

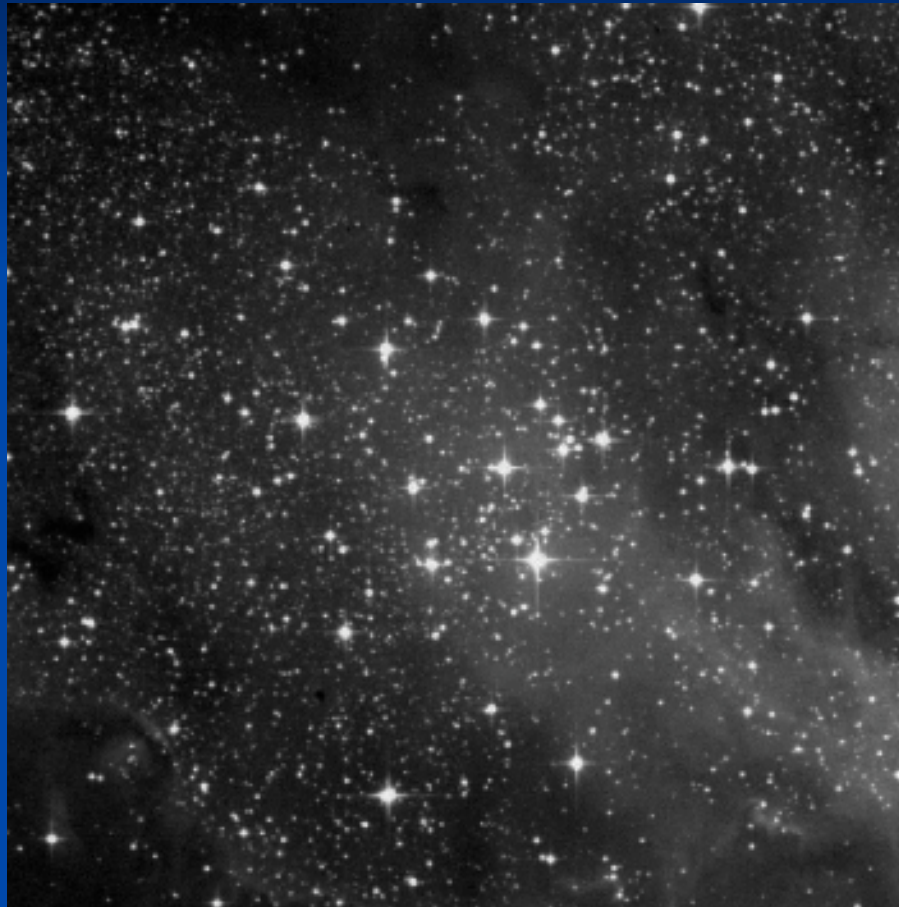
Automated spectral classification of pre-main sequence stars in NGC 6530

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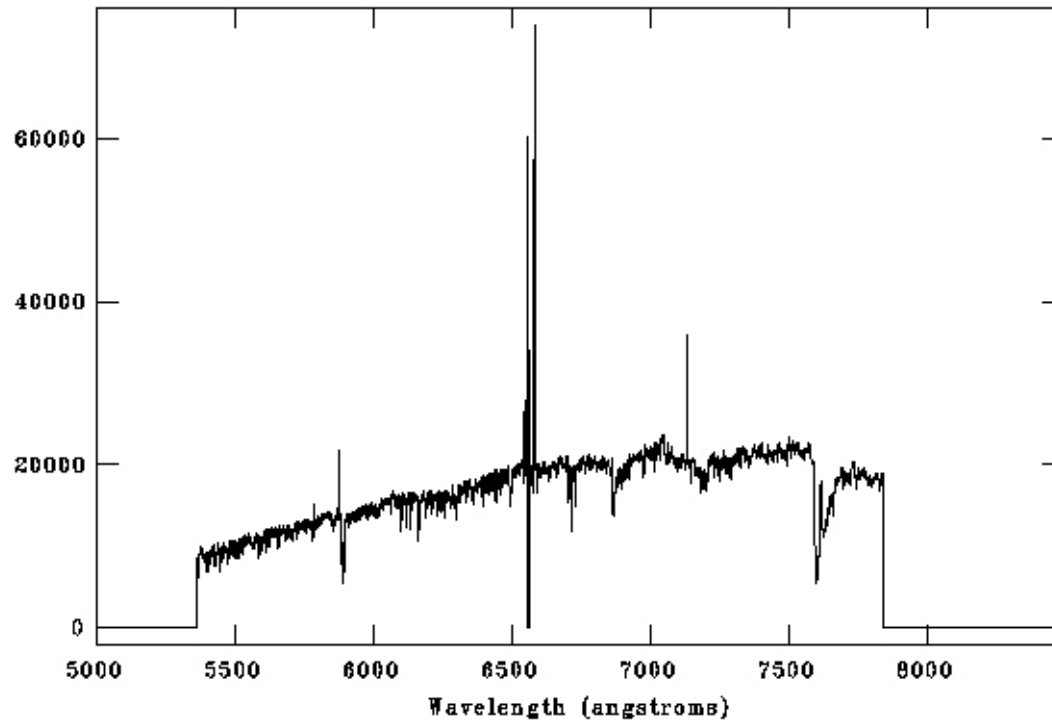


