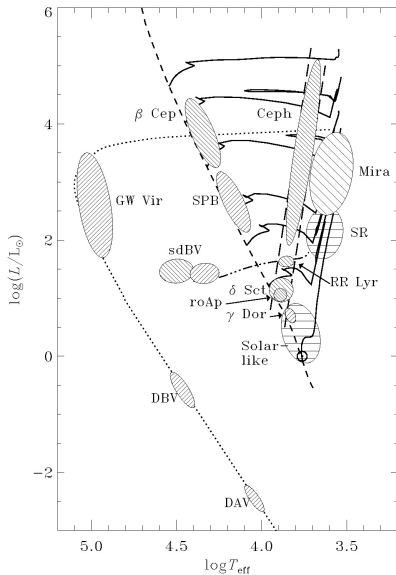


The quest for the Maia stars:
a VPHAS+ and CoRoT based search of
low-amplitude pulsating A and late B variables

Juan Fabregat

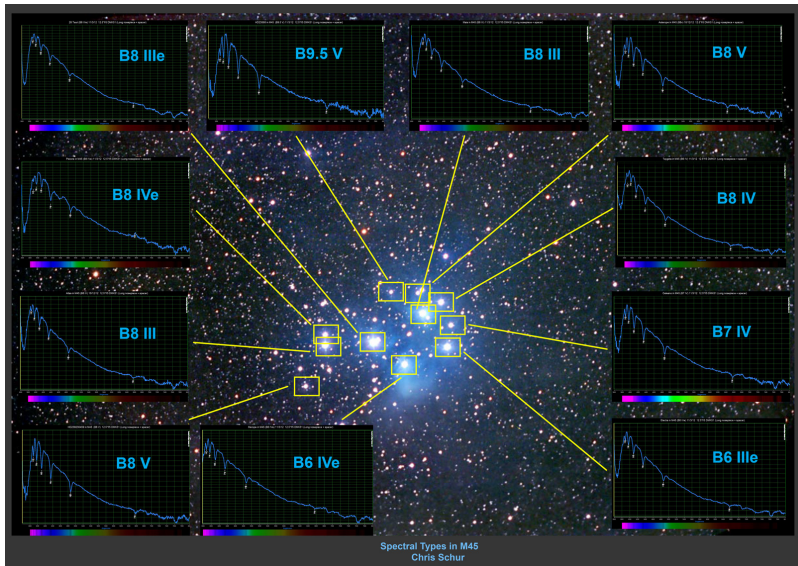
GEOS meeting 2014, Ca' del Monte

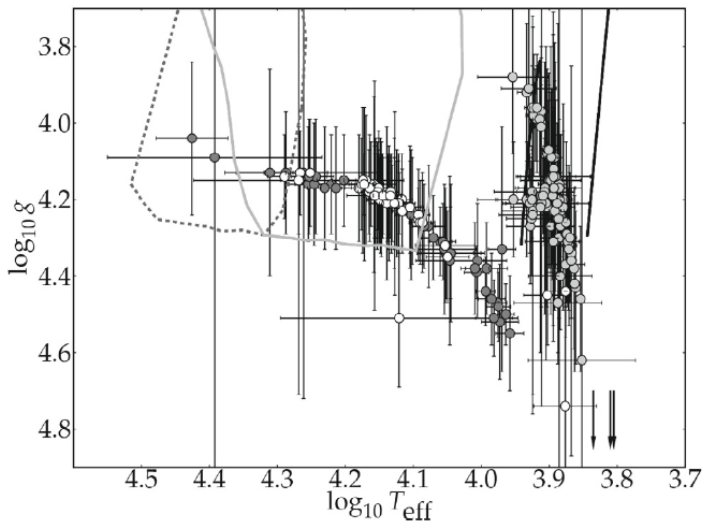
Pulsating stars in the HR diagram



The MAIA stars

- Struve (1955) detected periodic radial velocity variations in Maia, with a period of ~ 4 h.
- This discovery was unclaimed two years later (Struve et al. 1957).
- Waelkens et al. (1998) classified HD 121190 (B9V, $p=0.38$ d.) as an SPB
- Degroote et al. (2009) from CoRoT data found evidence of low amplitude pulsators between the SPB and δ Scuti strips.
- Balona et al. (2011) from Kepler data did not find that evidence.
- Mowlavi et al. (2013) found a new class of pulsating stars between the SPB and δ Scuti strips in NGC 3766.





