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M15pc : The search for Giant Planets around M dwarfs with astrometry

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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 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.

To this extent, I use the GaiaPMEX tool presented in Kiefer et al. (2024) to detect GPs around M stars 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 strongly constrain the orbit and characterize the companion.

I will present the first results of this work, along with perspective of work with GaiaPMEX, RV and HCI. More precisely, I built a catalog of M dwarfs within 15pc and performed a systematic search for GPs with GaiaPMEX to produce a list of 120 planetary candidates.

Astrophysics Field

Exoplanets, M dwarfs, Astrometry, Long-Period Giant Planets

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