NGC 6530 and observations

- Young and Rich open cluster, associated with the Lagoon Nebula, located ~ 1.25 kpc distant
- Affected by strong differential reddening
- Subject to a long term observing effort by the Palermo group, studies using methods including, photometry, X-ray, IR, NIR, Li 6707.8 line, H α line (Damiani et al, 2004, 2005, 2006, Prisinzano et al [2005](#), 2007)
- BVI catalogue taken with WFI/ESO 2.2m reaches down to $V \sim 22$
- Cluster candidates selected from the V vs $V-I$ colour-magnitude diagram using X-ray Chandra data
- Looking for spectral types to derive individual extinction values and effective temperatures



The VIMOS spectra



VIMOS spectra taken of 97 stars at a resolution $\sim 3\text{\AA}$ for the range 5200-7600 \AA

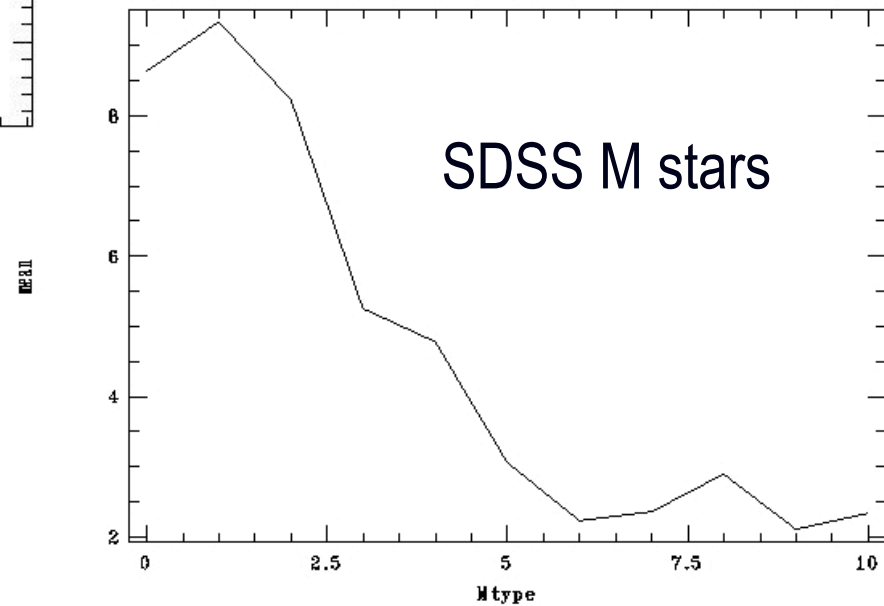
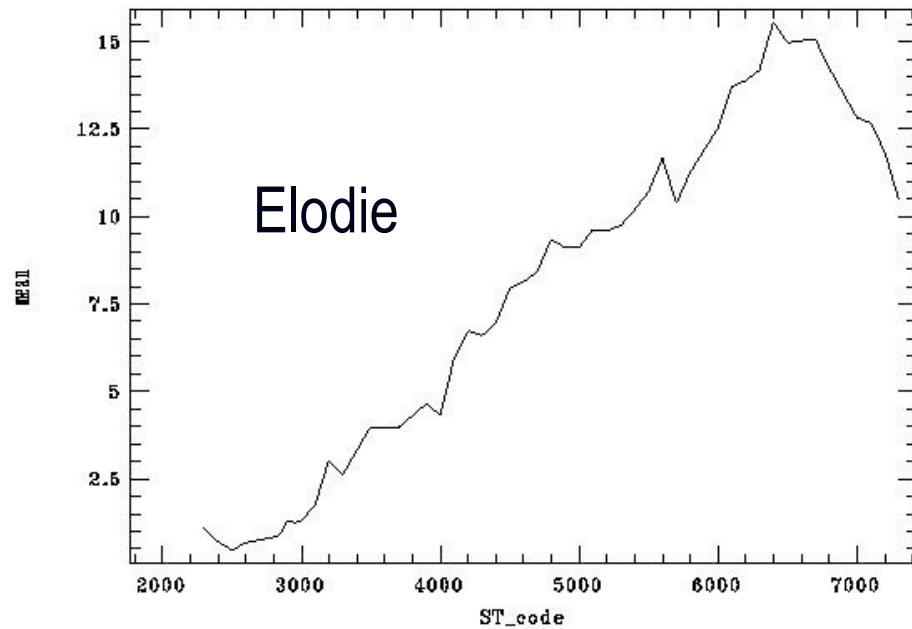


Automated Spectral typing using xcsao

- IRAF routine designed for template matching
- Designed to cross-correlate galaxy spectra with templates (Kurtz et al 1992)
- Compares the input spectrum with a given list of template/library spectra, carries out Fourier cross-correlation, and returns a r-statistic describing the goodness of fit.
- Stars were compared with templates from the ELODIE (Moultaka et al, 2004) and SDSS-DR5 low mass star spectroscopic sample (West et al 2008)
- For each spectral type a mean r-statistic is then determined



