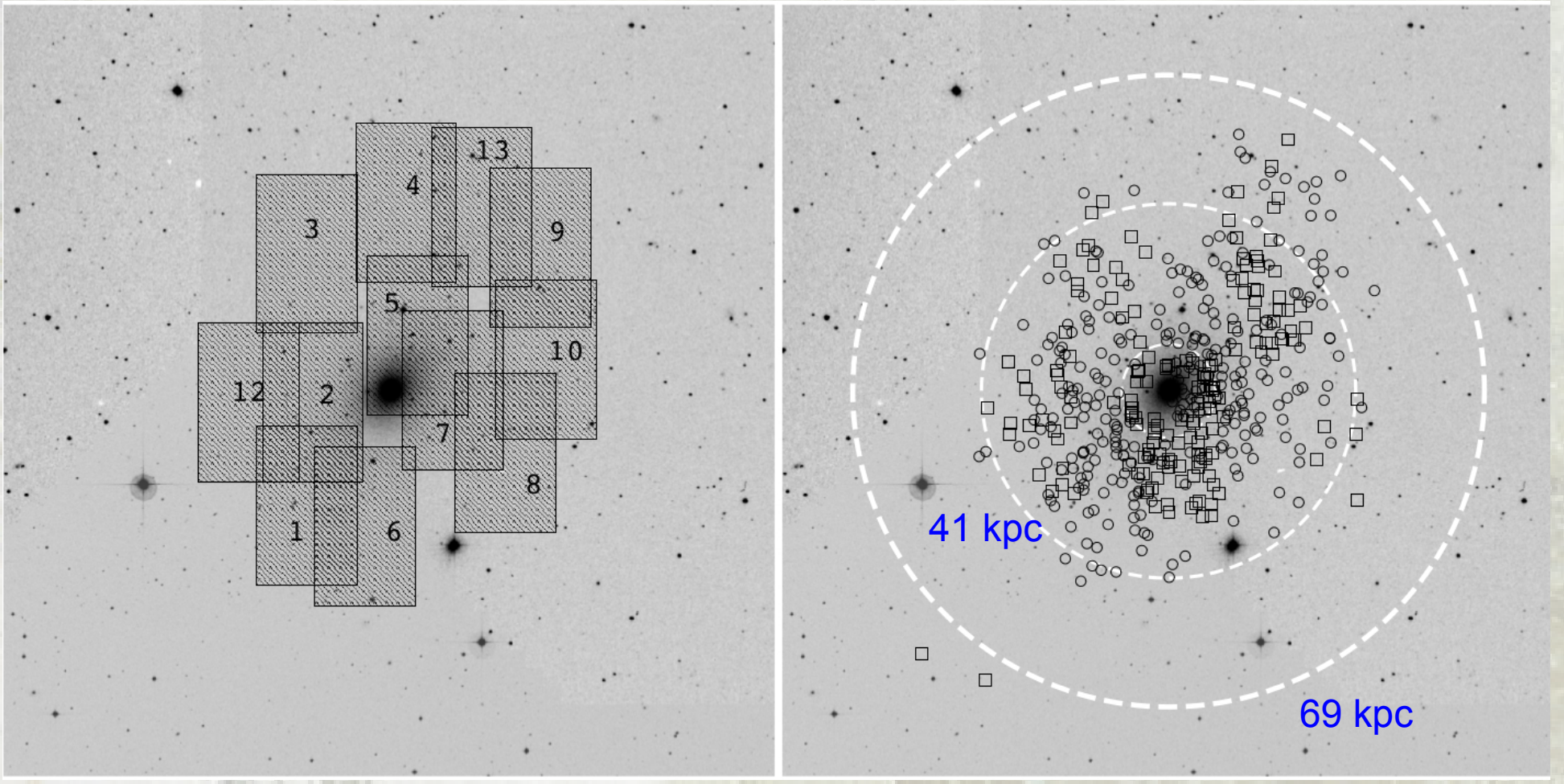


Richtler, Salinas et al. (2011)

