Interstellar extinction and Galactic Structure (CT15)

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Introduction

We are in the plane of the Galaxy - difficult to understand the structure due to uncertain extinction and distance ambiguity – effect of the dust clouds in the line of sight.

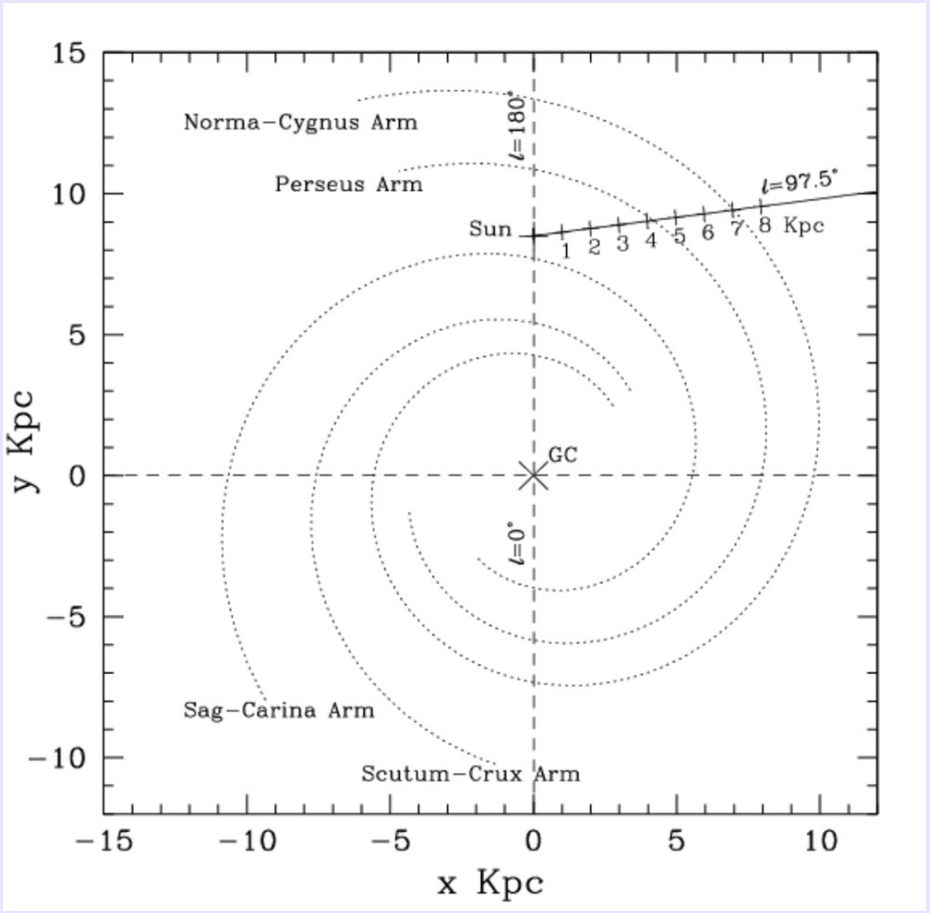
Make use of large scale, broad band, infrared surveys

- e.g. DENIS, 2MASS, etc
- Mid-infrared using observations from ISO (ISOGAL) and Spitzer (GLIMPSEs/GALCEN)

Trace the Red Clump stars in the field ...

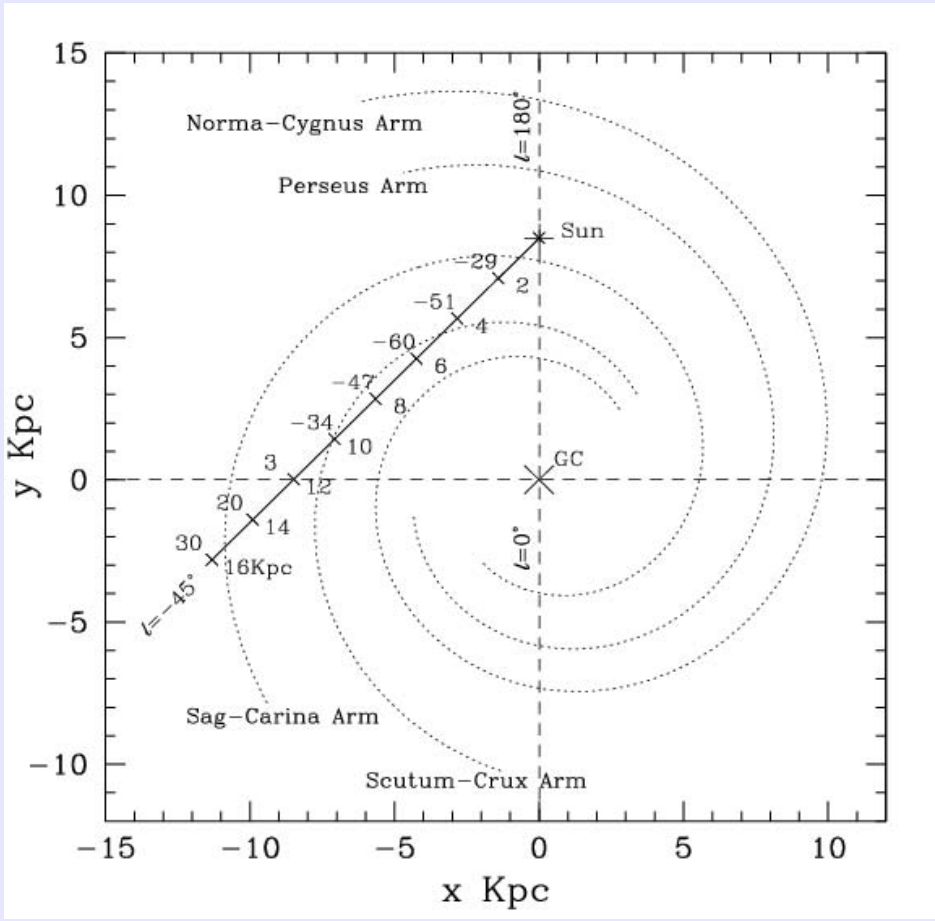
Introduction

Two directions in the Galactic plane (disk)



