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Feedback and Fragmentation: key processes in high-mass star formation across the cosmic time

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I present our resent efforts to understand key processes in the Pop III and low-metallicity star formation. One is the protostellar UV feedback, which is known to be strong enough to halt the accretion onto stars for Pop III cases. However, our knowledge on the UV feedback with non-zero metallicity is actually limited. Our recent radiation-hydrodynamic simulations show that, for cases with Z=Zsun, the UV feedback plays totally the opposite effect, i.e., the UV feedback rather enhances the mass accretion (Kuiper & Hosokawa 2018). I explain why.

The other process is the disk fragmentation, which potentially leads to the formation of binary stellar systems. 3D simulations show that the disk fragmentation easily occurs but merger of the fragments also easily occurs. Although the survival rate of the fragments is important, it is uncertain which physical processes control it. To understand this, we have performed a suite of 3D simulations to follow the orbital evolution of fragments in a well controlled manner (Chon & Hosokawa in prep.). The simulations show great diversity of the outcome, i.e., the merger or long-term survival as binaries, depending on different settings. I show that such a diversity is actually well understood with simple analytical considerations.

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Talk/Poster

Talk

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