Dark matter in elliptical galaxies: NGC 4636

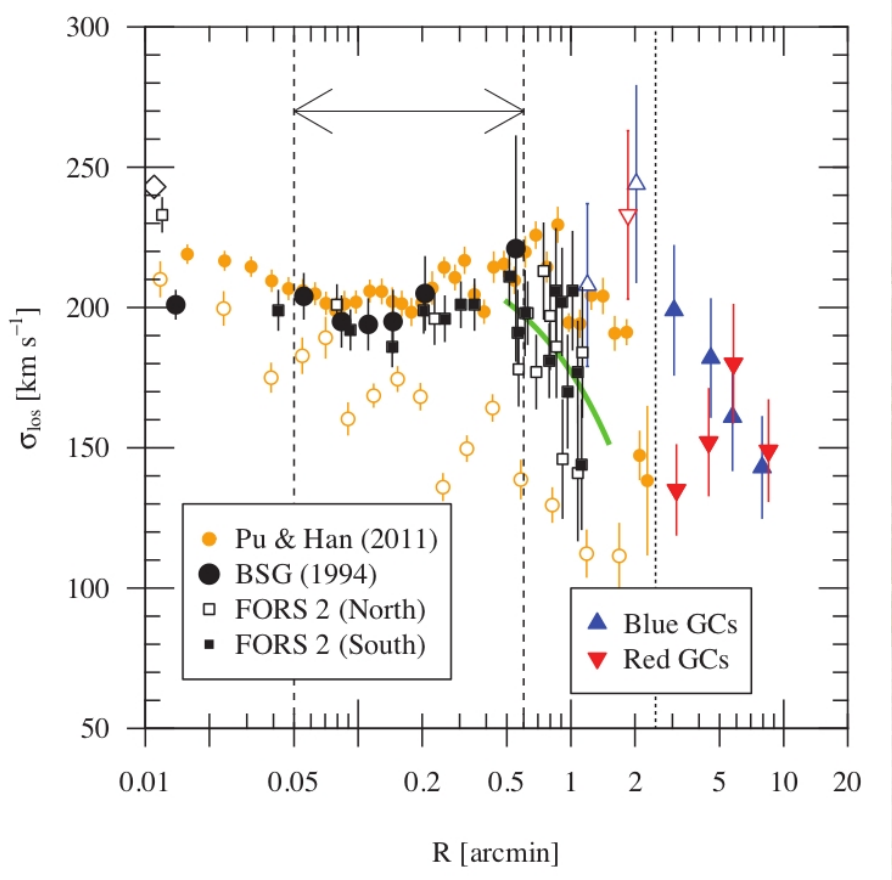
In the outskirts of Virgo at ~17.5 Mpc

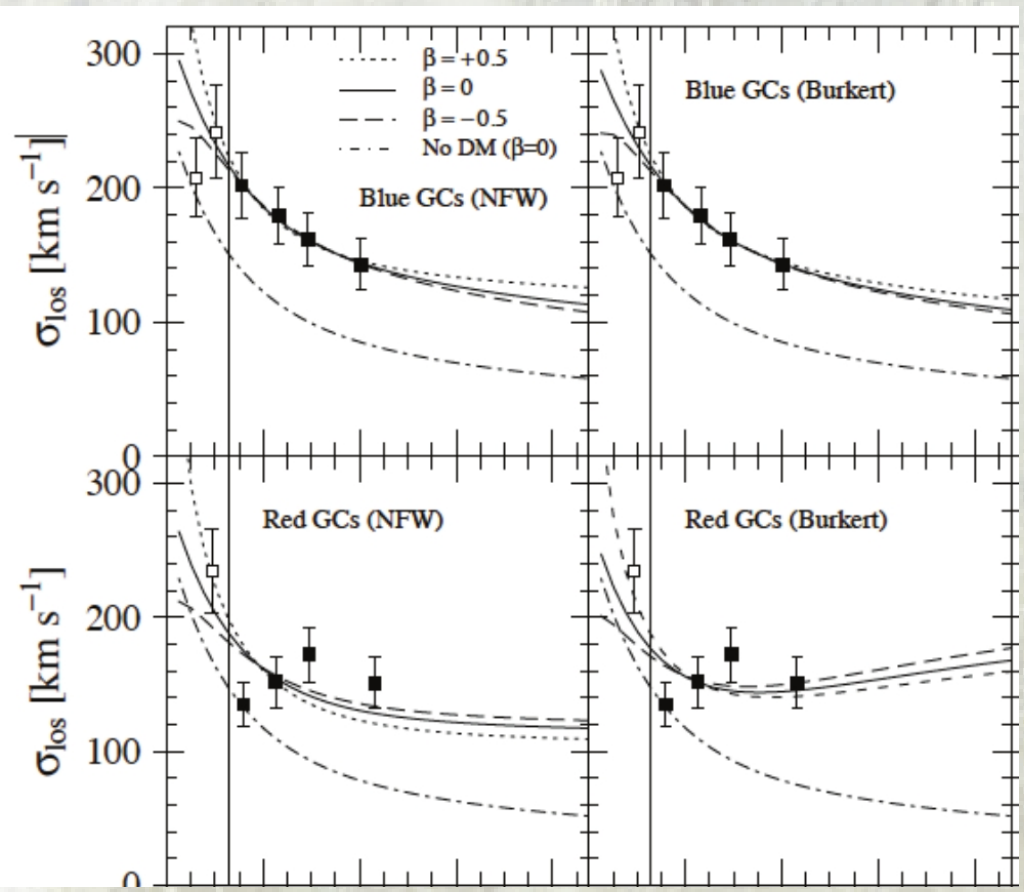


460 GC velocities using FORS2

Schuberth et al. 2012, A&A accepted, astro.ph 1205.2093

Dark matter in elliptical galaxies: NGC 4636





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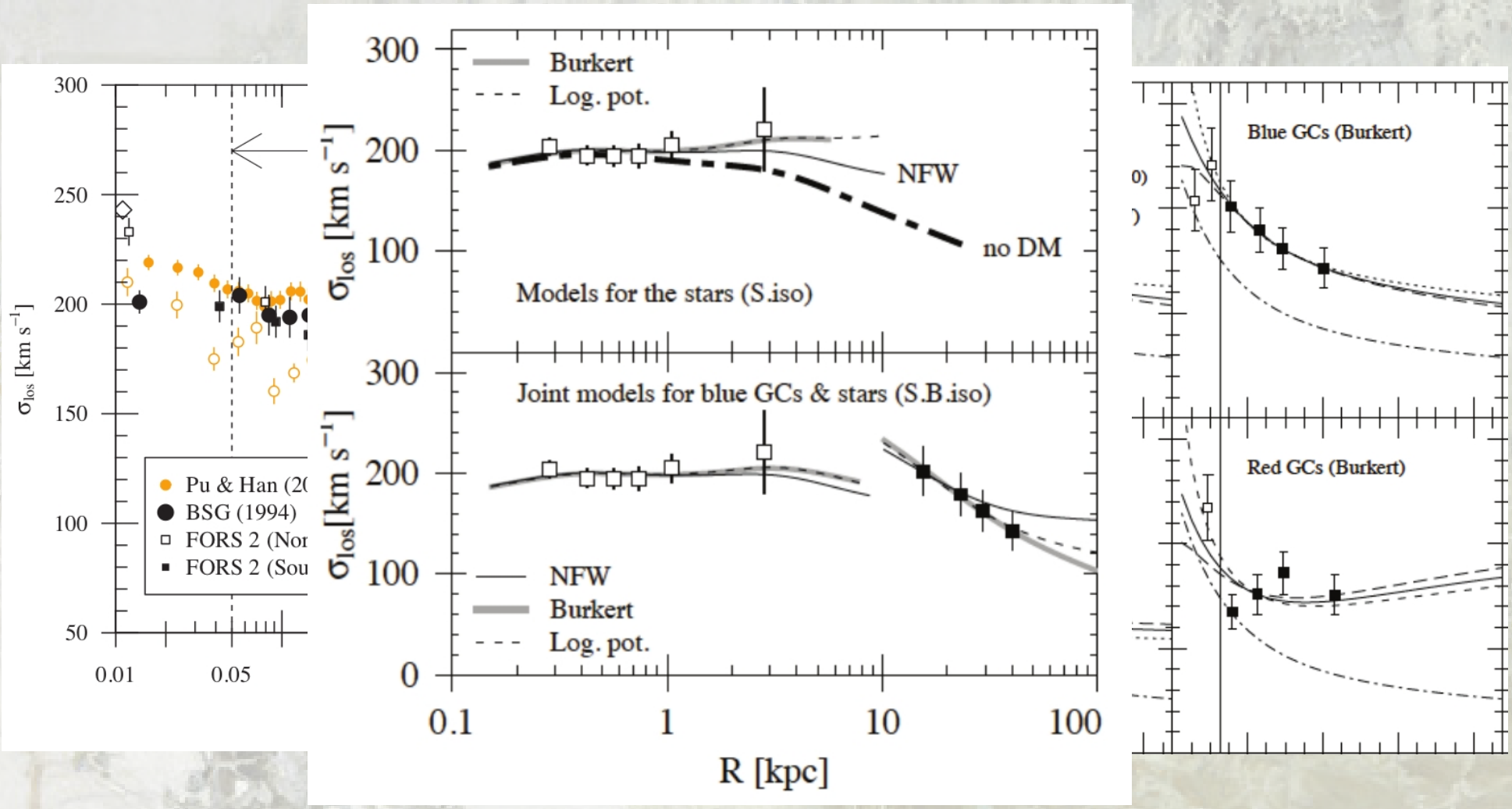
Dark matter in elliptical galaxies: NGC 4636



