

HD 189733 b: Bow shock or no shock?

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Introduction and Previous Work

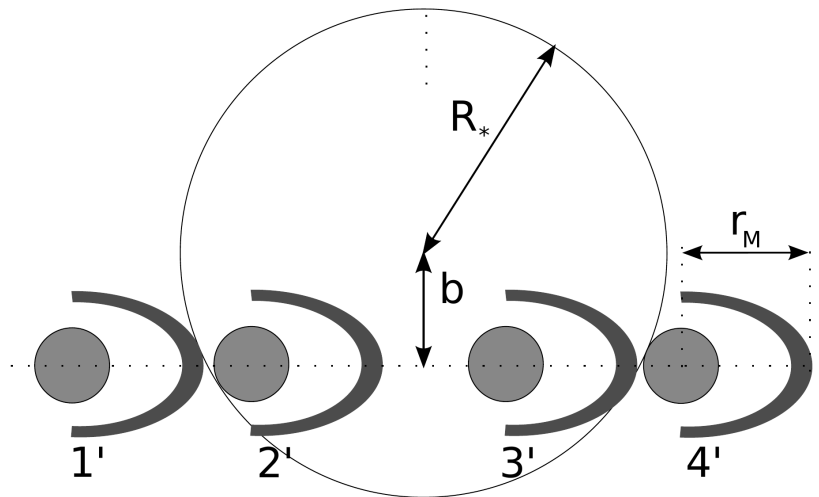


Figure: To-scale projections of the planet and bow shock. Vidotto 2011

Introduction and Previous Work

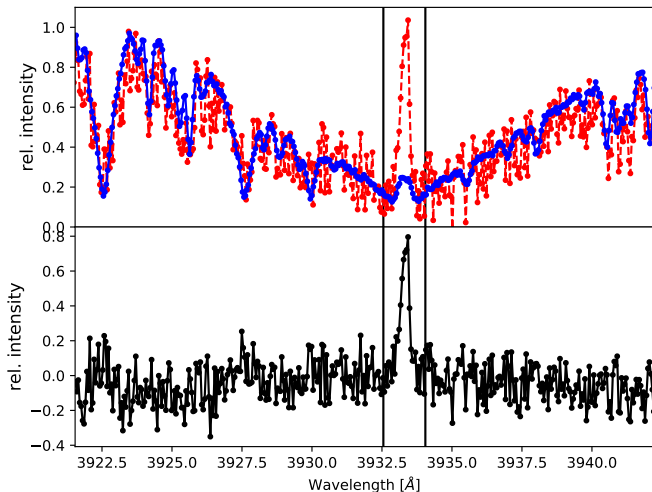


Figure: Upper panel: Ca K line in HD 189733 (red) and HD 10476 (blue). Lower panel: red minus blue. Vertical lines: 1.5 Å integration band.

Introduction and Previous Work

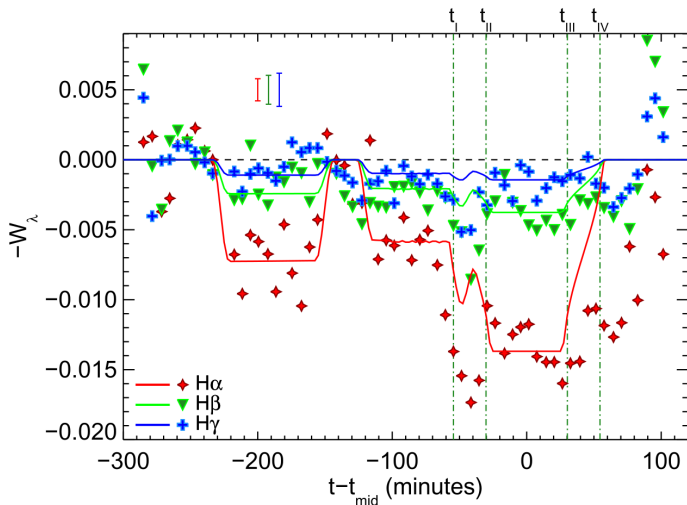


Figure: Absorption as a function of time for a single transit of HD 189733 b observed with HiRes at Keck. Cauley 2015

Time series

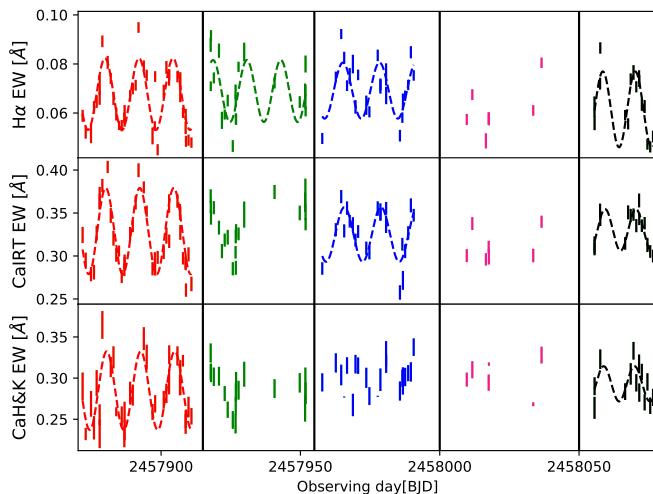


Figure: Excess equivalent width versus time. Dashed lines: maximum power sine waves. Vertical lines: different subsamples.