Galactic longitude = 97deg

Northern sky



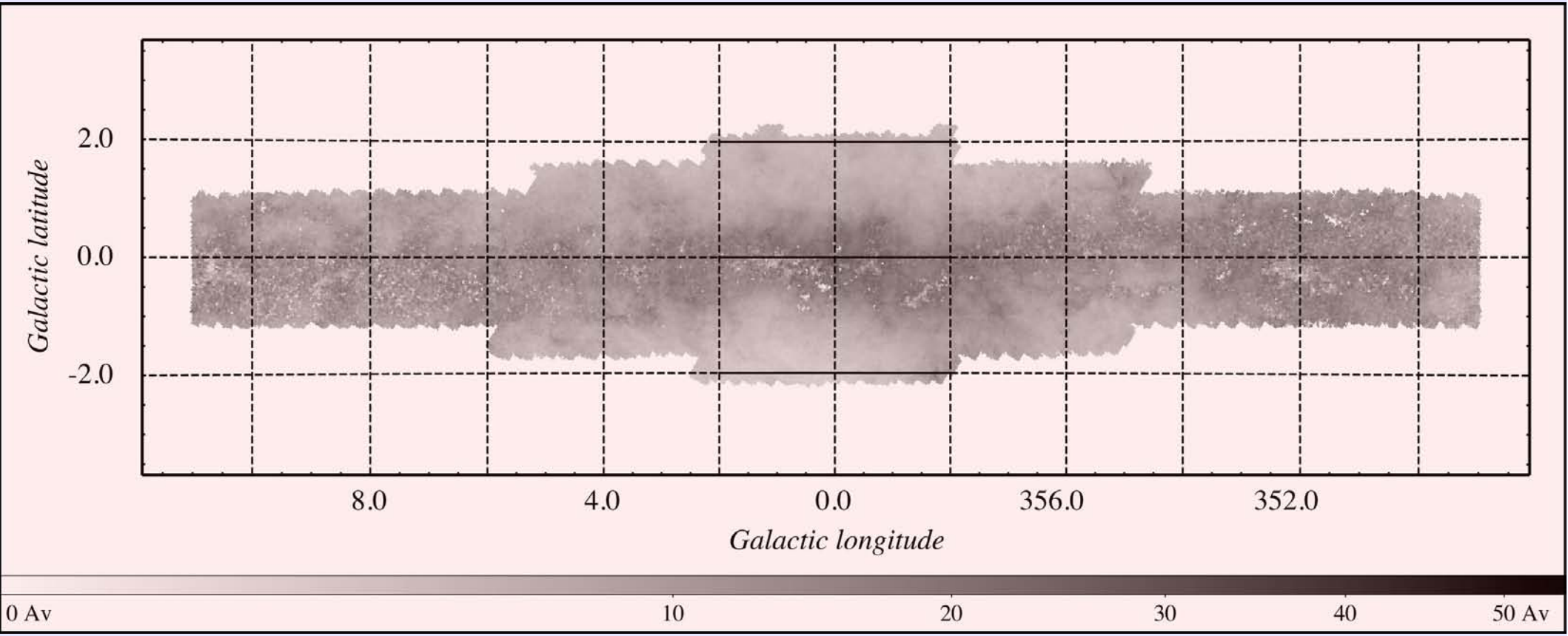
longitude = -45deg

Southern sky

... bulge

Inner bulge extinction map with 2MASS near IR photometry

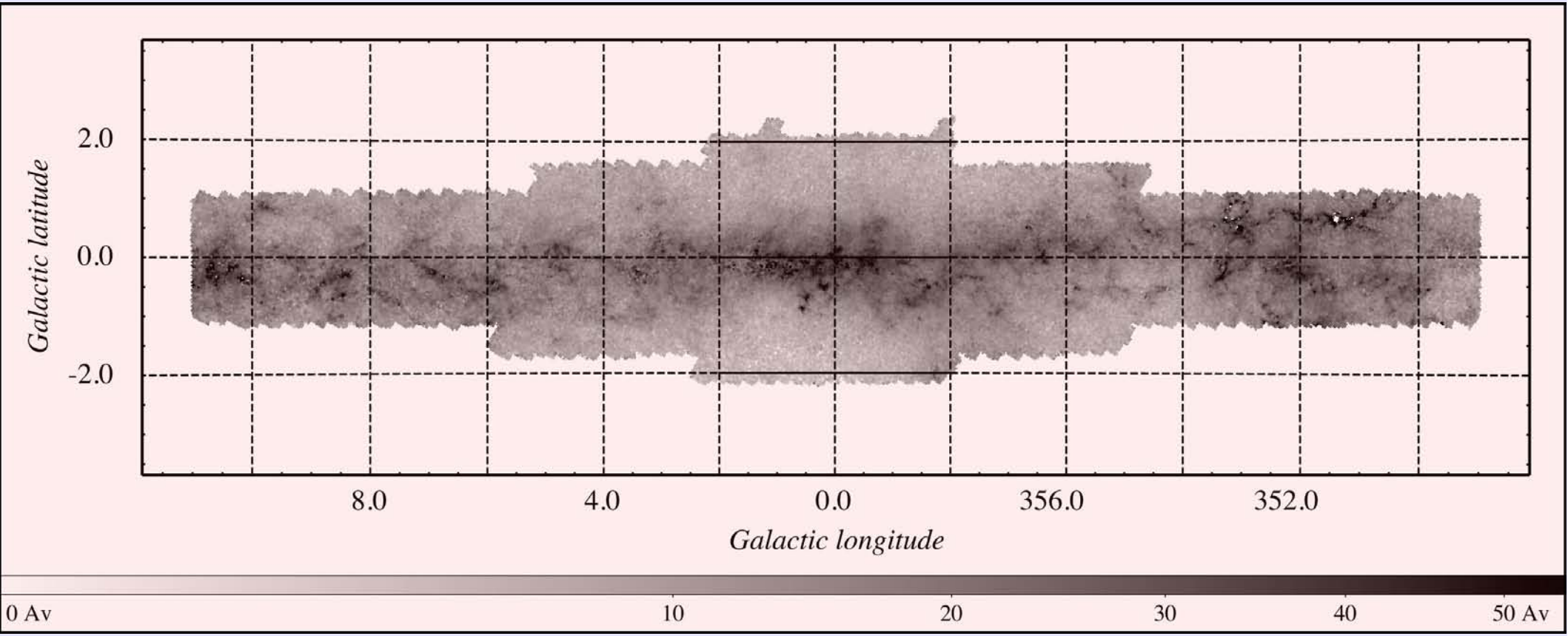
Extinction map using J, Ks data and RGB isochrones



Extinction < 40Av only probed in NIR
(e.g. Schultheis, Ganesh, Simon et al., A&A 1999 – DENIS map)

Inner bulge extinction map with Spitzer GLIMPSE-II & GALCEN

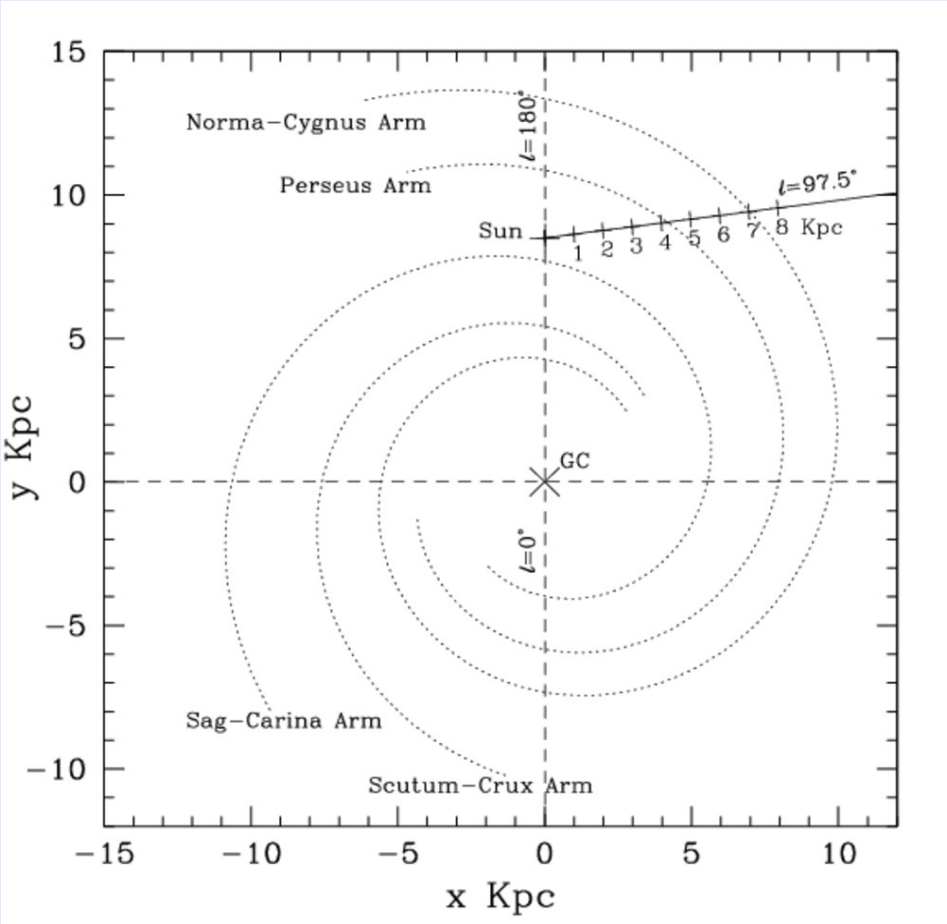
Using MIR photometry + MIR RGB isochrones