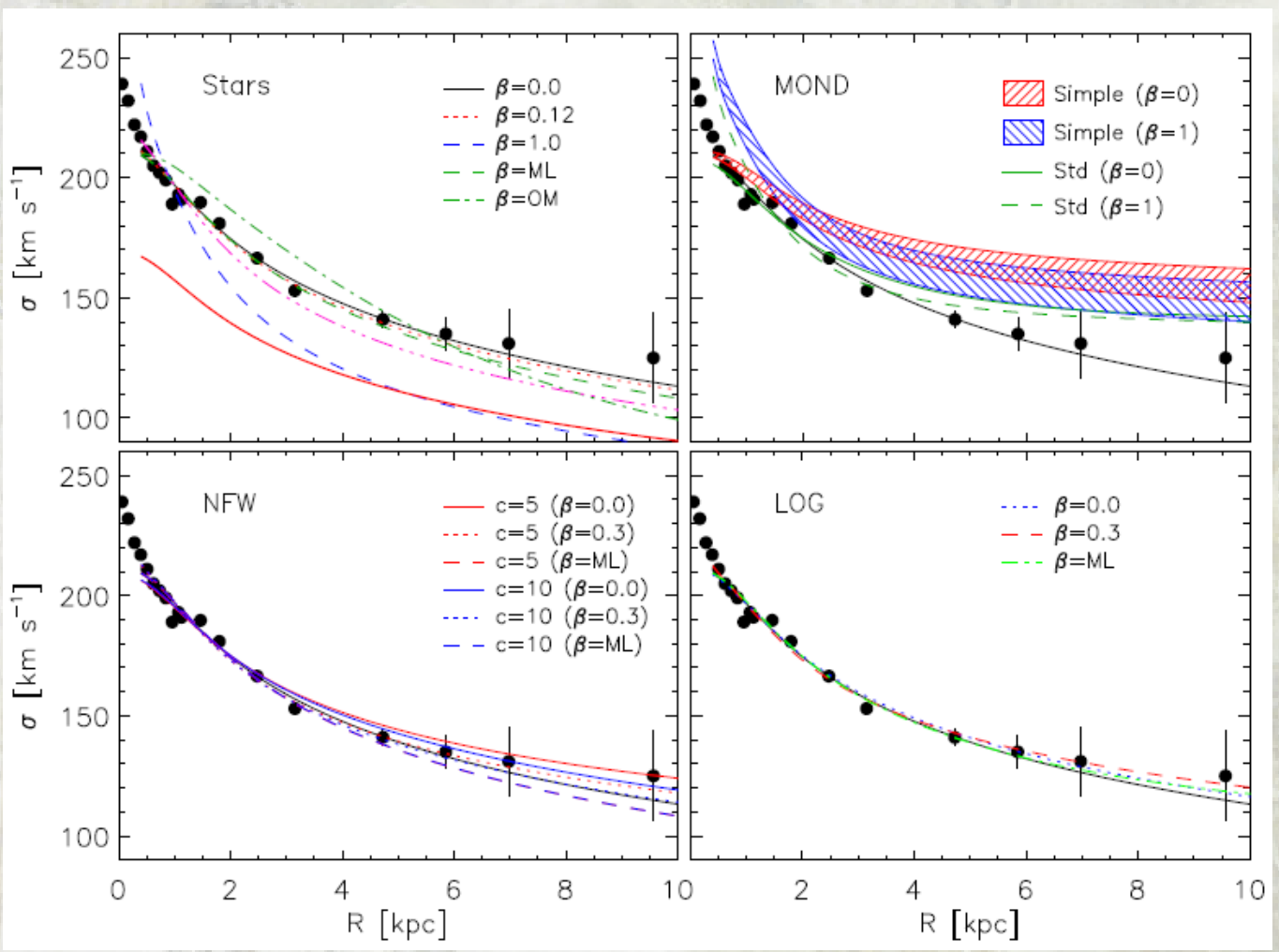
A “normal” DM halo, complying with simulations expectations and a previous X-ray analysis that considered an abundance gradient.

Schuberth et al. 2012, A&A accepted, astro.ph 1205.2093

Dark matter in elliptical galaxies: NGC 7507

NGC 7507: round, fairly isolated and nearby (~23 Mpc)

GMOS major and minor axis long-slit observations.



All the models indicate a low dark matter content

Salinas et al. (2012), A&A 538, A87

Our close and distant neighbor: Maffei 1

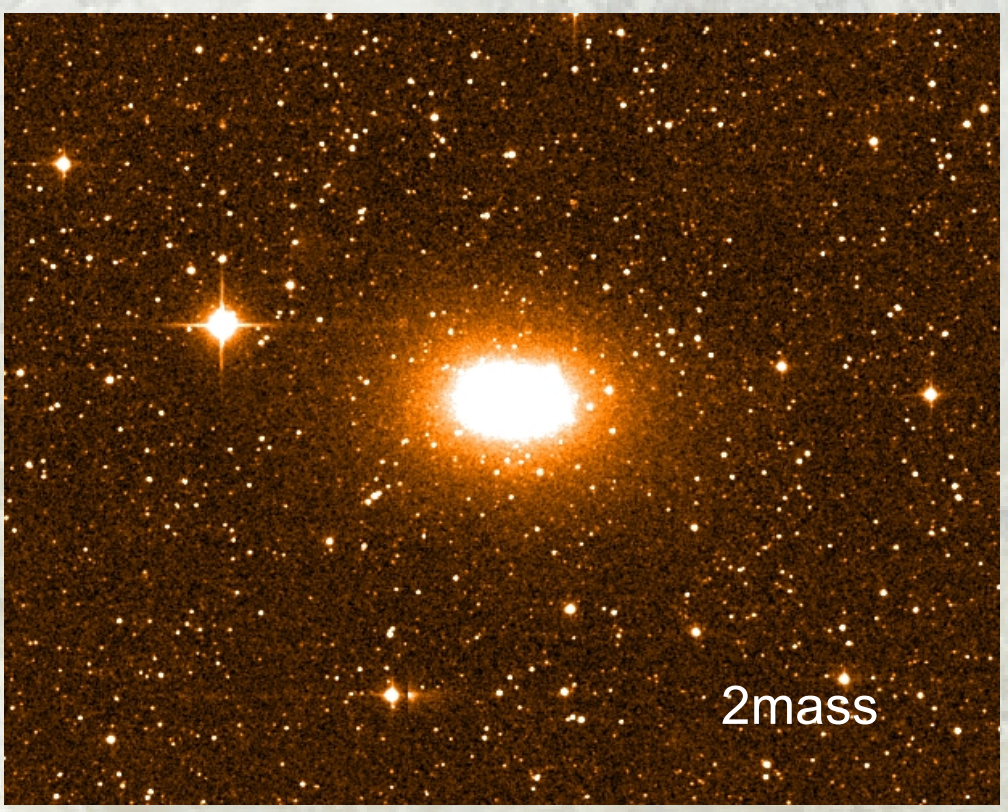
D=2.8 Mpc (Fingerhut et al. 2007)

