PROTOPLANETARY DISKS

LkCa 15 b, c and d prove elusive

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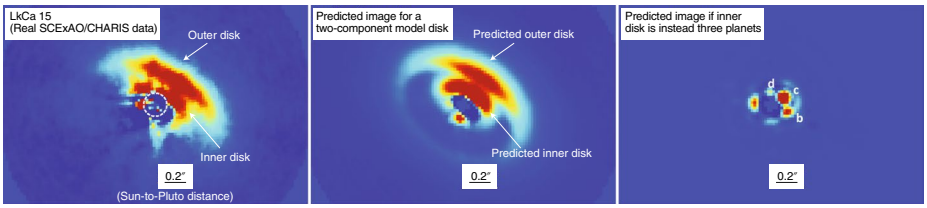

Credit: NAOJ/SCExAO Team

SCExAO, an instrument for the direct imaging of exoplanets on the Subaru Telescope, has done the opposite of what it was designed to do. Thayne Currie et al. took recent SCExAO observations of young Sun-like star LkCa 15 and its system of three candidate planets and combined them with extensive modelling to show that the planets do not exist — the signals interpreted as planets are likely to be features of the star's protoplanetary disk instead. Any real planets in the system must be fainter than the candidates, and probably lower in mass than suggested (sub-Jupiter mass). Such planets might be revealed after the upcoming SCExAO upgrade.

The candidate planets were originally identified using a challenging interferometric technique called sparse aperture masking (SAM; see A. L. Kraus and M. J. Ireland *Astrophys. J.* **745**, 5 (2012) and S. Sallum et al. *Nature* **527**, 342–344 (2015)). However, with SAM it can be difficult to cleanly separate the signal of putative protoplanets from their surroundings and from instrumental effects. SCExAO, in this case coupled with the CHARIS integral field spectrograph, observed in angular differential imaging mode.

The SCExAO image (seen here in the left panel) shows an inner ~9 au radius cavity (denoted by a white dashed circle) partially surrounded by a dusty arc, which is matched well by a model for a two-component disk (centre panel). Planets b, c and d are not clearly seen, and coincide with an extended region of emission with the same brightness as the planet candidates at the location of the inner protoplanetary disk. The right panel demonstrates what SCExAO would have seen had the planets existed.

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