



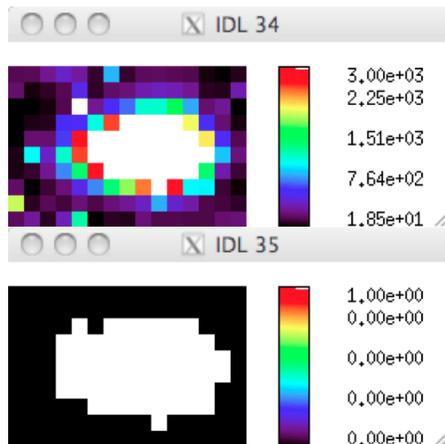
Barycentre computation on board on exo channel. C. Moutou, M. Ollivier, M. Auvergne

In order to eliminate false transit due to parasitic binaries stars it has been suggested to compute on board the barycenter of some target (magnitude interval $12 < R < 14$ TBD).

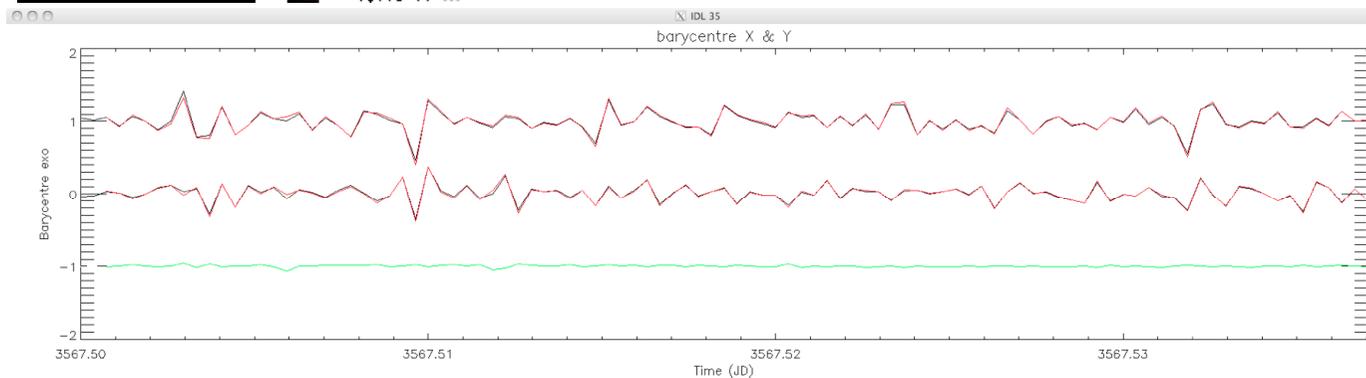
A binary parasitic star included in the target PSF induce a deformation of the PSF during the transit, detectable with the barycentre.

To demonstrate the feasibility we have computed a target barycentre on imagerie and corrected it from the decentering.

Run LRa03, corot_id = 102323657, R =12.6



The barycentre is computed with the algorithm used on-board for the seismology targets. In the same way we compute the barycentre of a seismology target (32 sec imagette) and subtract the X and Y to the exo barycentre. Residual rms = 0.01 pixel.



Red curve: seismo
Black curve: exo
Green curve: difference



By folding the barycentre curve on the transit period and filtering it, it seem reasonable to think that a rms of 0.003 pixel can be reached. In the following, we assume a rms of 0.005 pixel (horizontal black line)

