

## Report on the detectability of small planets around the star HD 179079 observed by CoRoT

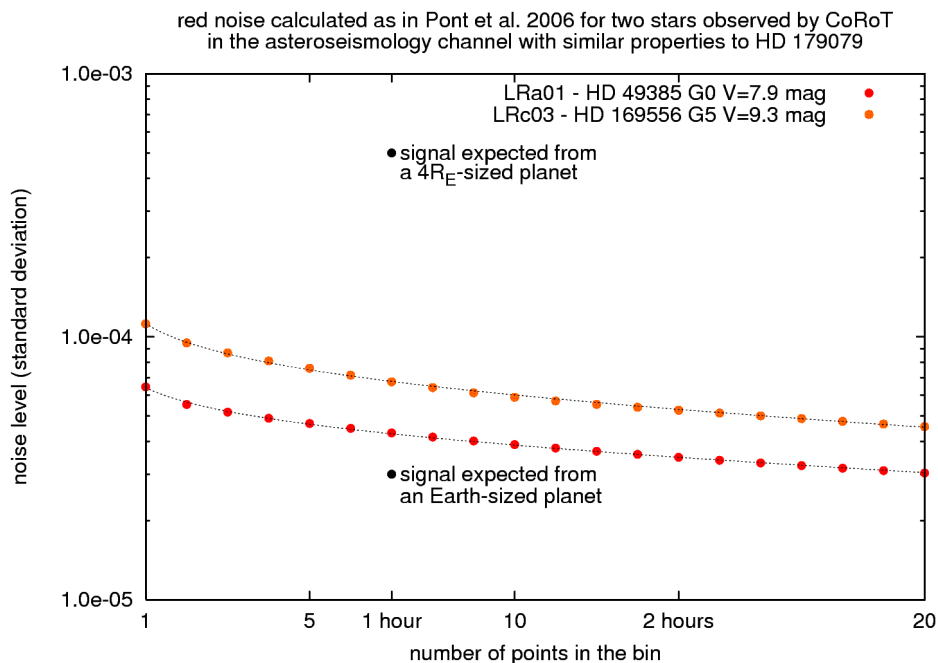
We analyzed the issue of the detectability of SuperEarth and Neptune-sized planets around HD 179079 as it would be observed by CoRoT in the asteroseismology channel. HD 179079b is a 0.08 MJ planet with a period of 14.476 days known from RV surveys.

For this purpose, we take stars already observed by CoRoT in the sismo channel which have similar properties to HD 179079 and we analyze:

- first, the noise level in these light-curves, to compare it with the expected depth of transiting planets, and
- second, we simulate artificial transits of planets and try to detect them blindly

HD 179079 is bright ( $V=7.96$  mag) and quiet ( $\log R_{HK}=-5.06$ ), so we selected a couple of stars from the sismo channel who could look like it: HD 49385 (observed in LRa01) with a similar brightness and HD 196556 (observed in LRc03) with same spectral type, but fainter brightness ( $V=9.32$  mag).

Figure 1 shows the noise level in the light curves calculated as Pont et al. 2006. We expect the light curve of HD 179079 to have a similar noise level. We don't expect to find Earth-sized planets because they lay well below the noise level of these light curves. On the other hand, Super-Earths or Neptune-sized planets should be clearly detected. The correlated noise in these light curves is dominated by stellar activity. If the noise was purely random, with the same scatter as HD 49385, Earth-sized planets would be within CoRoT reach.

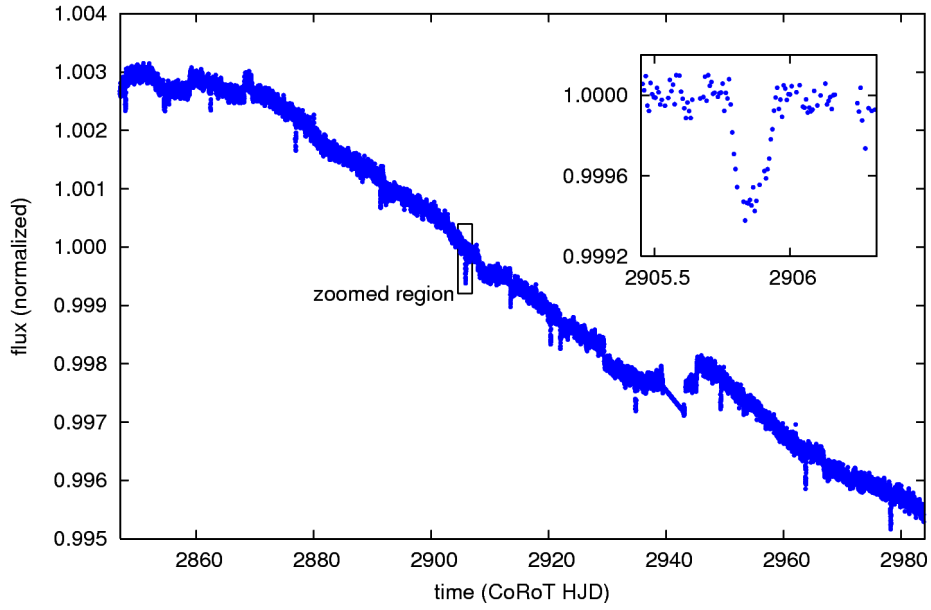


**Figure 1:** noise level in the reference stars HD 49385 and HD 196556. The noise level of HD 179079 is expected to be similar.

Figure 2 shows one simulated transit of a 4RE planet in the raw light-curve of HD 49385. We could detect individual transits of planets with these size (i.e. like we did with CoRoT-9b). But for a proper characterization, we would need to add a couple more transits to enhance the SNR (hence, these supports observing at least 3 or 4 transit events, adding up to ~40/60 days; not because of the detection threshold, but because of the characterization).

We conclude that Earth-sized planets are not within reach, but Neptune-sized planet are clearly feasible in medium length runs (~80 days).

simulated transit of  $4R_E$  radius planet on the raw light curve of HD 49385  
observed by CoRoT in the asteroseismology channel with similar properties to HD 179079



**Figure 2:** we have introduced simulated transits of 4 Earth radii planets in the light curve of HD 49385 observed by CoRoT. This should be representative of the expected transits of similar planets around the star HD 179079. The transits are clearly detectable. For viewing purposes, the sampling rate of the zoomed region is 512s.