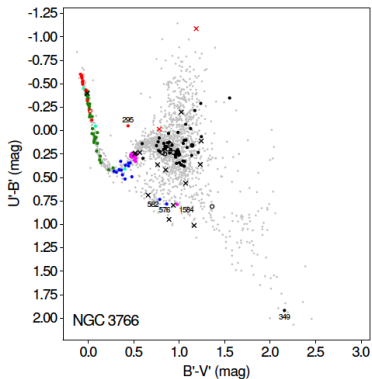
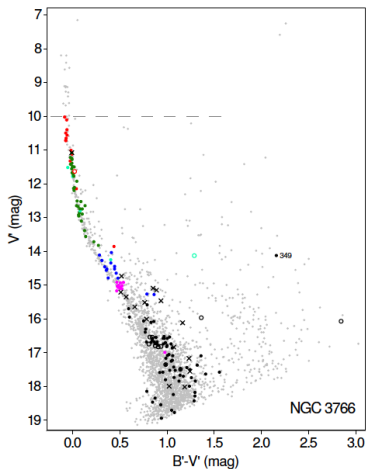
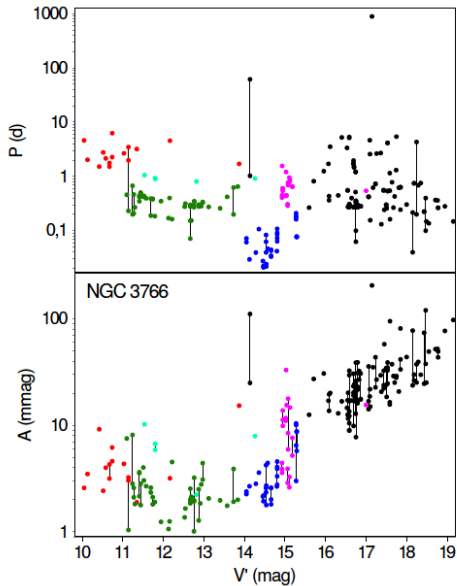


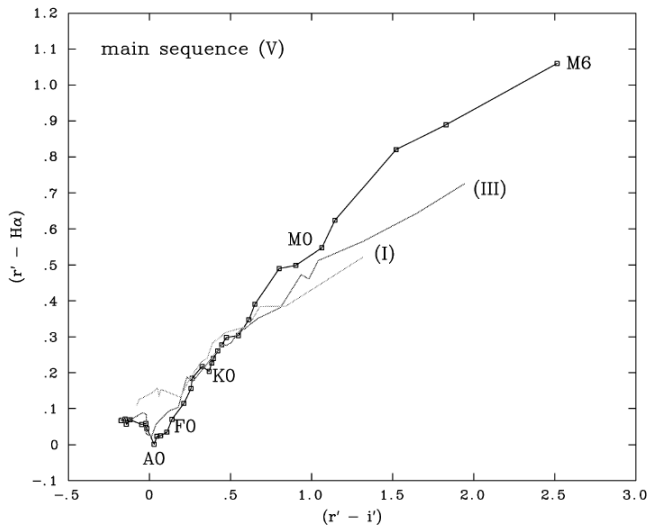
Fig. 8. Color-color diagram, with symbols as in Fig. 7. Only stars with good light curves in V' , B' and U' are plotted, except for binary stars which are plotted in red if their U' light curve is not good. Individual periodic variables whose variability classification are debated in Sect. 5 are labeled with their star id next to the marker.



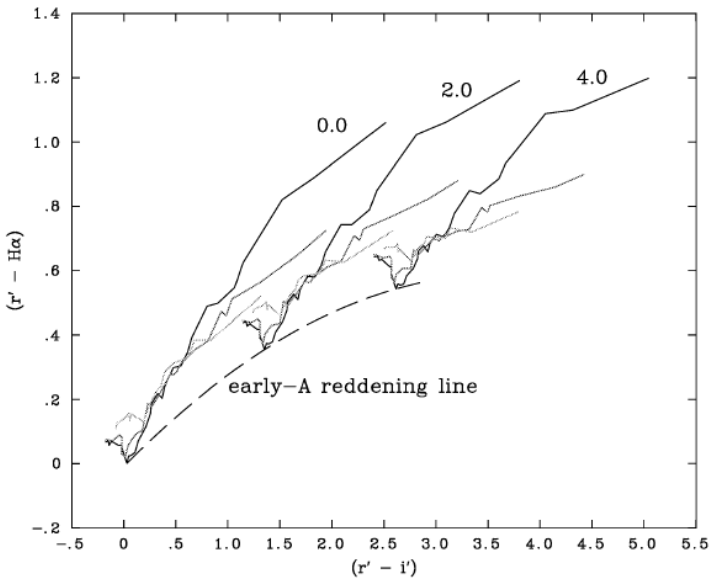
The VST/OmegaCam Photometric $H\alpha$ Survey of the Southern Galactic Plane and Bulge