b = -0.5° ; l=135.8°

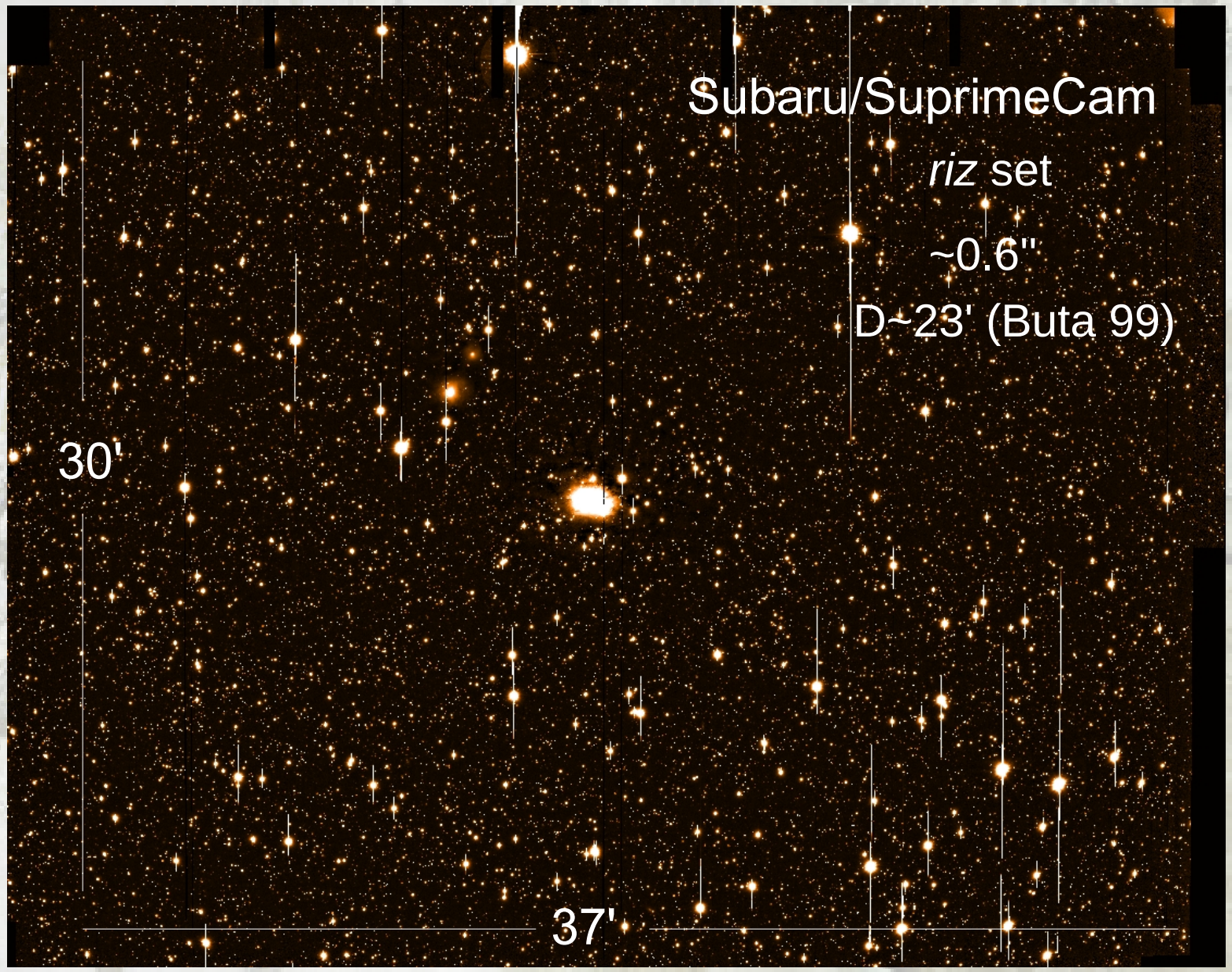
A_v=4.7 mag

v= +66 km/s

Dec= +59.43° (!)



Globular clusters in Maffei 1: the dataset



~100 000 objects and ~500 Gcs?