Extinction > 50Av

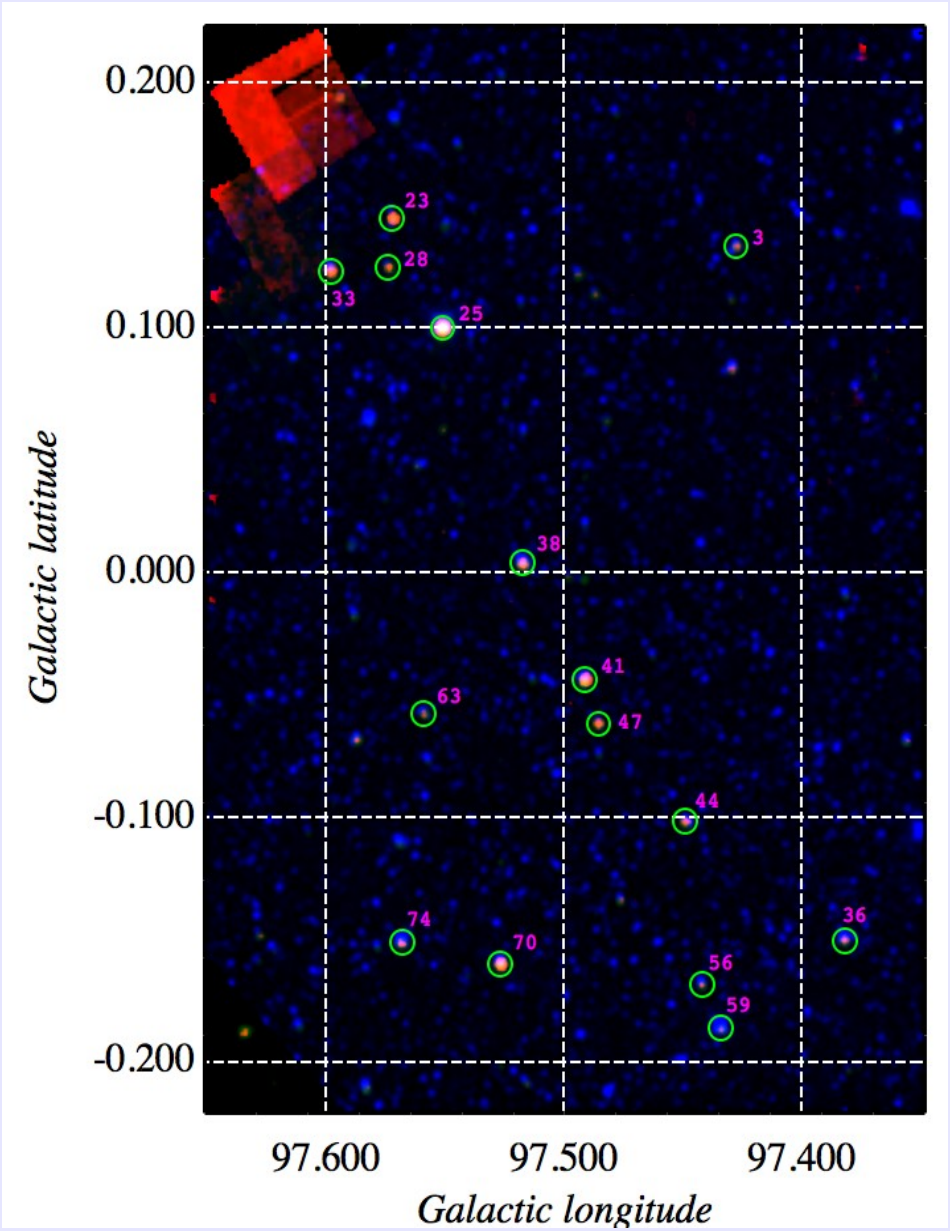
in some areas it is > 80Av

Interstellar extinction and polarisation in L97 field

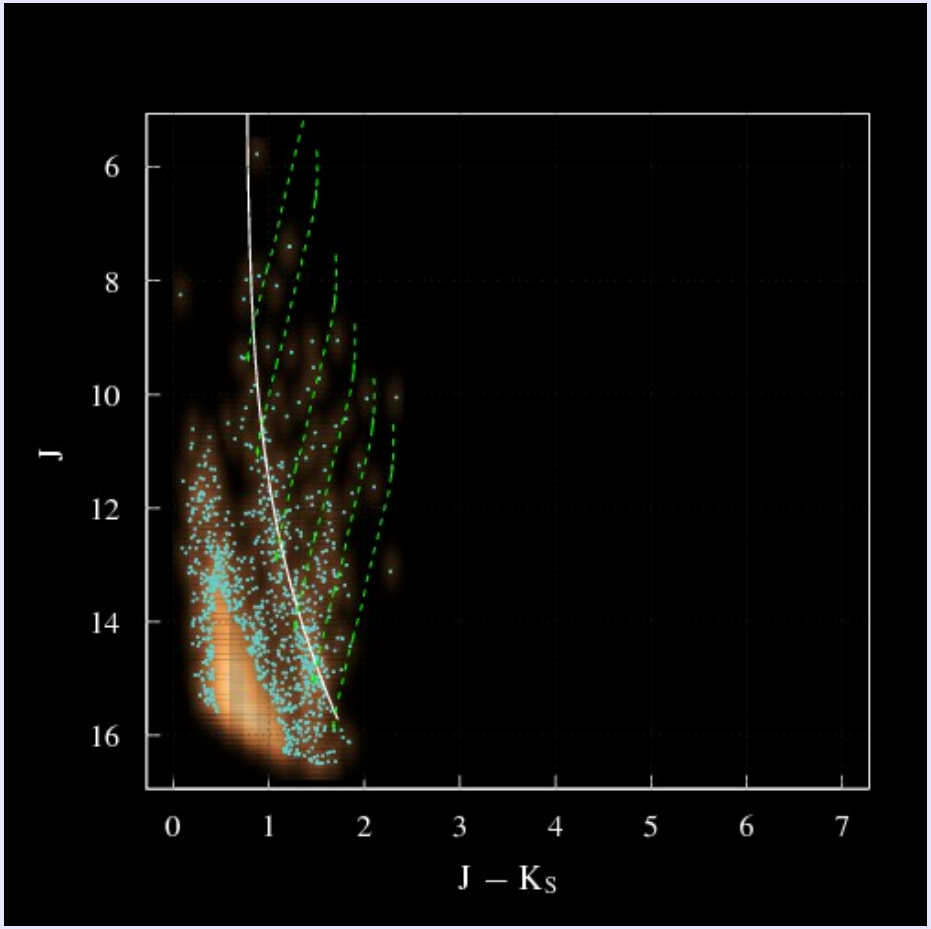


The L97 direction

(Ganesh et al., in prep)



Interstellar extinction and polarisation in L97 field



Full CMD

$$J = M_J + 5\log(d/10) + c_J(d/1000)$$
$$J - K_S = M_J - M_{K_S} + (c_J - c_{K_S})(d/1000)$$

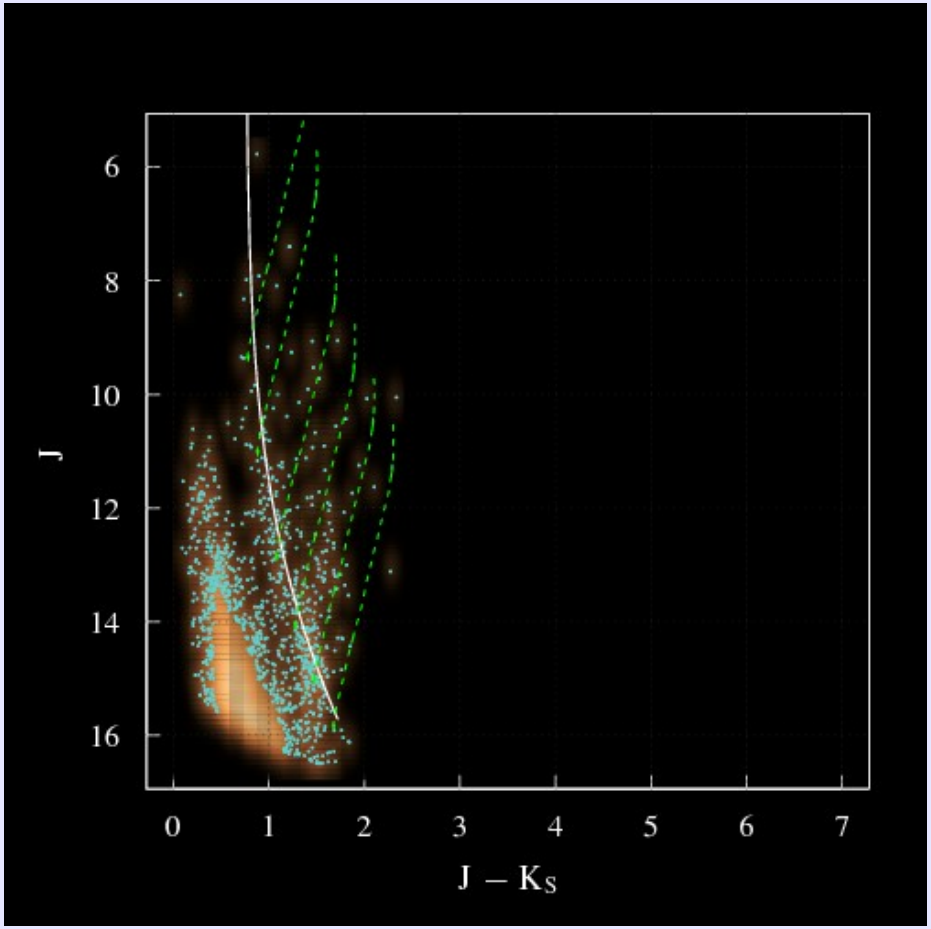
For red clump stars (K2 giants)

