



## New Dynamical Mass Estimates of the beta Pictoris Planetary System Through Gaussian Process Stellar Activity Modelling

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Nearly 15 years of radial velocity (RV) monitoring and direct imaging (DI) enabled the detection of two giant planets orbiting the young, nearby star  $\beta$  Pictoris. The  $\delta$  Scuti pulsations of the star, overwhelming planetary signals, need however to be carefully suppressed. In this talk, we propose a new and independent analysis of the system, making use of all available data, including photometric light curve from the ground and space, long term RV and DI monitoring. We demonstrate how all data can be consistently modelled in a Bayesian framework. We show how modern and physically motivated kernels for Gaussian Process can effectively model complex stellar activity. Using further careful statistical treatment of the data to extend the monitoring, we detect both planets from RV data only for the first time. To characterize the system more accurately, we also perform a joint fit of

all available relative astrometry and RV data. We provide precise orbital parameters and discuss the whole system architecture. The inferred dynamical mass measurements for both planets are also compared to mass-luminosity evolutionary tracks. This work opens the path towards a precise characterization of young planetary systems combining photometry, spectroscopy, and astrometry.