Poster: The Formation of Spectroscopic Massive Proto-Binaries via Early Disk Fragmentation and Migration

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Accretion-driven luminosity outbursts are a vivid manifestation of variable mass accretion onto protostars. We present three-dimensional gravitation-radiation-hydrodynamics simulations of pre-stellar core collapse, star, and disk formation. We find that accretion disks of young massive stars violently fragment without preventing the (highly variable) accretion of gaseous clumps onto the protostars. This episodic accretion of clumps is accompanied by luminous outbursts. Furthermore, while acquiring the characteristics of a nascent low-mass companion, some disk fragments migrate toward the central massive protostar with dynamical properties showing that their final Keplerian orbits resemble that of a close massive binary system. We predict the fragmentation of massive circumstellar accretion disks as a viable road to the formation of spectroscopic massive binaries and the recently observed strong accretion bursts in high-mass star forming regions.

Outflows and Disks