Periodogram analysis

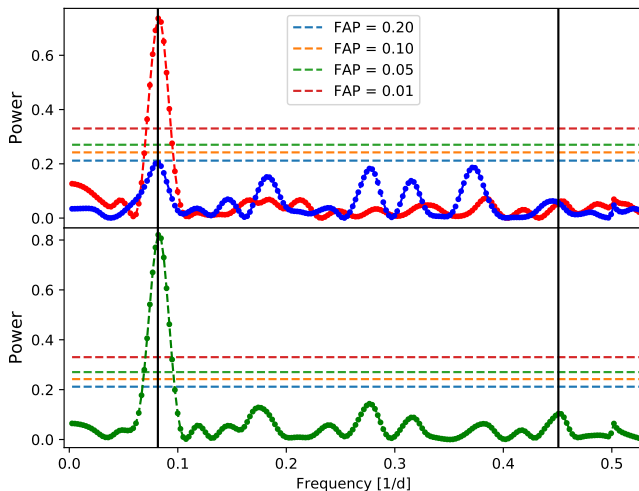


Figure: Upper panel: H α of subsample 1 (red). Corrected (blue). Vertical lines: P_{stellar} (left) and P_{planet} (right). Lower panel: Ca IRT.

Periodogram analysis

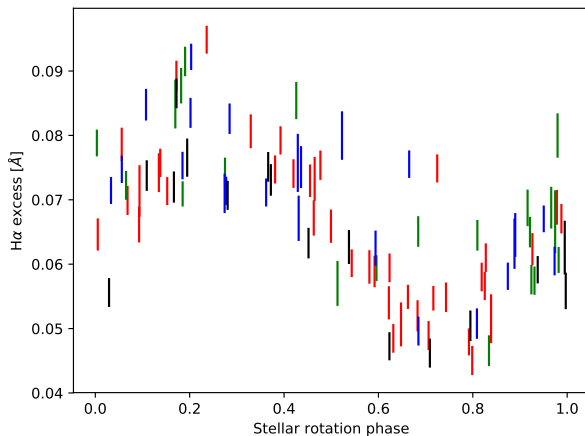


Figure: H α excess folded on stellar rotation period within each subsample individually.

A search for planetary $H\alpha$ absorption

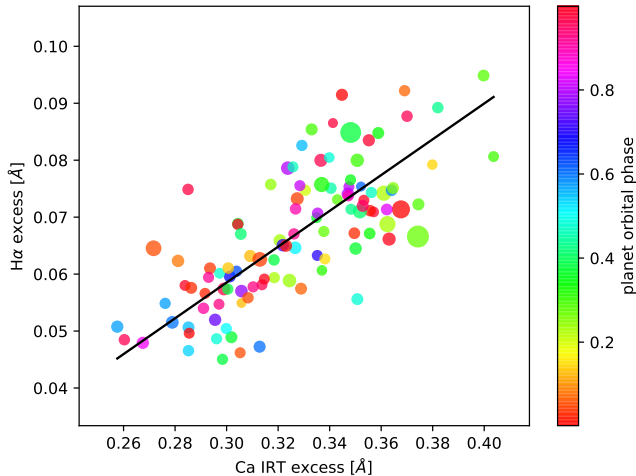


Figure: Correlation between excess equivalent width in $H\alpha$ and the average Ca IRT excess. Black line: best linear fit. Sizes: error margins.

A search for planetary $H\alpha$ absorption

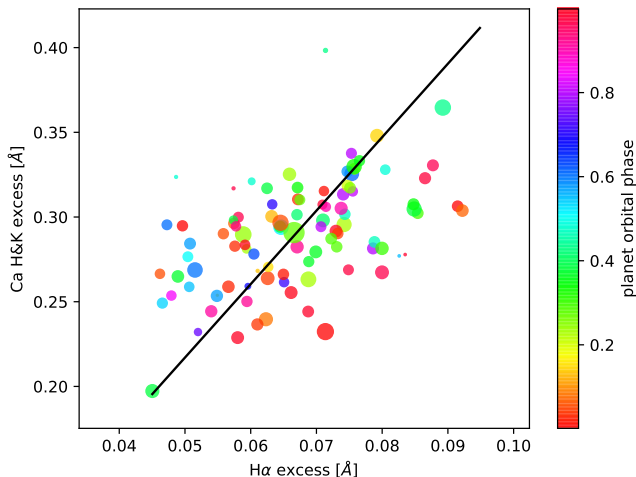


Figure: Identical to last figure but for $H\alpha$ against Ca H&K.