M_J = -0.95 and M_{Ks} = -1.65 mag

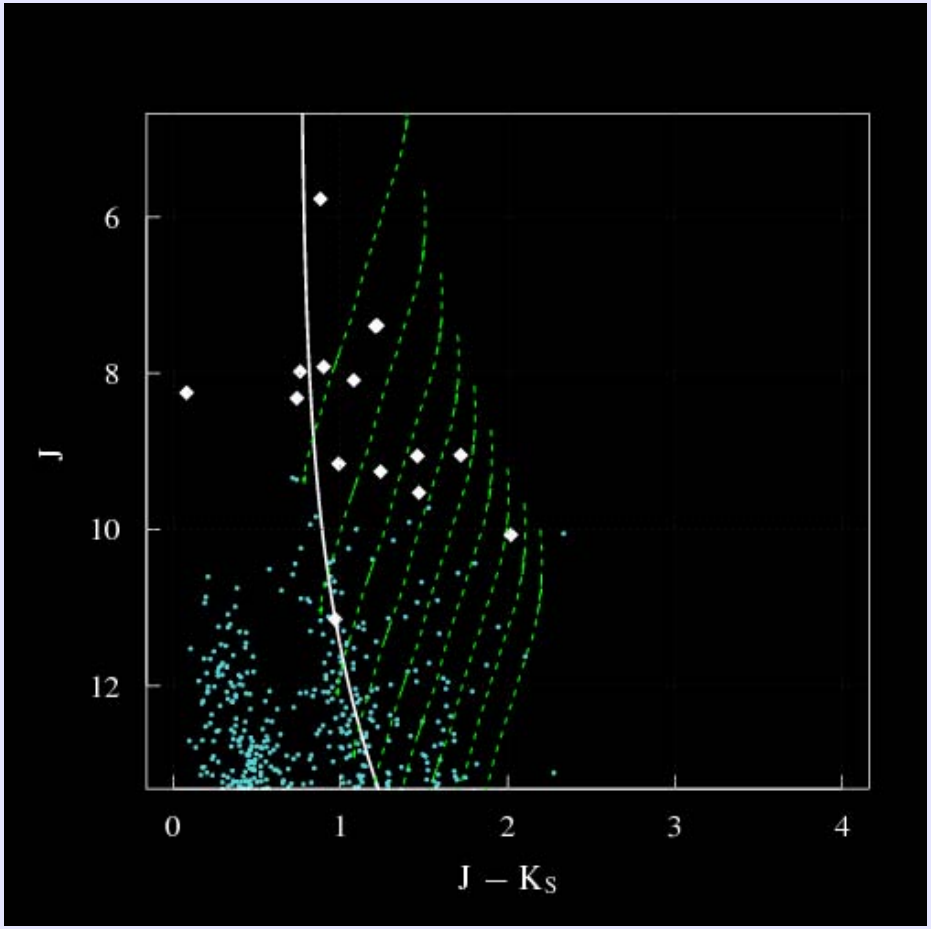
white curve : RC locus

green dotted curves : RGB isochrones

Interstellar extinction and polarisation in L97 field

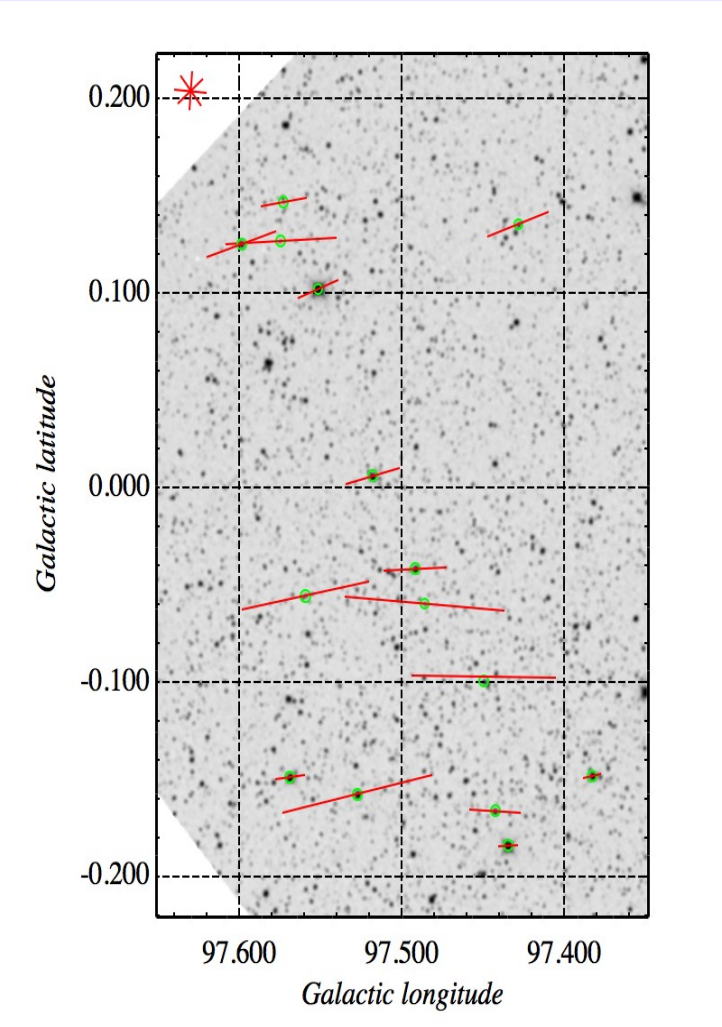


Full CMD

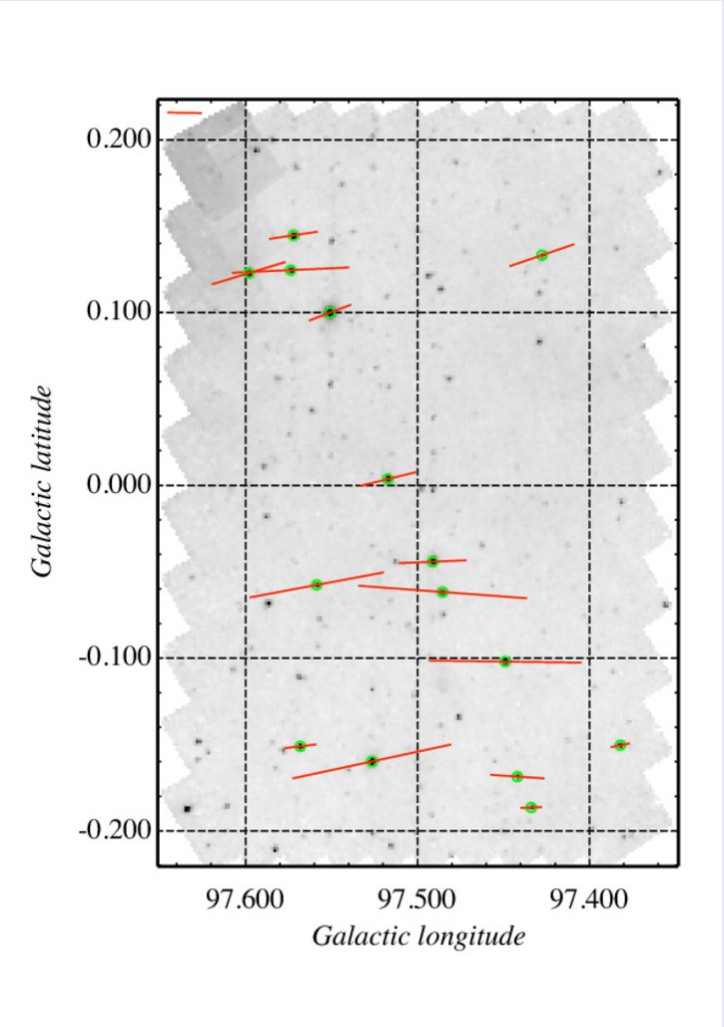


Observed for polarisation
in optical bands (large dots)