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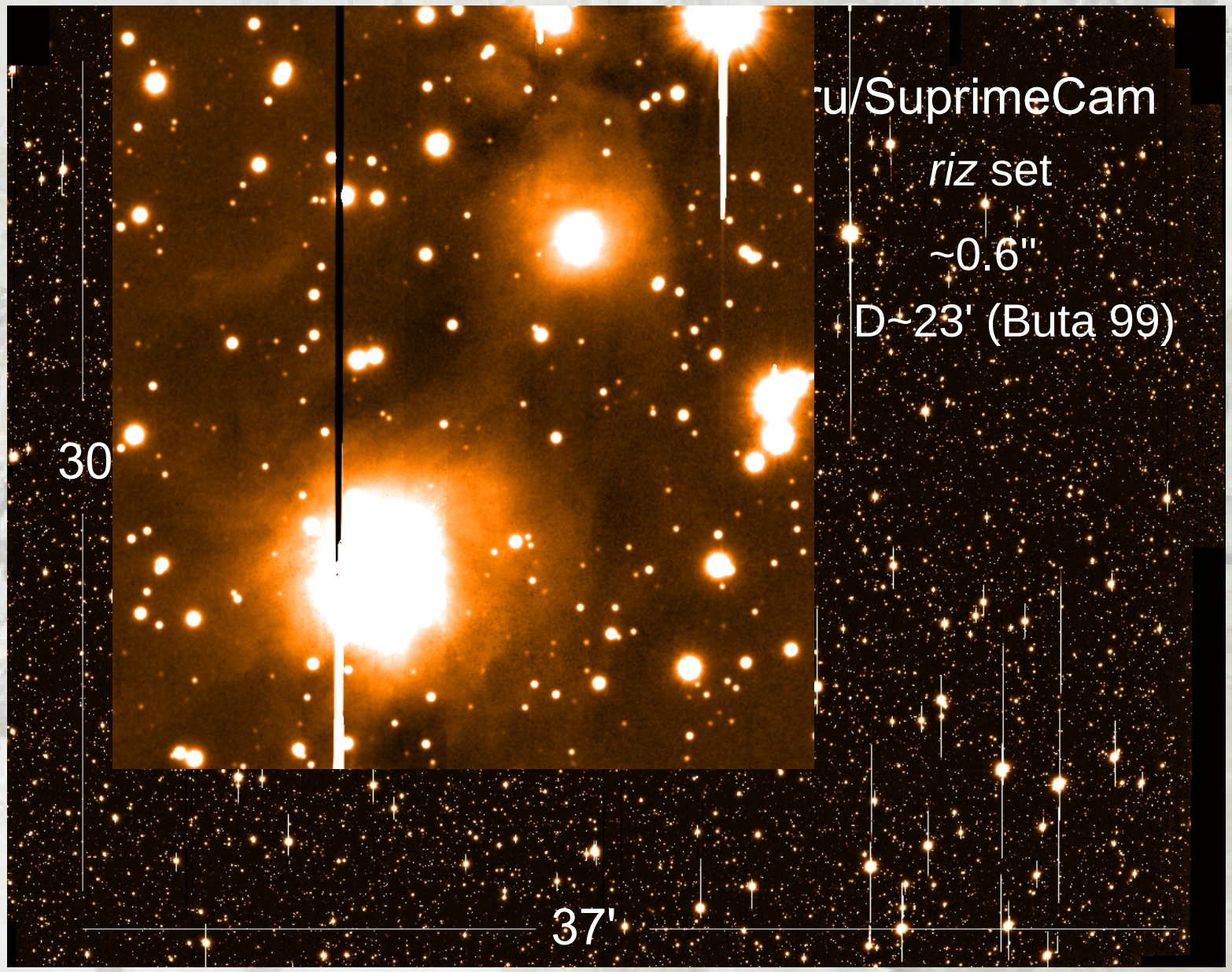

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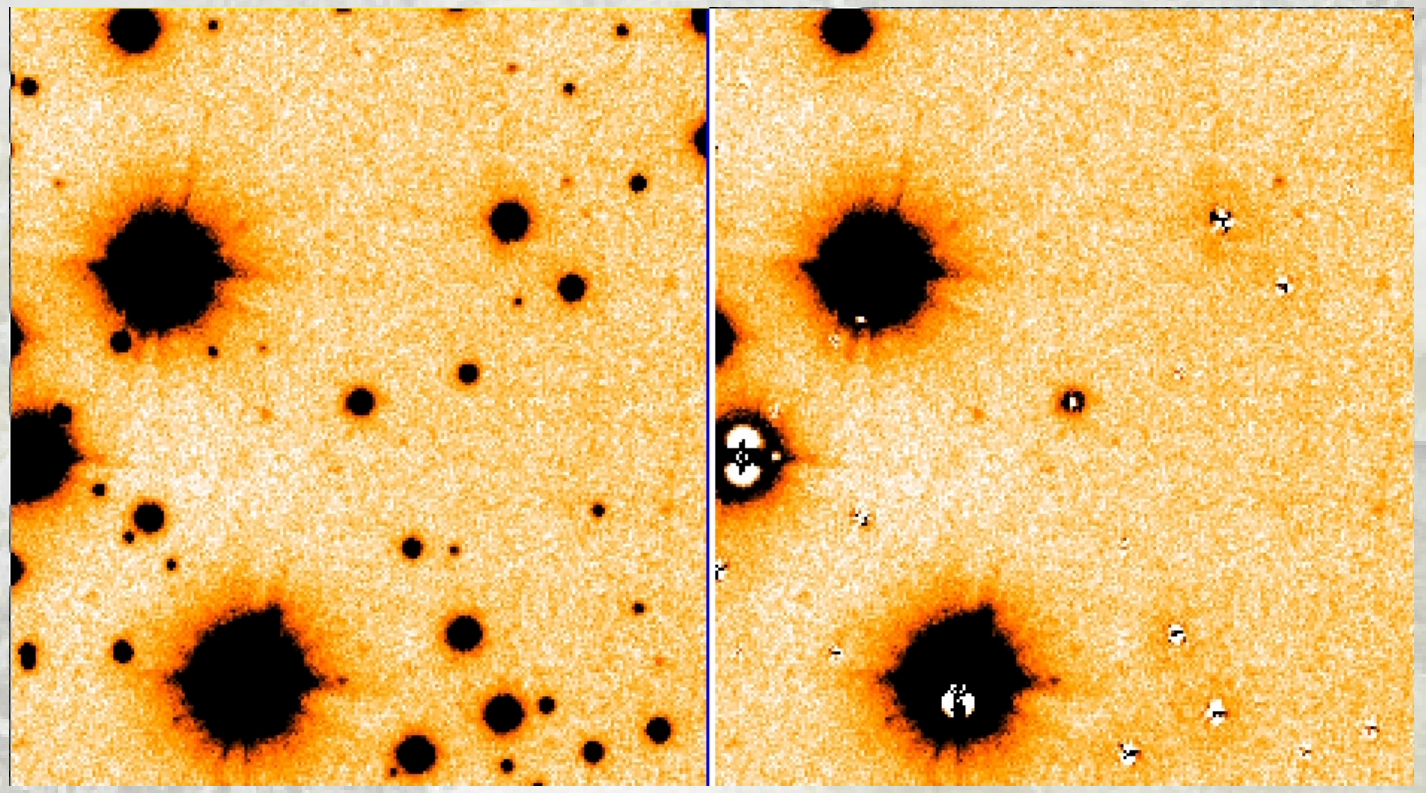
Globular clusters in Maffei 1: identification



GC identification -> psf fitting (e.g. Rejkuba 2001 for CenA)