A search for planetary $H\alpha$ absorption

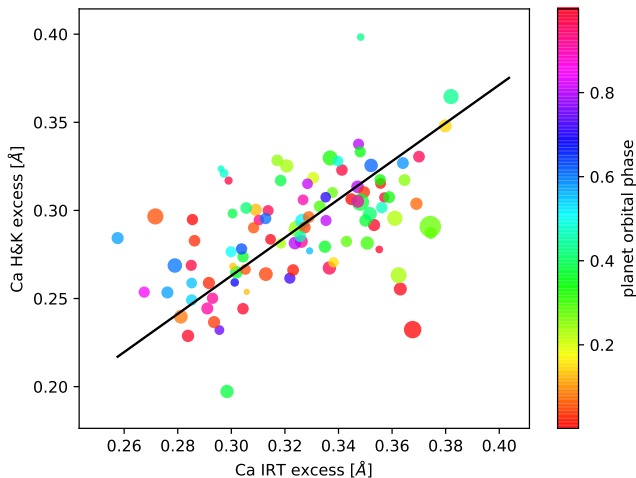


Figure: Identical to last figure but for for Ca IRT against Ca H&K.

A search for planetary $H\alpha$ absorption

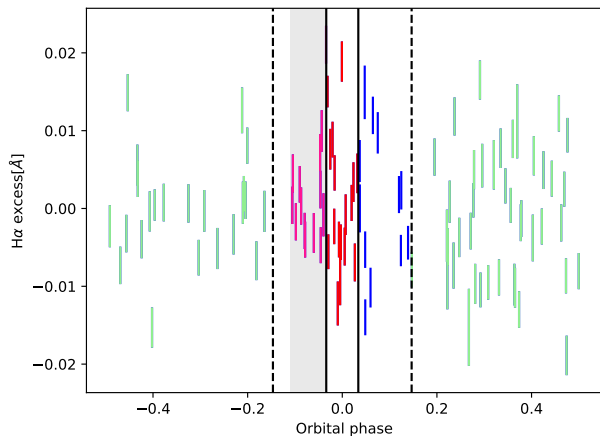


Figure: Phase folded corrected $H\alpha$ excess. Gray shaded area: T_1-4h . Solid vertical lines: T_1 and T_4 . Dashed lines: T_1-6h and T_4+6h .

A search for planetary H α absorption

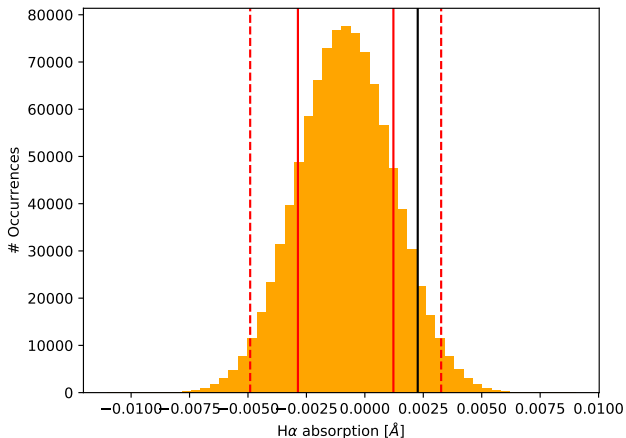


Figure: Distribution of the results for the t-test. Black line: mean of the bow shock data points, solid/dashed red lines: 1 and 2σ interval of the distribution.

A search for planetary H α absorption

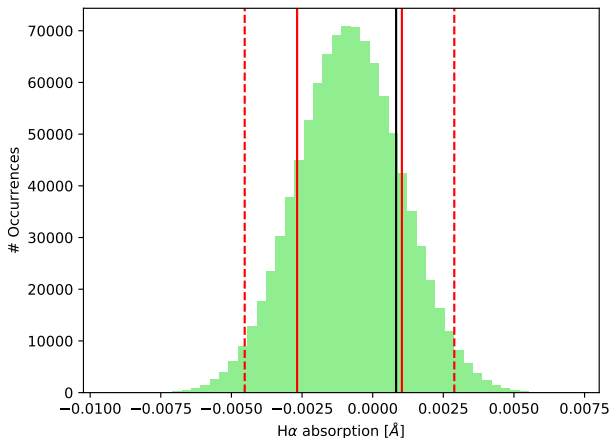


Figure: Distribution of the results for the t-test. Black line: mean of the in-transit data points, solid/dashed red lines: 1 and 2 σ interval of the distribution.

Summary and Conclusions

- at 99% confidence level: 6.2 mÅ pre-transit absorption and 5.6 mÅ in-transit absorption excluded.
- bow shock as reported in literature cannot be confirmed.
- H α variability dominated by stellar activity
- observed signals: excited atmospheric states due to short term stellar variability?