relation

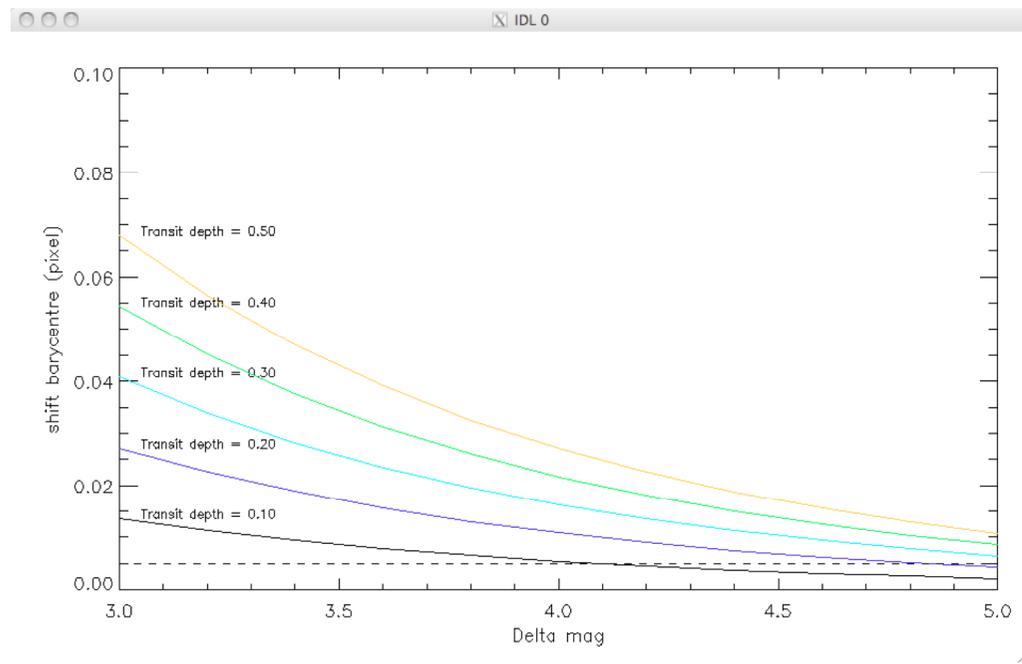
$$\text{Shift} = 10^{-0.4 \Delta m} * dF * d$$

dF = transit depth

d = angular distance

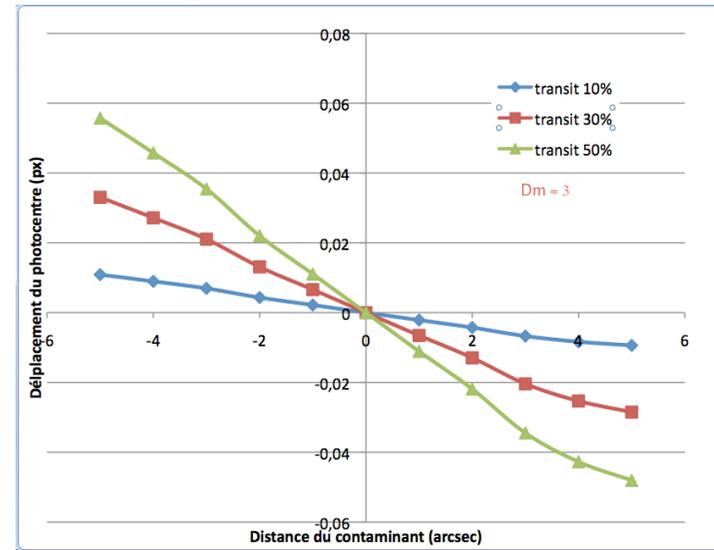
curves computed for

d = 5 arc sec

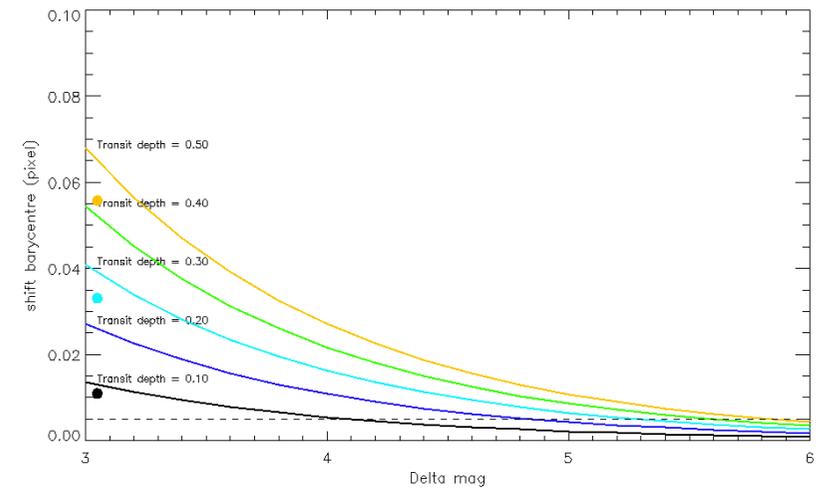


The barycentre shift has been computed with Corot PSF for a $\Delta m = 3$ as a function of the distance between the target and the parasite.

