

ALMA Observations of a Gap and a Ring in the Protoplanetary Disk around TW Hya

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We report the first detection of a gap and a ring in 336GHz dust continuum emission from the protoplanetary disk around TW Hya, using the Atacama Large Millimeter/Submillimeter Array (ALMA). The gap and ring are located at around 25 and 41 AU from the central star, respectively, and are associated with the CO snowline at ~ 30 AU. The gap has a radial width of less than 15 AU and a mass deficit of more than 23%, taking into account that the observations are limited to an angular resolution of ~ 15 AU. The observed gap could be caused by gravitational interaction between the disk gas and a planet with a mass less than super-Neptune ($2M_{\text{Neptune}}$), or result from destruction of large dust aggregates due to the sintering of CO ice.

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