Example xcsao spectral typing plots



Method

Determining spectral type gives the expected intrinsic $(V-I)_0$
Using relations from Kenyon & Hartman 1995



Compare with observed $V-I$ to get $E(V-I)$



Transform from $E(V-I)$ to A_V using relation
 $R_{VI} = A_V / E(V-I)$, $R_{VI}=2.5$ (Udalski, 2003)



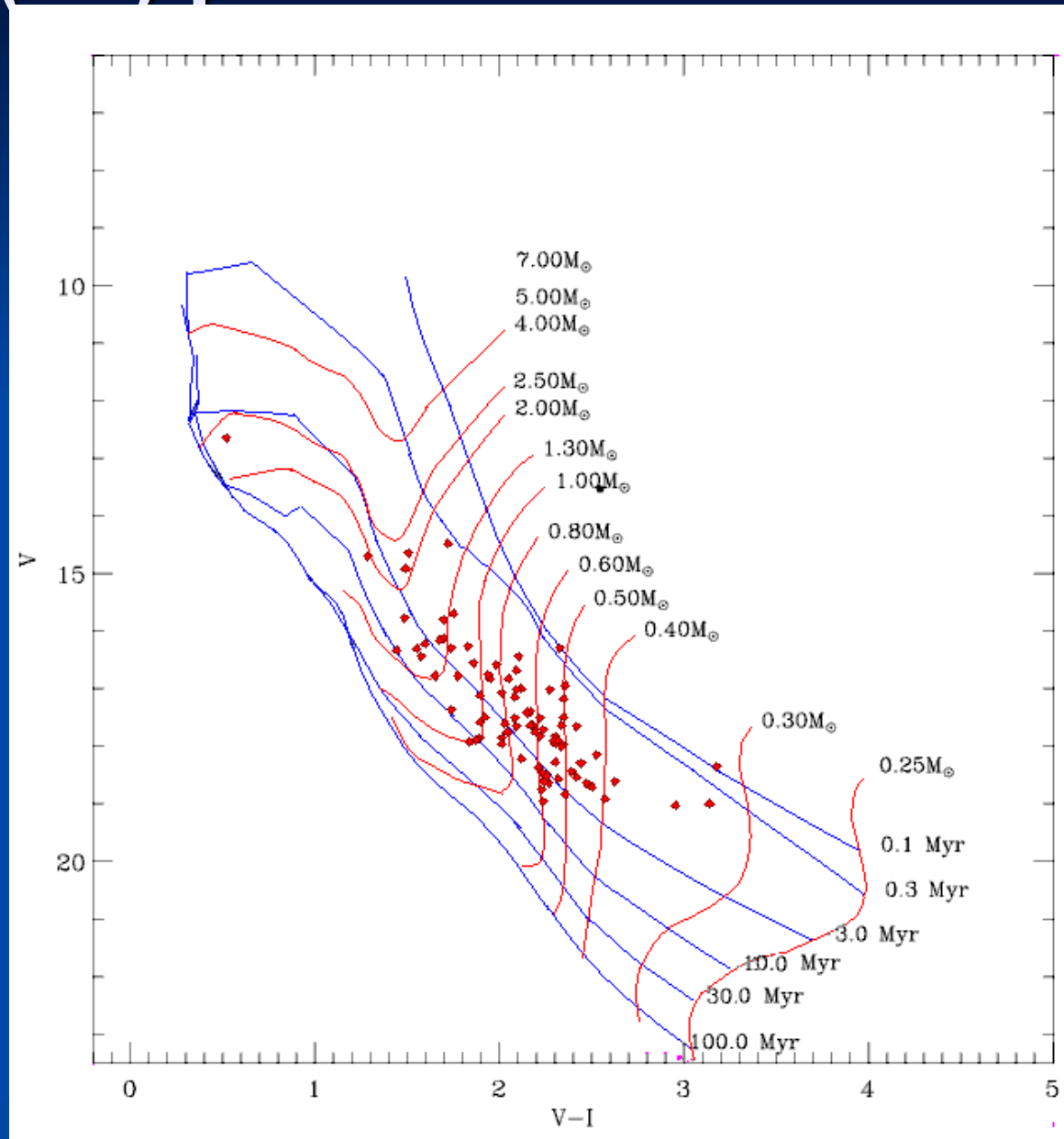
Apply reddening correction to determine
the intrinsic V mag



V vs (V-I) plot - initial

Colour-magnitude diagram used for selection of spectroscopic targets
Observed - V, (V-I)

Siess et al (2000)
theoretical tracks and isochrones at the distance of 1250pc and reddened using the mean reddening $E(B-V)=0.35$



V vs (V-I) plot - dereddened

(V-I) determined from spectral type using KH95
V determined from dereddening.

Should be corrected for NGC 6530s strong differential reddening

Plan to derive theoretical parameters such as masses, age spread, age