Comparison of the relation and simulation.
The filled circles show the simulation results for $d = 5$ arcsec.



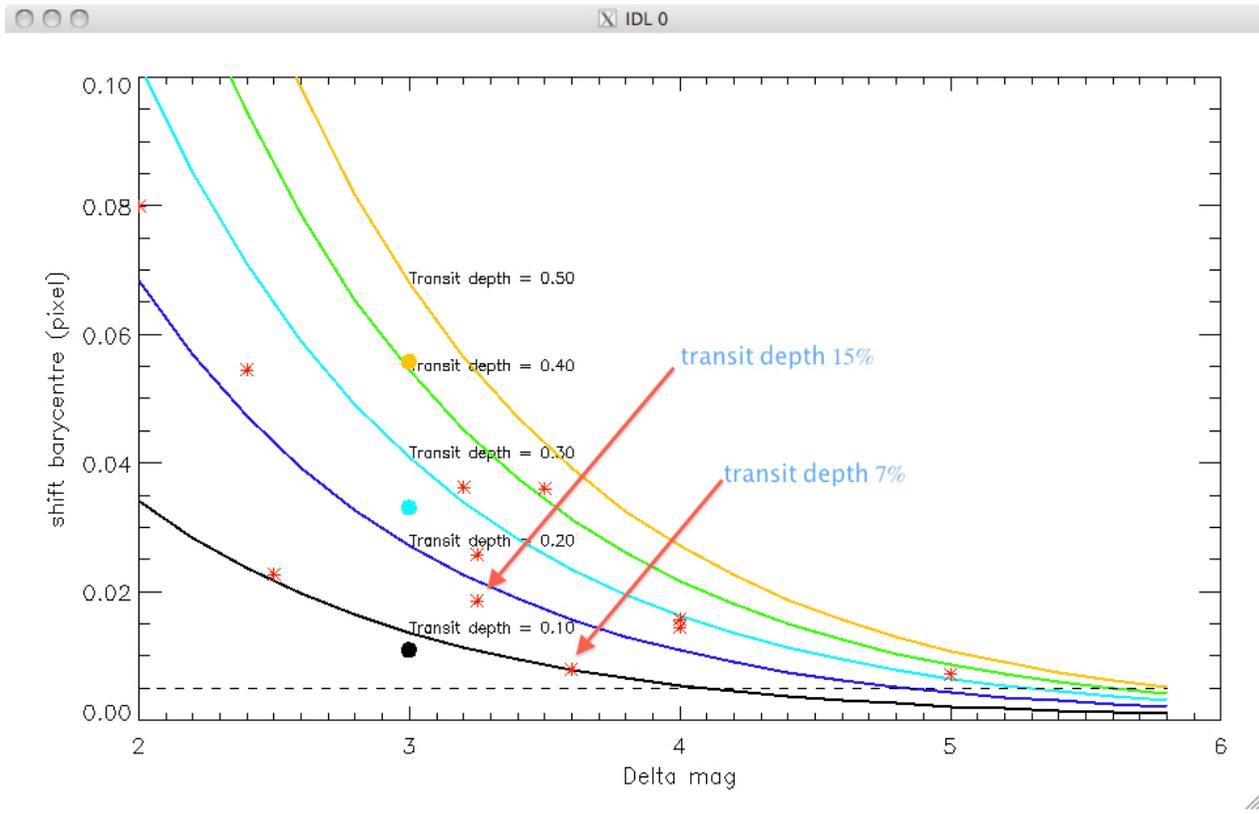
IDL 0





At least we add the barycentre shift for some corot target. (red points)

The arrows show two targets for which the parasite distance is close to 5 arcsec.





Conclusions:

Computing the barycentre on board help to detect parasite binaries.

We propose to modify the on board software for the second mission extension, with the following planning: begin the work before the next summer to reach a new software ready to be uploaded at the spring 2013.

We have to decide on which type of targets the barycentre computation will be done (for instance all stars with $R < 13.5$)