Contribution ID: **24** Type: **not specified**

Disk evolution and planet formation in the Triple HD104237 System

Wednesday 27 August 2025 15:50 (20 minutes)

Exoplanets are rare in close (a<10~au) binaries. Consequently, close-on binary pairs are believed to halt planet formation by depleting planet-building material from the disk. We observed the young, gas-rich, multiple system HD~104237 at 0.1\arcsec resolution with the Atacama Large Millimeter/submillimeter Array (ALMA) to study the effects of binarity on the disk's evolution. The new ALMA observations resolve the gas and dust disks for the first time. We find that the dust disk has a radius of $\sim$7-8~au, consistent with previous upper limits from the literature, and an inclination of $19.5\pm5.9^{\circ}$. The ^{12}CO(2–1) data is used to constrain the gas disk geometry. The gas disk inclination is $22.6\pm0.6^{\circ}$ and from the moment 0 image we estimate a radius of $\sim$26~au, also consistent with previous estimates of the gas disk geometry. The dust and gas disks are therefore compact and coplanar with the binary orbit. The outer disk radius aligns with semi-analytical predictions of truncation by the external binary companion, HD~104237-B. The disk has a mass similar to those of of much larger protoplanetary disks, suggesting that the presence of the close-in and the external companion does not deplete the disk of planet-forming material, but does halt planet formation beyond 10-20~au. We also report the serendipitous detection of protoplanetary disk emission around another member of ϵ Cha association, HD~104237-E, known to have excess dust emission. The dust and gas disks around this object fell within the observation's primary beam. We report the 1.3~mm and ^{12}CO(2–1) integrated fluxes around this source.

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Session Classification: Planet formation and stability in multiple systems