- Photometric survey of the galactic plane and bulge ($|b| < 5^\circ$) in the U, g', r', i' and $H\alpha$ filters.
- Magnitude range $12 < r' < 21$
- Observing began in January 2012
- First data release very soon
- www.vphasplus.org

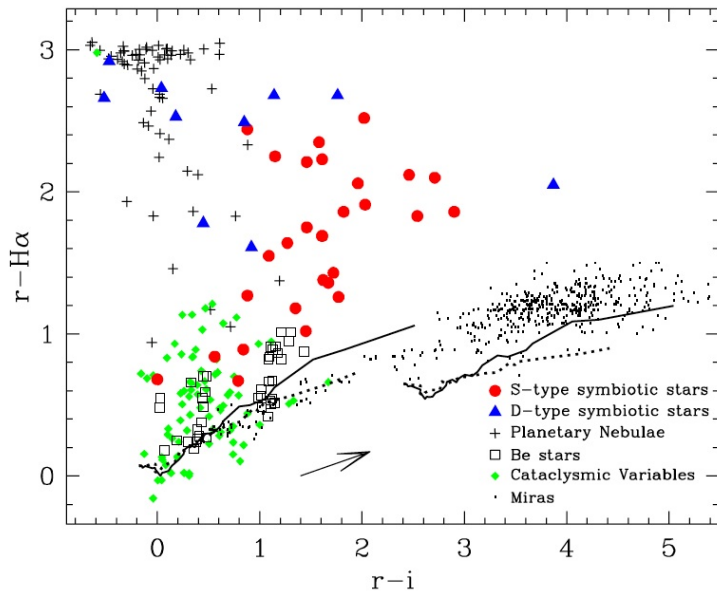
VPHAS+ Photometric Diagram



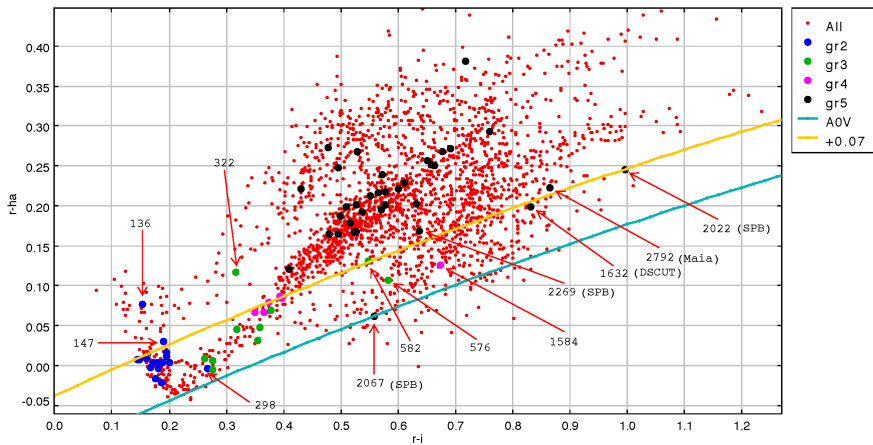
VPHAS+ Photometric Diagram



VPHAS+ Photometric Diagram



NGC 3766



VPHAS+ Photometric Diagram

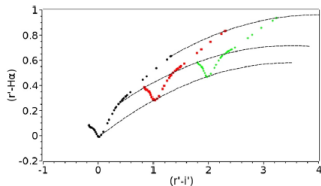


Figure 6. Main sequences where extinctions equivalent to $A_V = 0$ (black, left-hand side), 4 (red, middle), 8 (green, right-hand side) for an A0V star have been applied. The dashed black lines show the loci of A3V (bottom), G5V (middle) and M4V (top) stars under increasing extinction.

