

Outlier-resistant velocity measurements: the line-by-line approach

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Precision-velocity measurements are notoriously challenging in the near-infrared as a number of spurious signals (e.g., telluric absorption, sky line residuals, detector cosmetics) bias measurements at a level well above photon noise. To circumvent these issues, we have devised a per-line approach to velocity measurements that allows for a statistically robust assessment of velocity in the presence of outliers. This approach has been central in the confirmation of RV planets with accuracy on semi-amplitudes measurements at the sub-m/s level (TOI-1759, TOI-1452, TOI-2136) with SPIRou. While the LBL method has been tailored for nIR work, it leads to significant gains in optical pRV. RV uncertainties with the LBL outperform CCF measurements in HARPS data and lead to a two-fold improvement in accuracy in ESPRESSO observations of LHS 1140 as well as significant improvement on planetary masses and their derived properties. I will present an overview of the method as well as recent results with a variety of pRV instruments.