A new population of giant planets around M dwarfs with Gaia and SOPHIE

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M-type stars, the most common in the universe, are a major focus for surveys because they are well-suited for detecting low-mass planets in the habitable zone. Despite their importance in the formation and evolution of low-mass planets, little is known about giant planets (GPs) in M star systems. Detecting long period GPs (with semi-major axis typically greater than 1 au) is difficult with transit methods and challenging with radial velocities (RV) due to the faintness and relatively high activity level of M stars. This significant limitation can be effectively addressed by combining RV and high-contrast imaging (HCI) with Gaia-Hipparcos absolute astrometry.

In this context, I used the GaiaPMEX tool presented in Kiefer et al. (2024) to detect GPs around all M stars closer than 15 pc with Gaia Data Release 3 data. GaiaPMEX uses astrometric data from Gaia and Hipparcos data when available to build a two-dimension confidence map to constrain the mass and the semi-major axis of the companion. When combining these maps with RV and HCI detection limits, we can rule out binary companions, as well as identifying and characterizing planetary companions. I built a catalog of M dwarfs within 15 pc (M15pc) and using GaiaPMEX, I performed a systematic search for GPs to produce a list of hundreds of planetary candidates.

In this study, I use RV data to characterize the companion (case of detection in RV) or to provide detection limits at short separations (case of non detection). I obtained multiple nights of observation in service mode at OHP with SOPHIE to gather RV points on a monthly basis, as I am searching for long-period GP in M15pc. This program is the start of a multiple year search, that will allow a characterization of the new population of exoplanets detected with Gaia. My poster will present the M15pc sample, as well as the methodology used to combine astrometry and RV data to characterize the orbit of GPs.

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