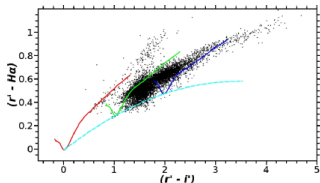
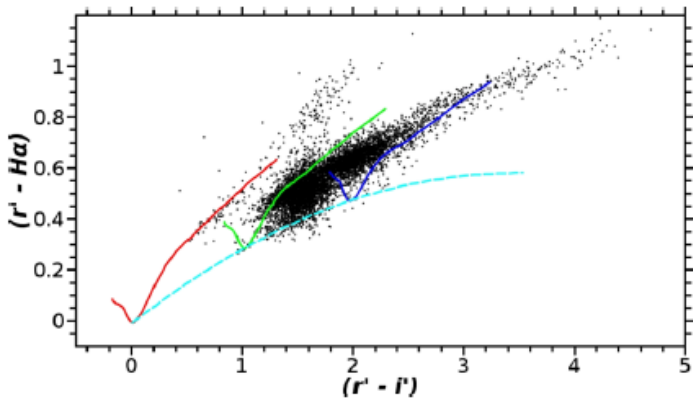
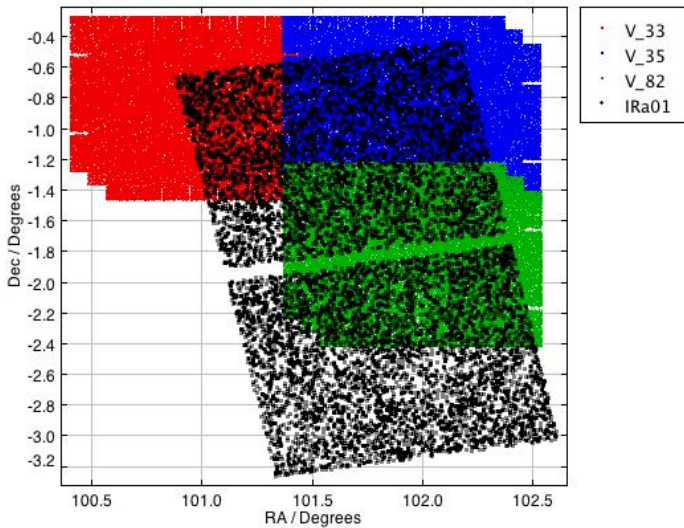


Figure 1. Black points show data from IPHAS field 4199, where $13 \leq r' < 20$. Main sequences where extinctions equivalent to $A_V = 0$ (red), 4 (green), 8 (blue) for an A0V star have been applied are shown with solid lines and the dashed cyan line shows an A3V reddening line. There are two main populations visible in Fig. 1, the first lies at bluer $(r' - I')$ aligned with and extending beyond the simulated unreddened main sequence: this population is mainly K–M dwarfs. The main body of stars falls between the $A_V = 4$ and $A_V = 8$ main sequences. The long trail of objects stretching from $(r' - I') \approx 2$ are M giants. Finally, there are five objects that appear to lie above the unreddened main sequence, these objects are candidate H α emitters.

