

## LBT observations of the HR8799 planetary system

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### Abstract

We present here observations of the HR8799 planetary system performed in H and Ks band exploiting the AO system at the Large Binocular Telescope and the PISCES camera. Thanks to the excellent performance of the instrument we were able to detect for the first time the inner known planet of the system (HR8799e) in the H band. Precise photometric and astrometric measures have been taken for all the four planets. Further, exploiting ours and previous astrometric results, we were able to put some limits on the planetary orbits of the four planets. The analysis of the dynamical stability of the system seems to show lower planetary masses than the ones adopted until now.

### 1. Introduction

The data (H and Ks band) for this work were taken during the commissioning of LBT+PISCES camera in October and November 2011. To be able to implement the Angular Differential Imaging (ADI) method we observed the star with the image rotator stopped. Further, to maximize the effectiveness of ADI, in the case of H band observations we observe the star during the passage to the meridian while this was not possible in the Ks case.

### 2. Results

Thanks to the exceptional performances of the Adaptive Optics (AO) system of the LBT we were able to image all the known planets around HR8799. For what concerns HR8799e, it is the first time it has been observed in the H band. In Figure 1 and in Figure 2 we display the final images obtained from H band and Ks band data respectively. In Figure 3 and in Figure 4 we display the contrast plot obtained in H and in Ks band respectively. In both images the position of the four planets is showed together with the determination by Marois used as comparison.

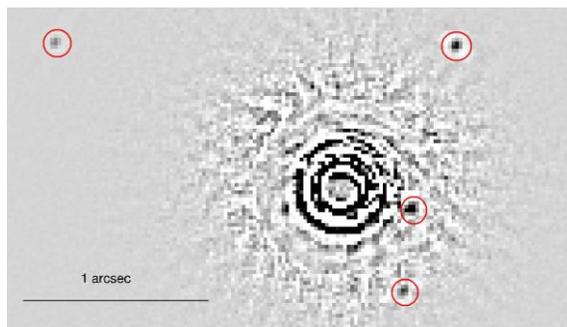


Figure 1: Final image obtained from the H band data

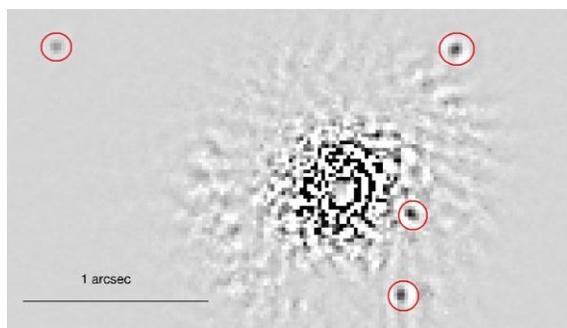


Figure 2: Final image obtained from the Ks band data

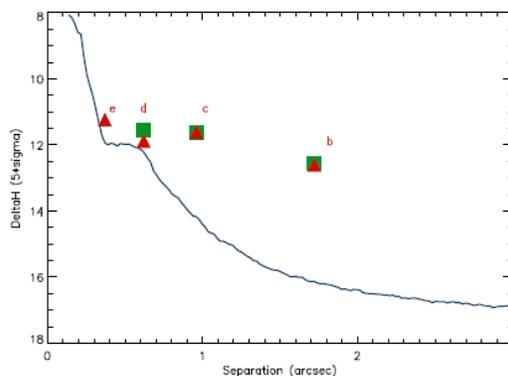


Figure 3: Contrast plot in H band

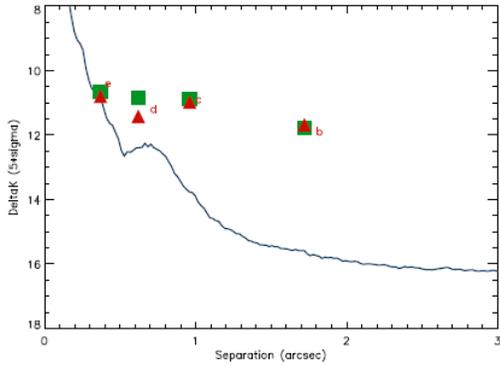


Figure 4: Contrast plot in Ks band

The precise astrometry obtained from our analysis was then used to put constraints on the possible orbits for the four planets and to study the dynamical stability of the system. This study gives some hints on the fact the planetary masses could be smaller than believed until now.

## 6. Summary and Conclusions

Exploiting the LBT + PISCES camera instrument we were able to image all the known planets of the planetary system around HR8799. For the first time it was possible to image the internal planet HR8799e in the H band. Exploiting our and historical astrometric results we were able to put some constraints on the planetary orbits.

## References

- [1] Skemer et al. - 2012ApJ 753 14S