Interstellar extinction and polarisation in L97 field

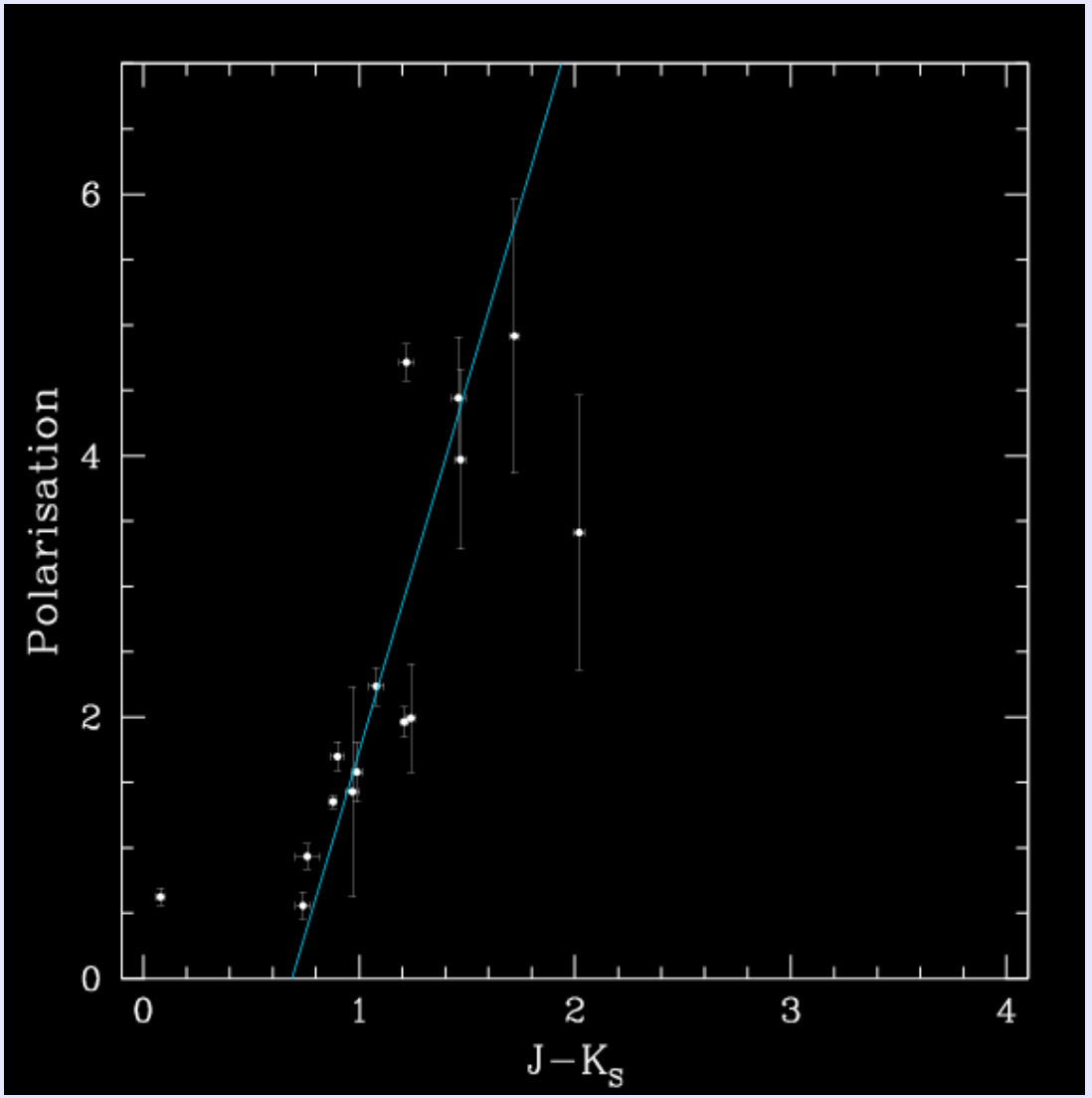


DSS image



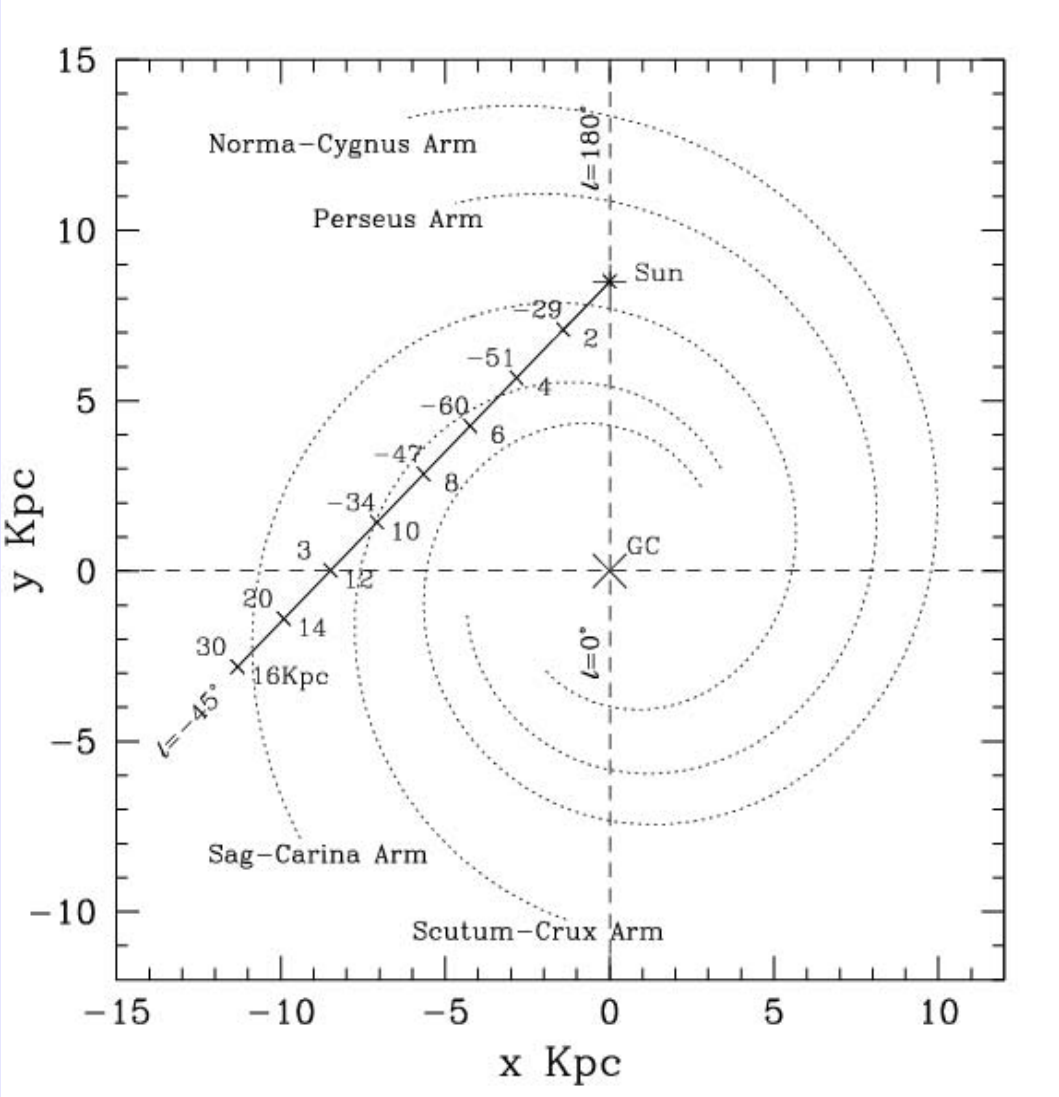
ISOGAL 7 micron

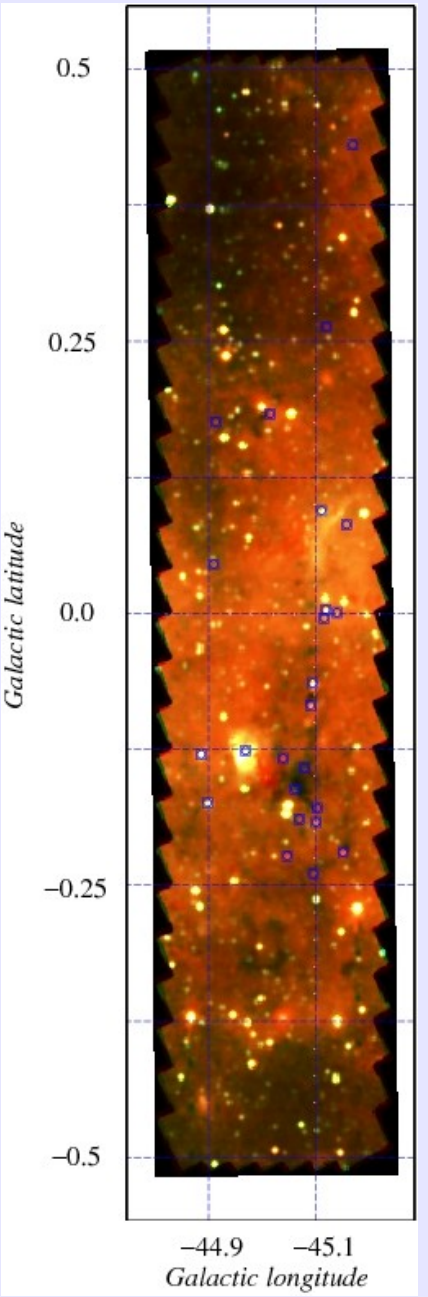
Interstellar extinction and polarisation in L97 field