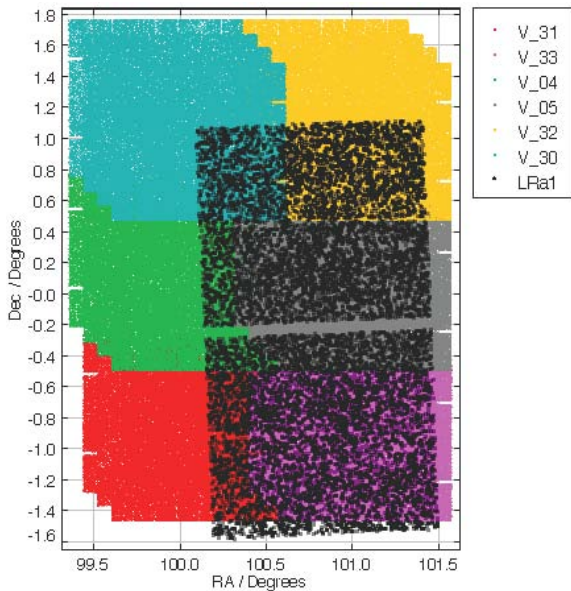
VPHAS+ Photometric Diagram

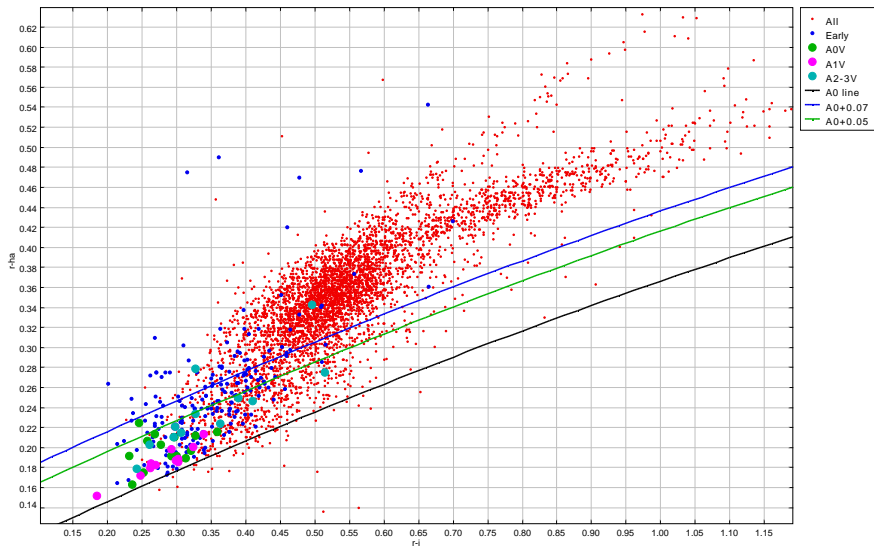


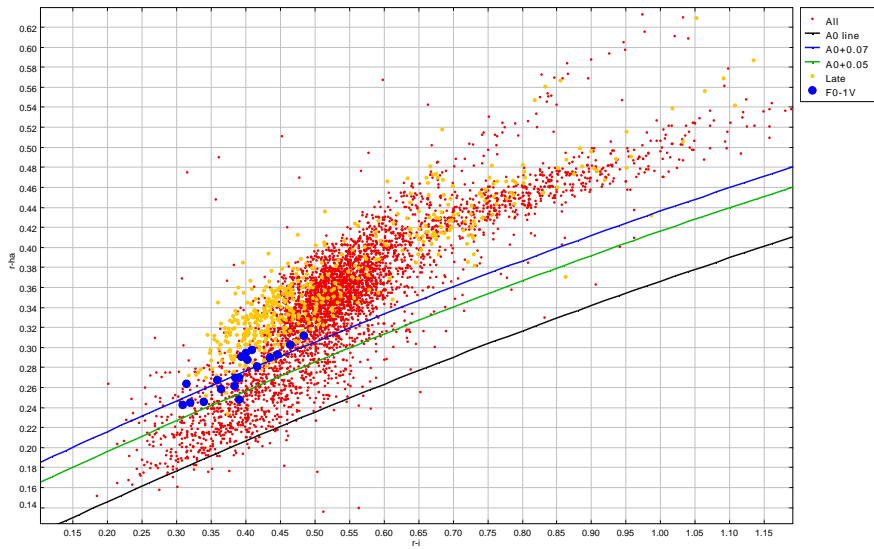
CoRoT IRa01

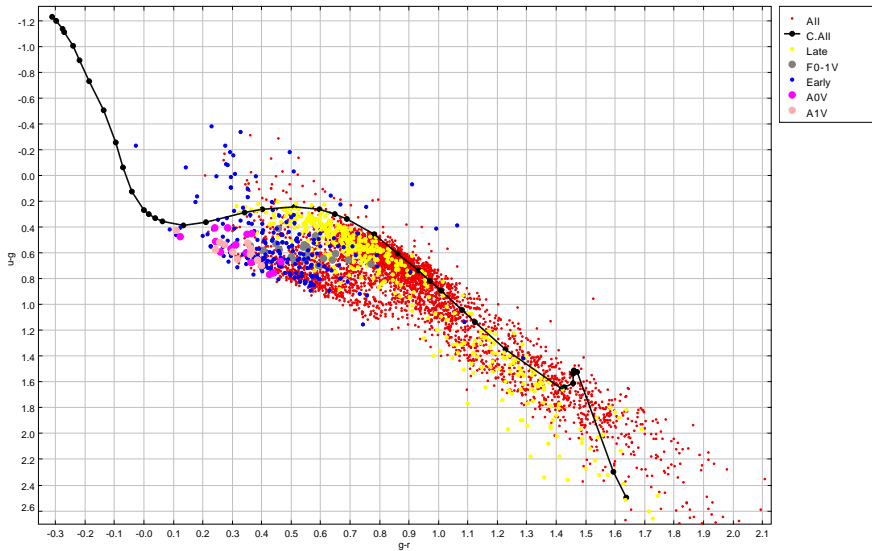


CoRoT LRa01









MAIA candidates from VPHAS+ and CoRoT

- Stars “close” to the A0 line in the $(r-H\alpha)$ - $(r-i)$ plane
- Period between 0.25 and 0.5 days
- Spectral type later than B3, as deduced from the $(u-g)$ - $(g-r)$ plane

- Spectral typing of the photometrically selected Maia candidates.
- Study of their pulsation characteristics from the CoRoT light curves.
- Photometric selection of samples of other interesting types of pulsating stars (β Cep, γ Dor, Red Giants,...)
- Search for Maia candidates in the Kepler FOV.