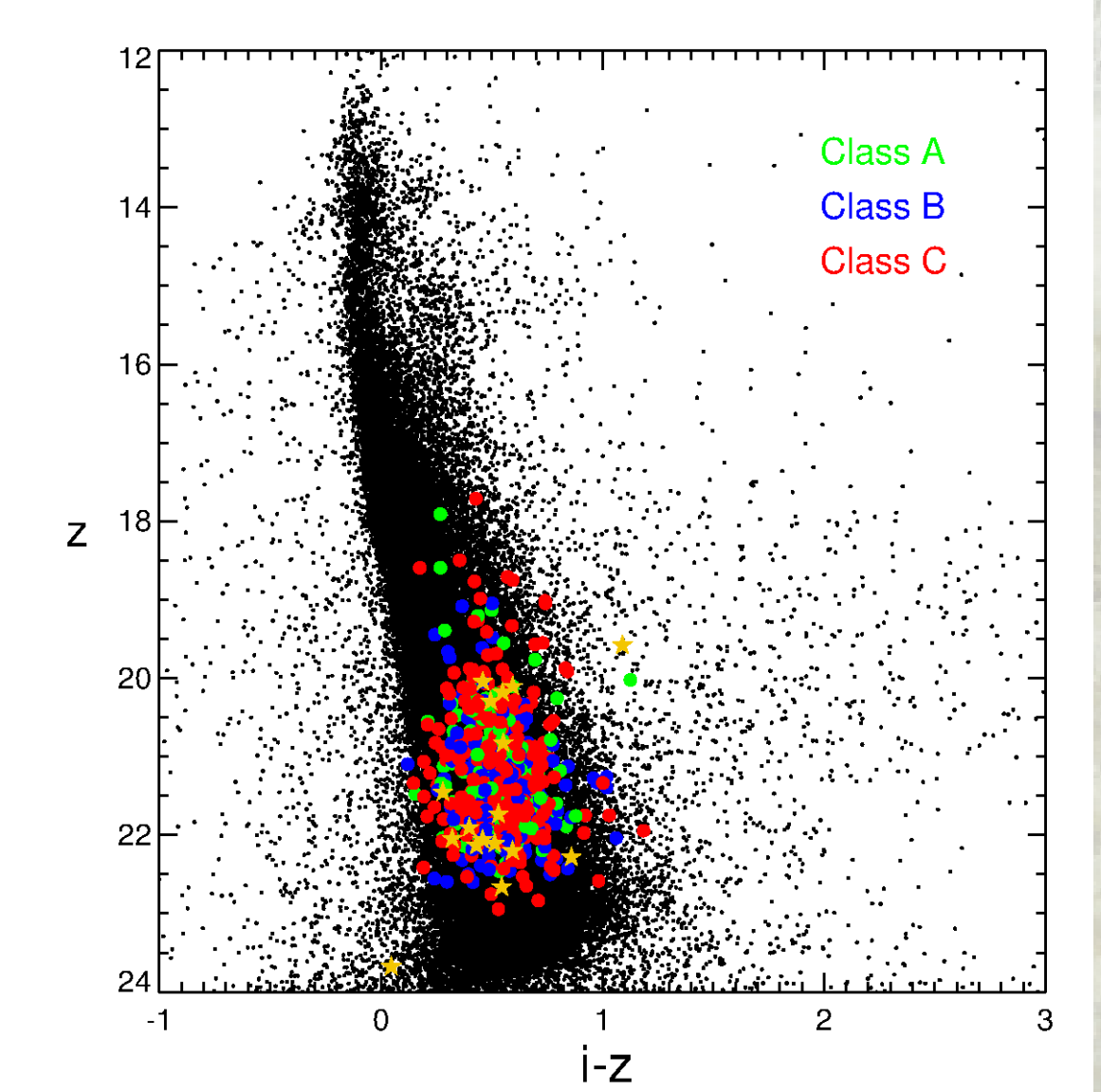
Class A: ring-shaped residuals --> 137 objects

Class B: elongated residulas with e<0.3 --> 192 objects

Class C: asymmetric residuals or FWHM>6pix --> 293 objects

Davidge (2002): no candidates; Buta & McCall (2003): 20 candidates;
Davidge & Van den Bergh (2005): an excess population

