A new look at exoplanetary spectroscopy

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Abstract

The field of exoplanetary spectroscopy is as fast moving as it is new. With an increasing amount of space and ground based instruments obtaining data on a large set of extrasolar planets we are indeed entering the era of exoplanetary characterisation. Permanently at the edge of instrument feasibility, it is as important as it is difficult to find the most optimal and objective methodologies to analysing and interpreting current data. This is particularly true for smaller and fainter Earth and Super-Earth type planets.

For low to mid signal to noise (SNR) observations, we are prone to two sources of biases: 1) Prior selection in the data reduction and analysis; 2) Prior constraints on the spectral retrieval. In Waldmann et al. (2013), Morello et al. (2014) and Waldmann (2012, 2014) we have shown a prior-free approach to data analysis based on non-parametric machine learning techniques. Following these approaches we will present a new take on the spectral retrieval of extrasolar planets. Together with non-parametric data detrending of exoplanetary spectra, we can reach an unprecedented level of objectivity in our characterisation of these foreign worlds.