An Homogeneous Retrieval of Exoplanet Atmospheres

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To date, we have observed dozens of exoplanets with multi-wavelength transmission spectra, thanks mainly to the Hubble and Spitzer Space Telescopes. However, despite these being some of the most valuable observations in existence, retrieval analyses have revealed our difficulties in establishing stringent constraints on the atmospheric properties of these planets. Given the complexity of atmospheric modeling and retrieval tools, multiple independent analyses are a valuable exercise to highlight the outcome of the assumptions taken by each approach, and ultimately, enable a better understanding of transiting exoplanet observations.

I will present an homogeneous retrieval analysis of a sample of exoplanets with HST and Spitzer observations reported in the literature. Our retrieval tool, Pyrat Bay, is an open-source package that combines advanced MCMC algorithms with an efficient radiative-transfer routine and the latest opacity databases from ExoMol or HITRAN to constrain the parameter space of exoplanet atmospheric models. I will discuss the general properties of the sample and, when applicable, compare our results to those of other retrieval tools, i.e., Line, Madhusudhan, Benneke, or Waldmann. I will also discuss the difficulties that degeneracies in the physical parameters impose in the observed spectra, the consequences that arise from modeling choices made by the researcher, and the expectations for observations from future observatories, like the James Webb Space Telescope.

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