Globular clusters in Maffei 1: CM diagrams



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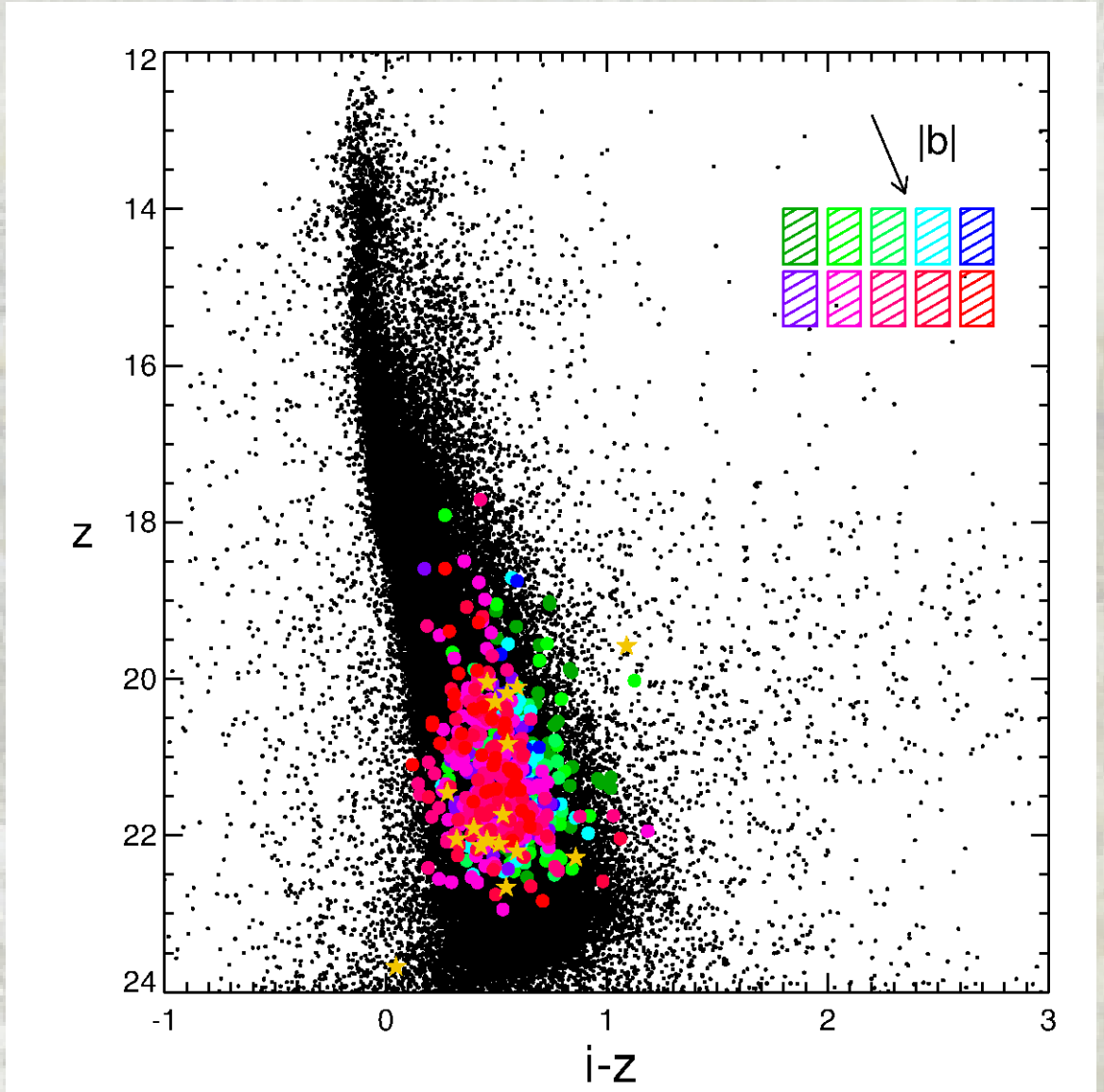
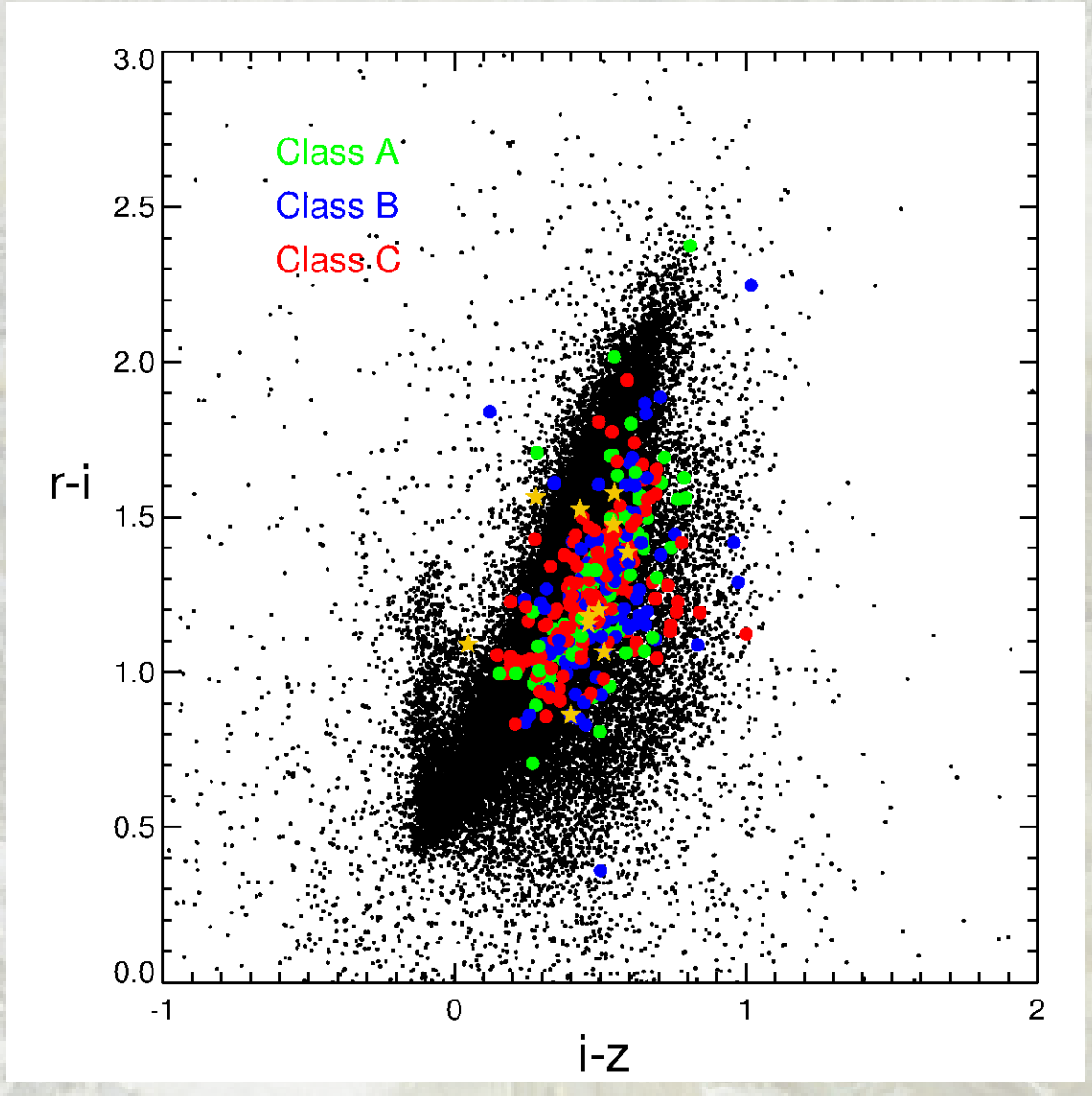