R band Polarisation vs near-infrared colour

Stellar populations in an ISOGAL field in the galactic disc

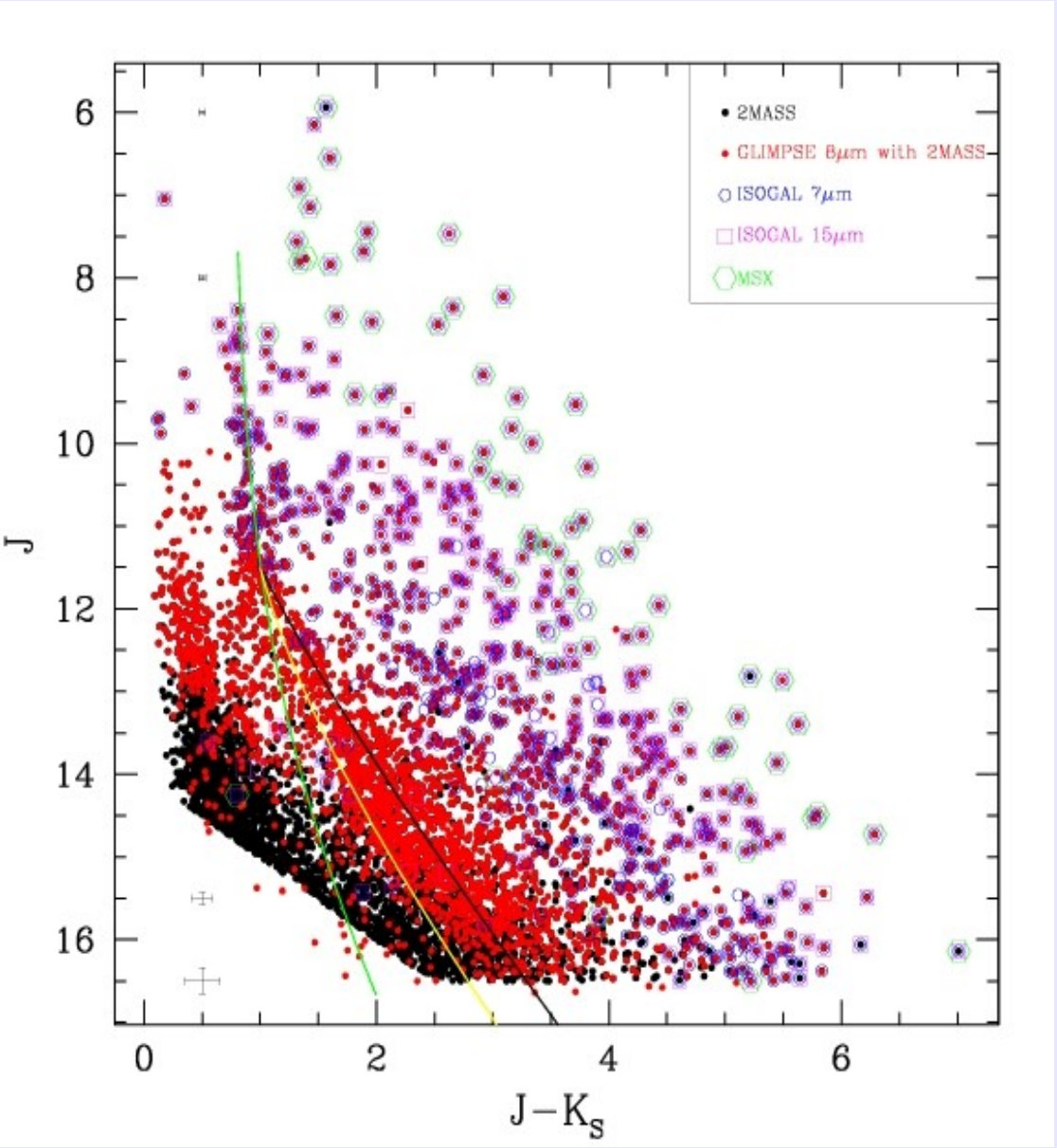




The LN45 direction

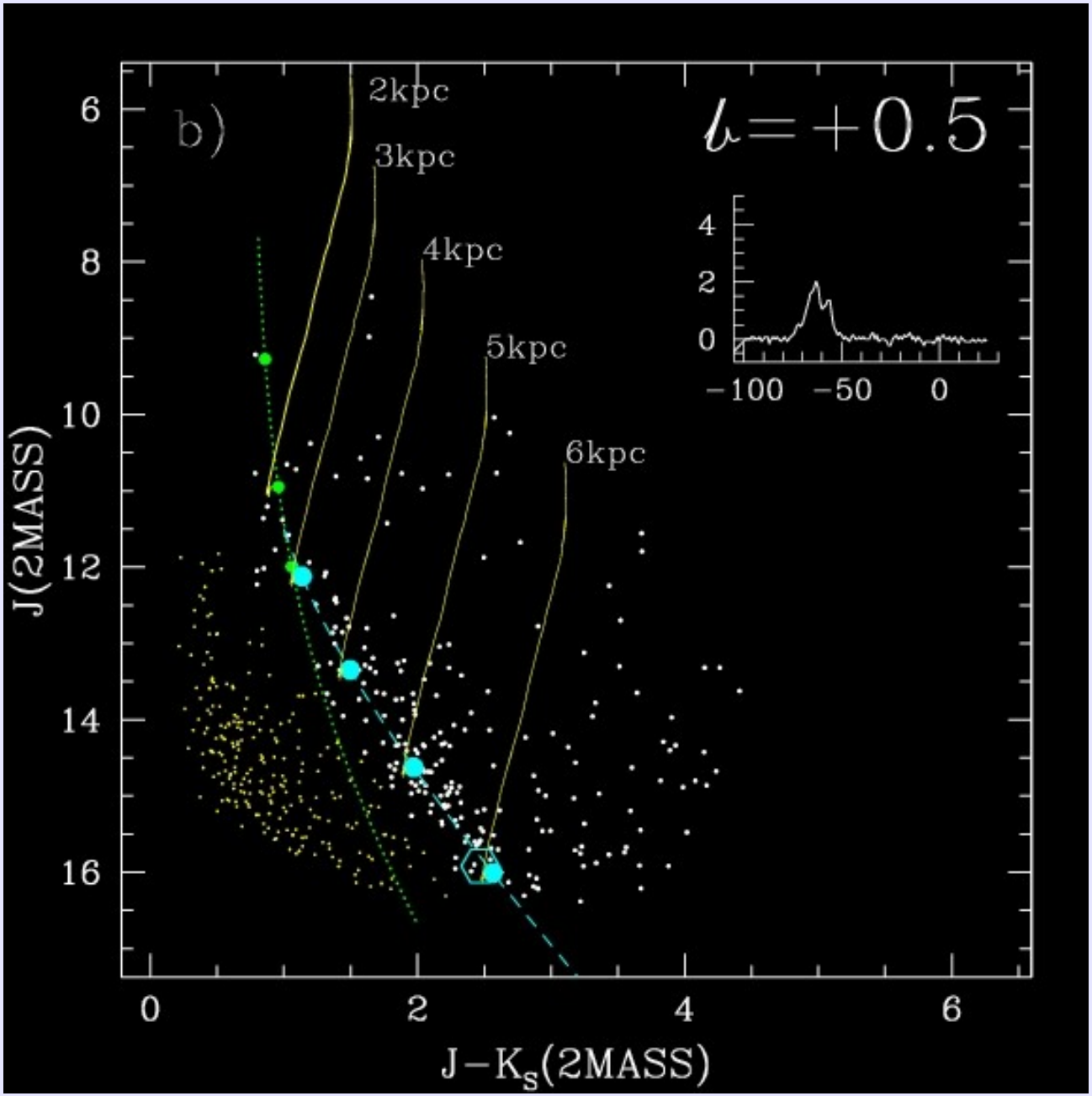
(Ganesh, Omont, Joshi et al., A&A 2009)

