P203a Possible flyby in the XZ Tau system as revealed by the multi-epoch ALMA archival data

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As most stars, including the Sun, are born in cluster environments, dynamical interactions between young stellar systems should be ubiquitous. Such an interaction can alter the future evolution of the circumstellar disks (hereafter CSDs) and planet formation therein. We used ALMA archival data to investigate the possibility of flyby in the Class II binary XZ Tau system with a projected separation of ∼39 au between the two stars (XZ Tau A and B). Previous studies have reported the presence of the dust CSDs with a radius of ∼7 au in each of A and B and gas disks from the ^{12}CO (2–1) emission. Both of the gas disks show signatures of Keplerian rotation and they are misaligned with each other. Notably, the inferred gas radius is much larger than the separation of the two stars, and the gas disks are highly overlapped. The multi-epoch ALMA archival data from 2015 to 2017 indeed reveal a clear proper motion between the two stars. The inferred kinetic energy of the relative motion is higher than the gravitational potential, supporting the flyby scenario. Moreover, we performed SPH simulations with the parameters tailored to those of the observed properties of XZ Tau and compared the results with the observed data. We found that the observed arc-like structure resembles closely to that predicted from our simulation of the dynamical interaction of the two stars, i.e., flyby. In this presentation, we will report the results of these analyses and discuss whether or not XZ Tau is a candidate of flyby.