[JJ] Evening Poster | P (Space and Planetary Sciences) | P-CG Complex & General

[P-CG22]New Developments of Planetary Sciences with ALMA

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The Atacama Large Millimeter/Submillimeter Array (ALMA) starated its science operation in 2011, and long-baseline observations have become available since 2014. ALMA, with its high sensitivity and resolution, has provided us with qualitatively new information on star and planet formation and small bodies in our Solar System. For example, the discovery of narrow gap structures in the protoplanetary disks around young stars HL Tan and TW Hya enabled us to actually compare the long-standing theoretical models of planet formation with real observations. In our solar system, 60km pixel-scale non-uniform brightness distribution and the rotation of the asteroid Juno are detected. Spatially-resolved thermal mapping of Europa icy surface enables us to search for thermal anomaly in possible plume source regions. As of Cycle 4, Solar observations are available, enabling us, for example, to determine the physical parameters of plasmoid quantitatively. In this session, we overview the latest results of ALMA observations in the field of planetary sciences. We also accept any theoretical and experimental works that are closely related to the observations and discuss the impact on the planetary science community.

[PCG22-P10]The Structure of the Asymmetric Multi-Ring Transitional Disk around 2MASS J16394544-2402039

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We revisit a double-ring transitional disk around 2MASS J16394544-2402039 (J16394544) to investigate the disk parameters and morphology. This object has recently reported by Cox et al. (2017) as a part of the 870-micron dust continuum survey in the rho Ophiuchus star forming region with Atacama Large Millimeter/submillimeter Array (ALMA). As will described below, our detail analysis first reveals that the J16394544 disk has a wide and shallow gap structure, similar ring widths in both major and minor disk axis, and weak brightness asymmetry in the inner ring. At first, we construct an axisymmetric surface brightness model to estimate the disk parameters. The best-fit model is estimated by using Markov Chain Monte Carlo fitting in visibility space. Our modeling efforts reconfirm the double-ring structures, and first show the detail disk parameters, such as the system inclination of 58.5 +0.3/-1.6 degrees and the position angle of 174.1 +1.0/-0.2 degrees. The deprojected radii of two rings are 68.1 +/- 3.5 au and 201.8 +/- 10.4 au. A gap between the rings has the width of 58.2 +/- 4.6 au, and the gap surface brightness is 27 +/- 3% fainter than the ring disk. These properties show that the gap in J16394544 disk is one of the widest and shallowest gaps among the resolved disks by ALMA. Our modeling also shows that the deprojected widths of the rings coincide between the major and minor axes within 1-sigma error. The ring widths along major and minor axes are expected to be similar if the dust settle down to the disk midplane. Therefore, our measurements indicate that the J16394544 disk is geometrically thin and has low-level turbulence. By subtracting the axisymmetric model of the disk emission from the observed surface brightness, we first confirm the weak asymmetry at ~36 au from the central star and the position angle of ~245 degrees. The dust continuum emission at the asymmetry is brighter by a factor of 1.4 than the opposite side. The disk around J16394544 may serve as an

important sample of disks having both multi-ring structures and brightness asymmetry to study such disk structures and their origins.