

On-sky demonstration of VIPA high resolution spectrometry for exoplanets

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We present the on-sky characterization and first exploitation of the single-mode fiber-fed compact high-resolution VIPA spectrometer operating in the near-infrared. The study is based on one year of observations obtained at OHP with the PAPYRUS adaptive optics facility. Our goal is to assess the actual capabilities for astronomical high resolution spectroscopy, in particular for the detection and characterization of exoplanets, of the VIPA concept based on a low-cost high-transmission component, allowing extension to very high resolution. Extensive tests in H-band enable a validation of a well understood signal-to-noise budget (for both the spectrum itself, and the information extracted from multi-line cross-correlation). Preliminary tests also confirm its applicability with dedicated fibers in the K band. Overall, this work provides a first end-to-end evaluation of the VIPA approach on sky and represents a solid basis to estimate its performance in other science cases and conditions. It confirms the potential of this compact concept for very high spectral resolution. Corresponding fields of application of future VIPA-based instruments include high-contrast spectroscopy, radial-velocity measurements, and transmission spectroscopy.