

Declaration

Most of the work described in this thesis has been published in scientific journals in the form of papers written cooperatively by myself, my supervisor Suzanne Aigrain, and other collaborators at the University of Exeter and in the CoRoT team.

The work presented on the Iterative Reconstruction Filter in Chapter 2 was published in Alapini & Aigrain (2009). This work was essentially my own but benefited from regular discussions and advice from S. Aigrain and T. Naylor.

Parts of the work presented in Chapter 3 were carried out as part of the CoRoT collaboration and published in Fridlund et al. (2010) for CoRoT-6b and Léger et al. (2009) for CoRoT-7b. My contribution to these papers was to derive independent measurements of the planet parameters, using the IRF to process the light curve.

Some of the work presented in Chapter 4 was carried out as part of the CoRoT collaboration and published in Alonso et al. (2009a,b). Specifically, I used the method described in Chapter 4, as a method among other ones in the paper, to detect the secondary eclipses of CoRoT-1b and CoRoT-2b.

The work presented in Chapter 5 on building and testing equivalent width ratios as temperature sensors, benefited from several discussions and advice from G. Israelian, A. Ecuivillon, S. Aigrain and N.C. Santos. Based on the learning from this work, a more precise calibration using the same technique was built and published in Sousa et al. (2009). My additional contribution to this paper was in testing the robustness of this new calibration by comparing it to the old one. The temperature analysis of the host star of CoRoT-6b that I performed in Chapter 5 forms part of Fridlund et al. (2010).

Finally, the work performed in Chapter 6 benefited from regular discussion and advice from S. Aigrain and F. Pont. The MCMC was designed by S. Aigrain and F. Pont, but all the implementations presented in this chapter were my own work. My contribution to the overall MCMC was in developing our understanding of the impact the prior on the stellar temperature has on the probability distributions of the planet parameters.

List of publications

The secondary eclipse of the transiting exoplanet CoRoT-2b. Alonso, R., Guillot, T., Mazeh, T., Aigrain, S., **Alapini, A.**, Barge, P., Hatzes, A., and Pont, F. – A&A 2009

An iterative filter to reconstruct planetary transit signals in the presence of stellar variability. **Alapini, A.** and Aigrain, S. – MNRAS, 2009

Transiting exoplanets from the CoRoT space mission VIII. CoRoT-7b: the first Super-Earth with measured radius. Léger, A., Rouan, D., Schneider, J., Barge, P., Fridlund, M., Samuel, B., Ollivier, M., Guenther, E., Deleuil, M., Deeg, H. J., and 151 coauthors of which **Alapini, A.** – A&A 2009

Ground-based photometry of space-based transit detections: photometric follow-up of the CoRoT mission. Deeg, H. J., Gillon, M., Shporer, A., Rouan, D., Stecklum, B., Aigrain, S., **Alapini, A.**, Almenara, J. M., Alonso, R., Barbieri, M., and 16 coauthors – A&A 2009

The secondary eclipse of CoRoT-1b. Alonso, R., **Alapini, A.**, Aigrain, S., Auvergne, M., Baglin, A., Barbieri, M., and 16 coauthors – A&A 2009

Removing systematics from the CoRoT light curves. I. Magnitude-dependent zero point. Mazeh, T., Guterman, P., Aigrain, S., Zucker, S., Grinberg, N., **Alapini, A.**, Alonso, R., Auvergne, M., Barbieri, M., Barge, P., and 24 coauthors – A&A 2009

Noise properties of the CoRoT data. A planet-finding perspective. Aigrain, S., Pont, F., Fressin, F., **Alapini, A.**, Alonso, R., Auvergne, M., Barbieri, M., Barge, P., Bordé, P., Bouchy, F., and 23 coauthors – A&A 2009

Planetary transit candidates in CoRoT-LRc01 field. Cabrera, J., Fridlund, M., Ollivier, M., Gandolfi, D., Csizmadia, Sz., Alonso, R., Aigrain, S., **Alapini, A.**, Almenara, J.-M., Barge, P., and 45 coauthors – A&A 2009

An effective temperature calibration for solar type stars using equivalent width ratios. A fast and easy spectroscopic temperature estimation. Sousa, S. G., **Alapini, A.**, Israelian, G., Santos, N. C. – A&A 2010

Transiting exoplanets from the CoRoT space mission. IX. CoRoT-6b: a transiting “hot Jupiter” planet in an 8.9d orbit around a low-metallicity star. Fridlund, M., Hébrard, G., Alonso, R., Deleuil, M., Gandolfi, D., Gillon, M., Bruntt, H., **Alapini, A.**, Csizmadia, Sz., Guillot, T., and 38 coauthors – A&A 2010