Poster: Explosive Outflows and Luminous IR Transients from Massive Protostars

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ALMA and near-IR adaptive optics observations of Orion's OMC1 / BNKL outflow reveal that a 10^{48} erg explosion occurred in Orion about 550 years ago. This event was likely produced by a protostellar merger resulting from the decay of a non-hierarchical system that ejected 3 stars and $\sim$10 $M_\odot$ of gas from the star-forming OMC1 cloud core. Other Galactic star forming regions show fossil evidence for similar explosions within the last 10,000 years (DR21, IRAS 05506+2414, and G34.26+0.15). Explosive outflows may be associated with the ejection of some runaway stars, the production of IR transients with luminosities between novae and supernovae, and have profound feedback impacts on their parent molecular clouds. Episodic accretion events and mergers may be responsible for some of the over 150 luminous IR-transients detected in nearby star-forming galaxies by the Spitzer warm-mission program SPIRITS during the last three years (Kasliwal et al. 2017, ApJ, 839, 88); SPIRITS 14ajc in Messier 83 is the best-studied example. Most massive protostars form in clusters having high stellar volume densities and, when accreting at high rates, develop AU-scale photospheres. Interactions with dense gas in such clusters can lead to orbit decay, N-body interactions, ejection of runaway stars, and protostellar mergers which produce luminous IR transients.

Galactic Scale