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Kinematic detection of embedded protoplanets

We still do not understand how planets form, or why extra-solar planetary systems are so different from our own solar system.

Recent observations of protoplanetary discs have revealed rings and gaps, spirals and asymmetries. These features have been interpreted as signatures of newborn protoplanets, but the exact origin is unknown, and remains poorly constrained by direct observation.

In this talk, we show how high spatial and spectral resolution ALMA observations can be used to detect embedded planet in their discs.

We report the kinematic detections of Jupiter-mass planets in the discs of HD 163296 and HD 97048. For HD 97048, the planet is located in a gas and dust gap. An embedded planet can explain both the disturbed Keplerian flow of the gas, detected in CO lines, and the gap detected in the dust disc at the same radius.

While gaps appear to be a common feature in protoplanetary discs, we present a direct correspondence between a planet and a dust gap, indicating that at least some gaps are the result of planet-disc interactions.

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