Globular clusters in Maffei 1: color-color diagrams



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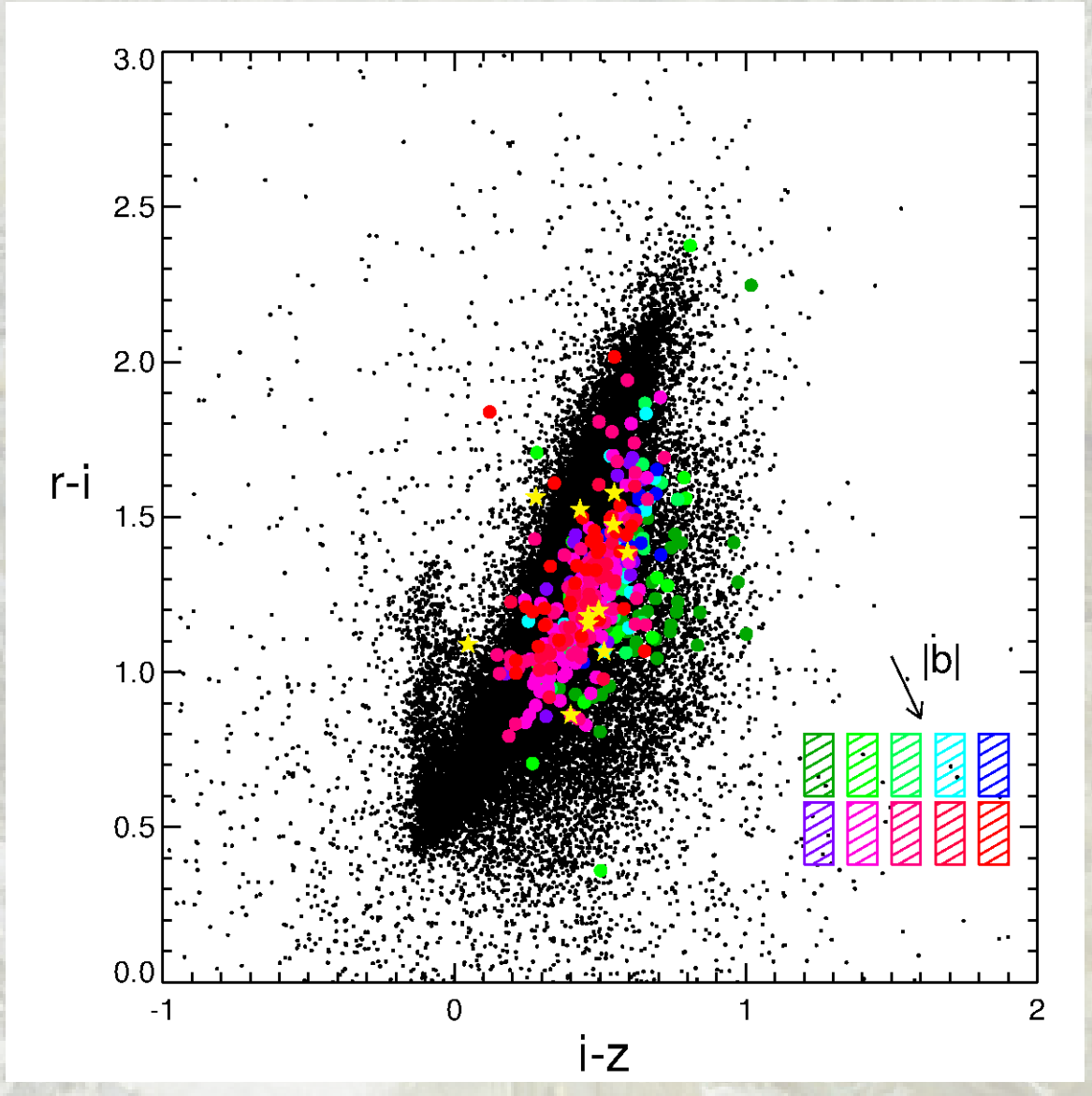
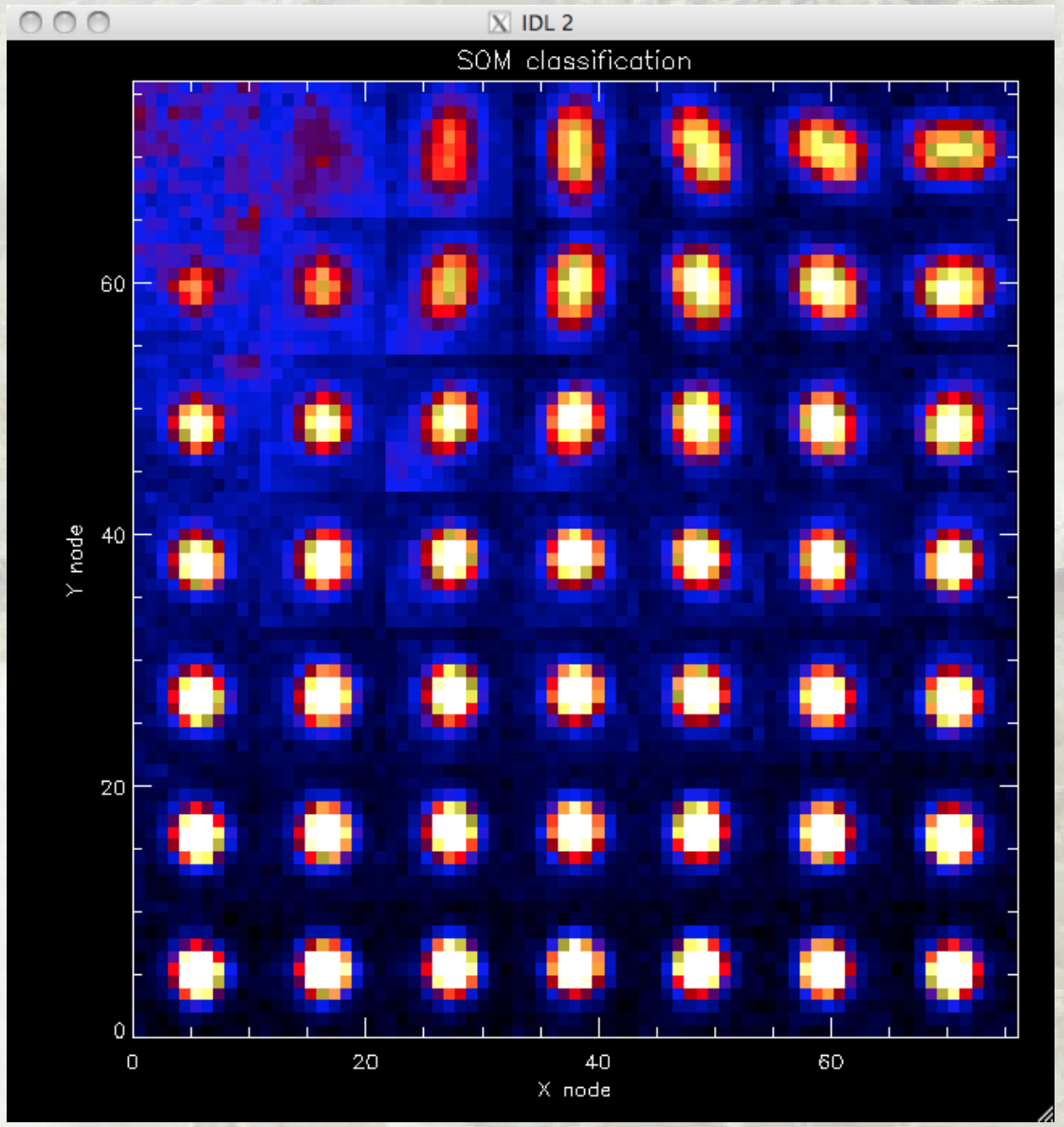


Globular clusters in Maffei 1: an alternative path?

(with Pasi Hakala)

Self-Organizing Map
(Mähönen & Hakala 1995)

Has to be trained with “fake” globular clusters.



Follow-up observations and outlook

One mask with Keck/DEIMOS -> only 15 minutes under bad conditions :(
(with A. Romanowsky and J. Arnold)

Next semester?: 3 nights with the NOT/NOTCAM
K-band imaging of 20 small fields (fov 4'x4')
K-band spectroscopy of ~20 bright GC candidates
(with A. Romanowsky, J. Vanderbeke and J. Reunanen)

Next year?: Subaru/FMOS --> 400 fibers in 30' ; J-H spectroscopy