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A Keplerian disk around a Class 0 source: ALMA observations of VLA1623A

Shih-Ping Lai (National Tsing Hua University, Taiwan), Nadia Murillo (Max-Planck Institut fur extraterrestriche Physik (MPE)), Simon Bruderer (MPE), Daniel Harsono (Leiden Observatory), Ewine van Dishoeck (MPE & Leiden Observatory)

When do rotationally supported disks (Keplerian disks) form and what factors influence or hinder their formation have been studied but are largely unanswered. Observations of early stage YSOs are needed to probe disk formation. VLA1623 is a triple non-coeval protostellar system, with a weak magnetic field perpendicular to the outflow, whose Class 0 component, VLA1623A, shows a disk-like structure in continuum with signatures of rotation in line emission. We aim to determine whether this structure is in part or in whole a Keplerian disk. ALMA Cycle 0 1.3 mm continuum and $C^{18}O$ (2-1) observations are presented here and used to perform an analysis of the disk-like structure using thin disk modelling with the addition of foreground absorption. Kinematical modelling of the line emission shows that the disk out to 180 AU is actually rotationally supported, with the rotation being well described by Keplerian rotation out to at least 150 AU, and the central source mass to be $\sim$0.2 $M_\odot$ for an inclination of 55°. Pure infall and conserved angular momentum rotation models are excluded. VLA1623A, a very young Class 0 source, presents a disk with an outer radius R_{out} = 180 AU with a Keplerian velocity structure out to at least 150 AU. The weak magnetic fields and recent fragmentation in this region of ρ Ophiuchus may have played a lead role in the formation of the disk.