Stellar populations in an ISOGAL field in the galactic disc

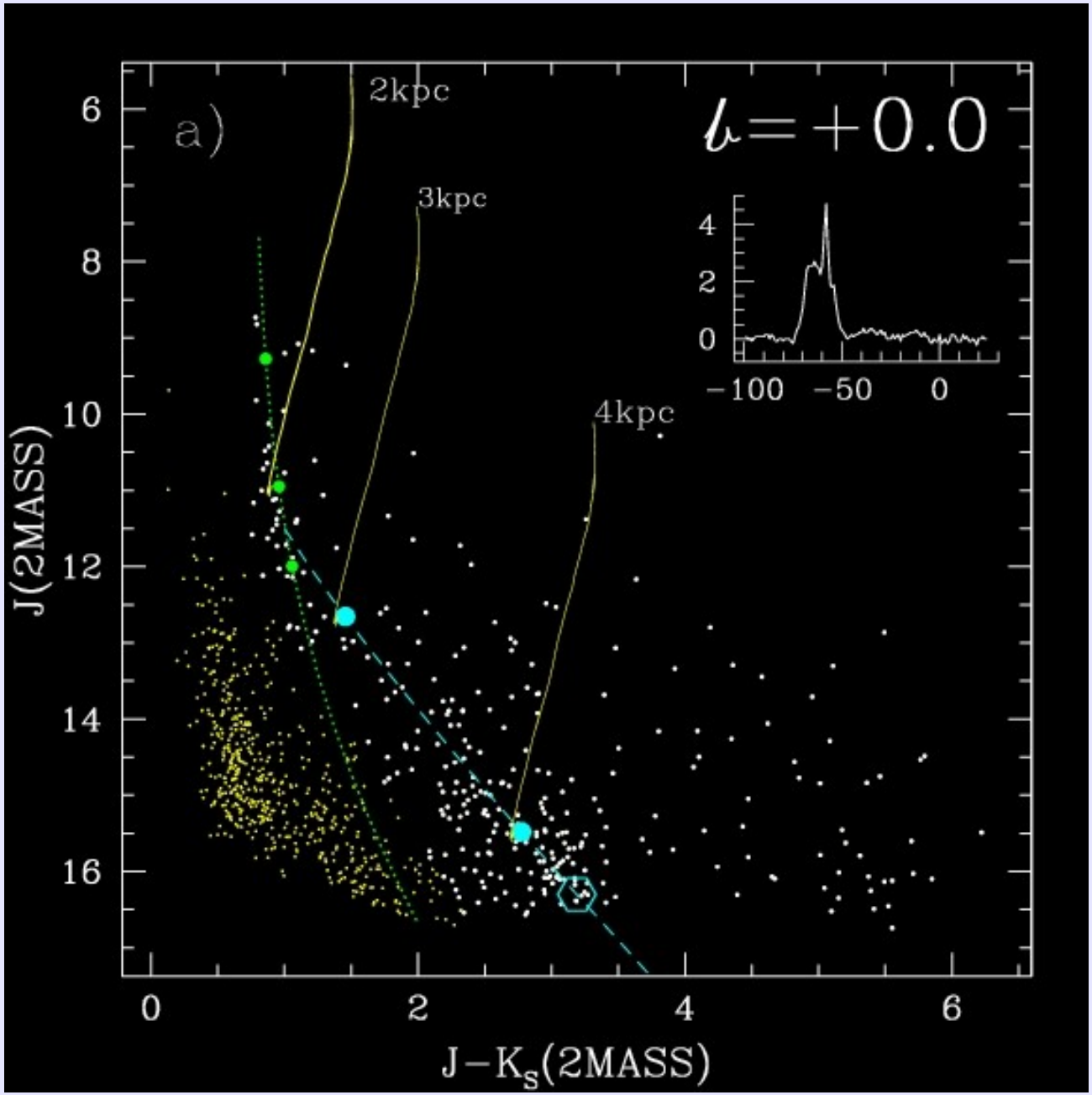


2MASS CMD with detections in various surveys

Stellar populations in an ISOGAL field in the Galactic disc



Stellar populations in an ISOGAL field in the Galactic disc



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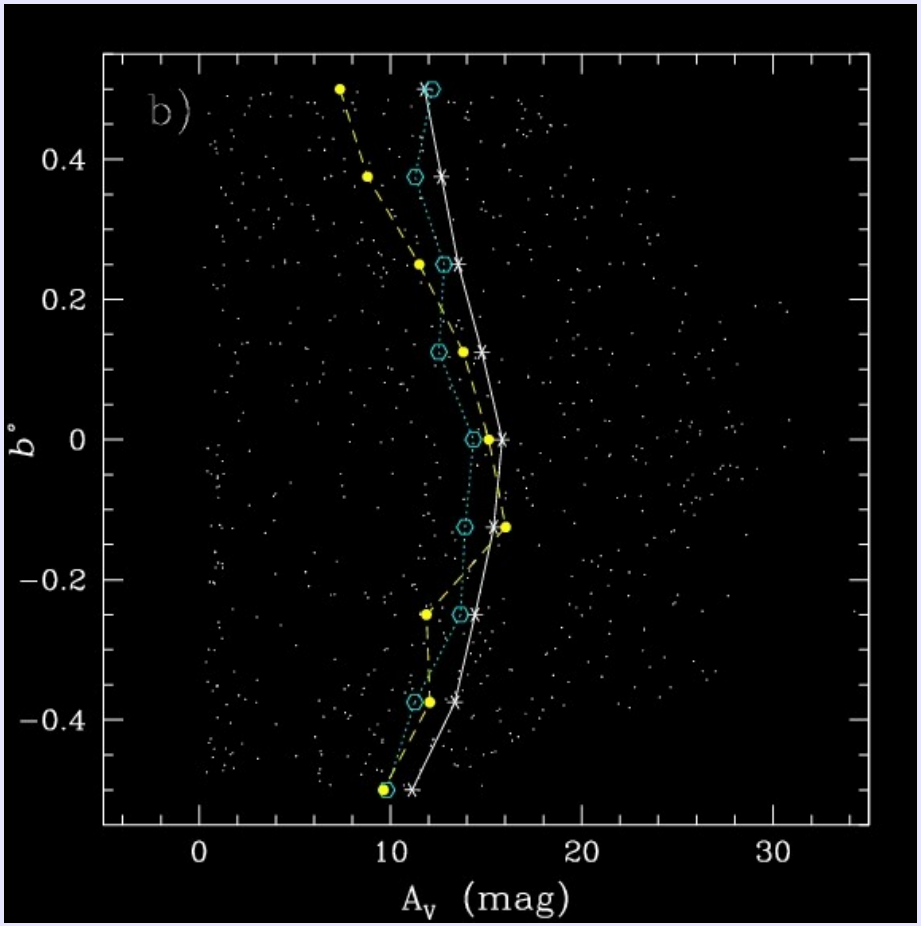
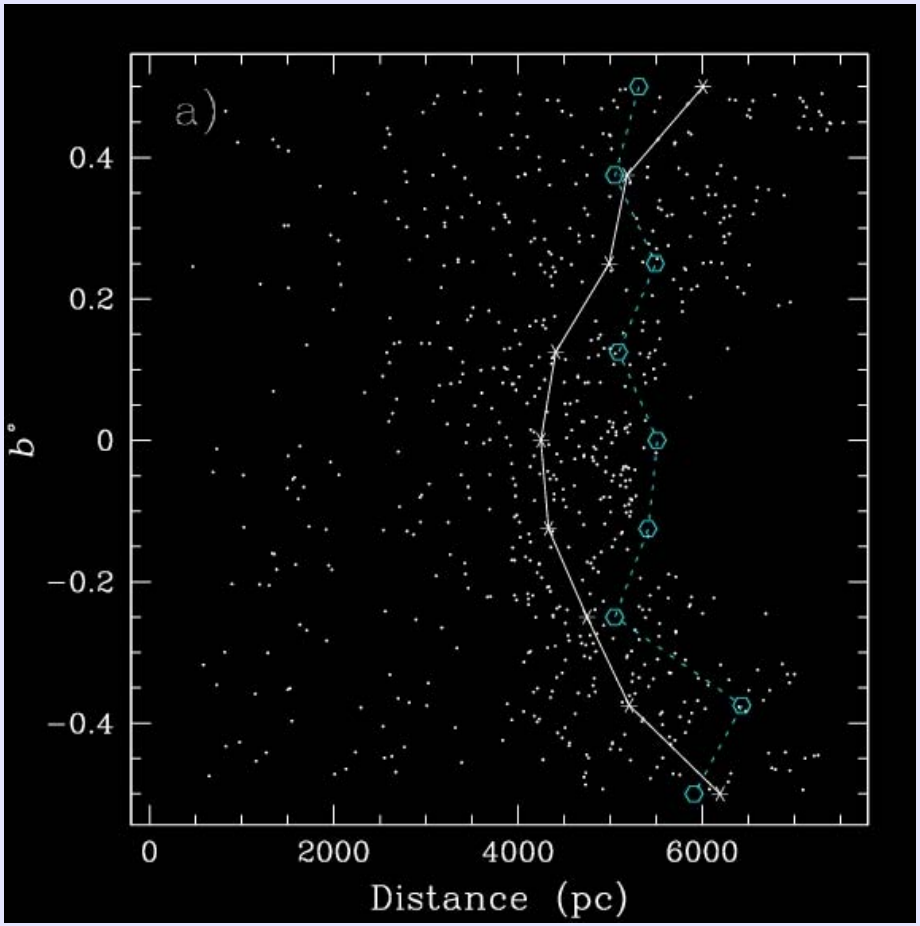
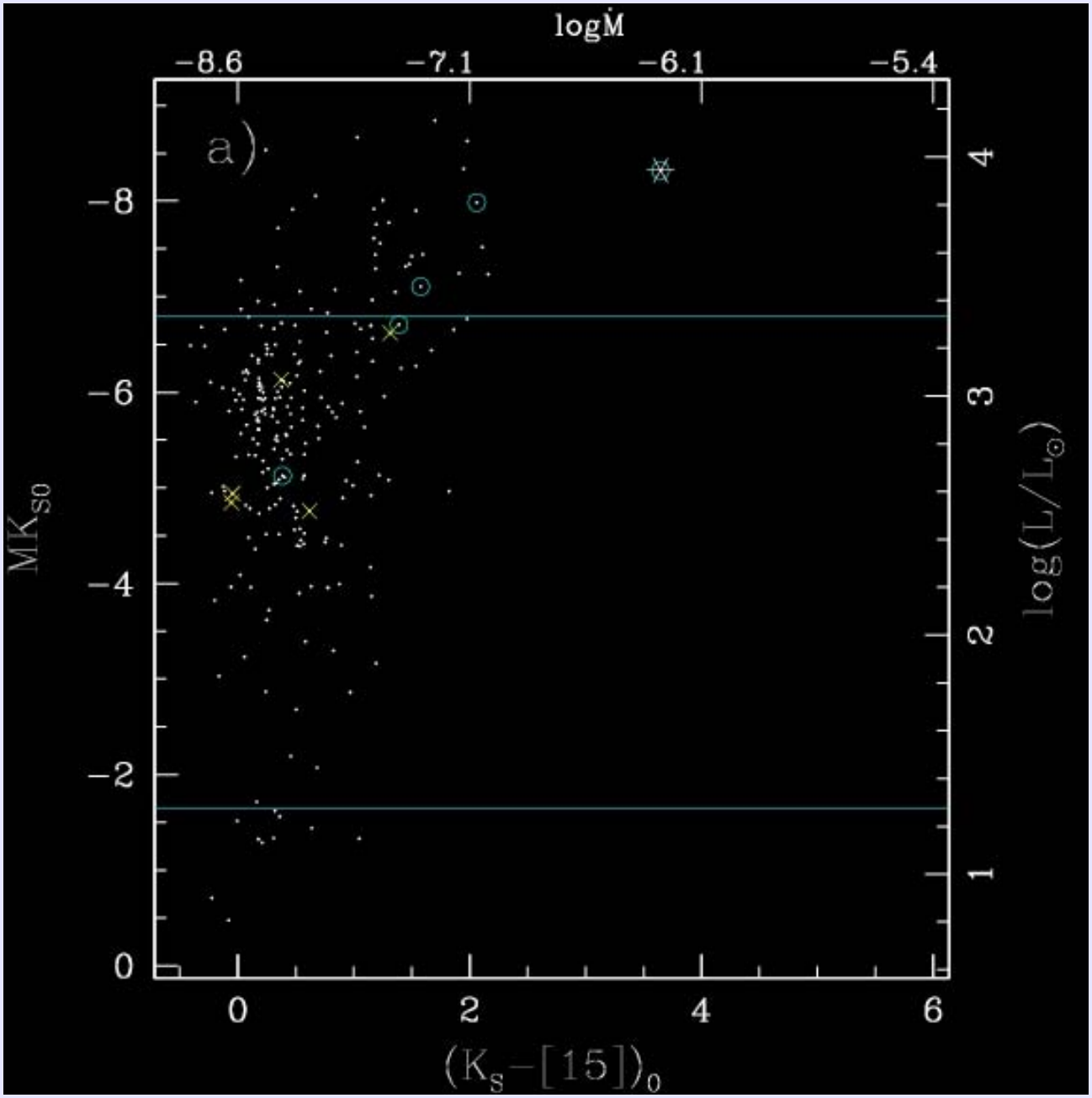




The LN45 direction : Av and distance with latitude
leading edge of the Scutum-Crux spiral arm (4kpc)

Stellar populations in an ISOGAL field in the Galactic disc



Summary

- Extinction (~80mag Av) mapped towards inner bulge (2' resolution)
- Estimate distance, extinction for stars in a field towards l=97, b=0
- Optical polarisation measured for mid-infrared selected stars in this field – found to have linear relation with infrared colours
- Estimate distance, extinction for stars in a large field at l=-45
- Towards l = -45, c_J varies with distance and latitude
- In this field the AGB stars found to have ~ small mass-loss rates
- Large scale NIR surveys not deep enough to probe beyond the edge of first spiral arm in line of sight in directions with large extinction

Thanks