Study suggests gas giants may be more common than thought in some parts of the galaxy

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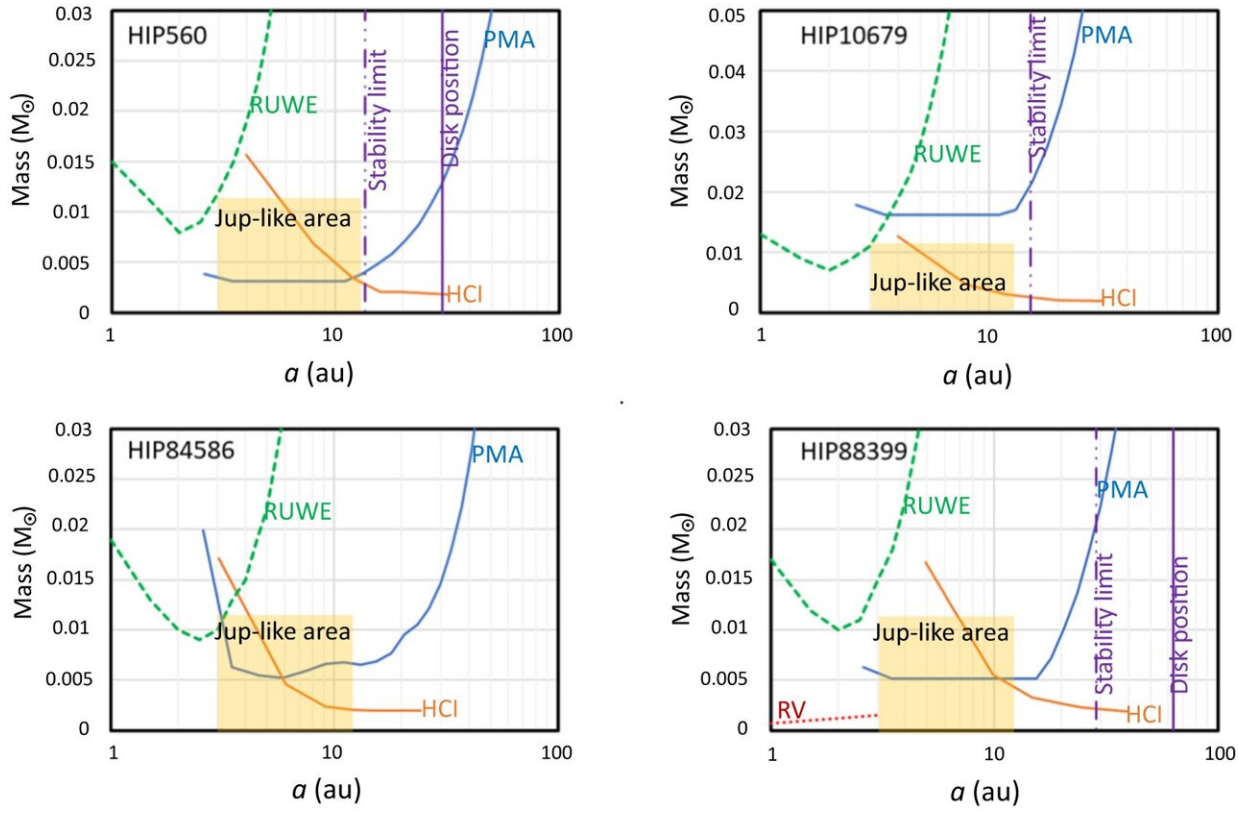

Diagrams showing the mass of companions (in M⊙) that may be responsible for the observed Proper Motion anomaly (PMA) as a function of semi-major axis a in au (blue solid line). They are compared with 90% confidence upper limits obtained from the Gaia RUWE parameter (green dashed line), the upper limit from high-contrast imaging (HCI) with SPHERE (orange solid line), and the upper limit from RVs (red dotted line). The solid violet lines mark the position of known debris disks and the dash-dotted violet lines are the outer edge of the

stability region due to the presence of these disks or of known companion (HIP 10679). Upper left panel: HIP 560, HCI from Dahlqvist et al; Upper right panel: HIP 10679, HCI from Dahlqvist et al; Lower left panel: HIP 84586 HCI from Asensio-Torres et al; Lower right panel: HIP 88399, HCI from Mesa et al. The orange area is occupied by Jupiter-like planets. The companions responsible for the PMa should be close to the solid blue line, below the dashed green, the solid orange line, the dotted red line, and the left of the dash-dotted violet line. Credit: *Nature Communications* (2023). DOI: 10.1038/s41467-023-41665-0

A team of astronomers and astrophysicists from INAF-Osservatorio Astronomico di Padova, Vicolo dell'Osservatorio 5, Universidad Diego Portales, the University of Exeter and Sorbonne Université has found evidence that gas giants may be more common than thought in some parts of the galaxy. In their study, reported in the journal *Nature Communications*, the group analyzed the mass and movement of 30 stars in the Beta Pictoris Moving Group.

Prior research has suggested that gas giants, similar in some respects to Jupiter, should form easily around stars with properties similar to the sun. But finding them has proven to be difficult, leading some in the planetary community to wonder if these assumptions have been wrong.

For this study, the research team took a new approach—they used a new type of high-contrast imaging to focus on a grouping of stars relatively near to Earth called the Beta Pictoris Moving Group. Prior research has shown that the small cluster of stars move together through space.

In their work, the research team focused on 30 stars in the group, seeking to determine their mass and movements. The team chose the group for several reasons: It is relatively small, there is a lot of space between the stars, and they seem to be rather young. They reasoned that gas giants might be more likely to develop in such places. The team

found evidence of the potential existence of gas giants in 20 of the star systems they studied—all of which, if they do exist, orbit far from their star.

More work is required to confirm their findings. The researchers also suggest that gas giants appear more likely to form in small, low population groups, which have not typically been the focus of intense research efforts. And that, they point out, suggests that there may be many more gas giants than previously thought.

More information: Raffaele Gratton et al, Jupiter-like planets might be common in a low-density environment, *Nature Communications* (2023). DOI: 10.1038/s41467-023-41665-0