Colloquium

SFB 956

Conditions and Impact of Star Formation

30 Jan 2017 | supplementary colloquium

Monday 3:00 pm

Physikalische Institute Köln

Seminarraum II

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Massive Star Formation – An Investigation of Orion KL with ALMA

About massive star formation, there is a debate between two major models in recent years. One is the merger of less massive stellar objects, and the other is still through accretion but with the help of disk or outflow. So far the accretion-disk-outflow one has been supported with observation evidences mostly. However we are wondering if this model can explain the massive star formation processes in our nearest massive star formation region Orion KL. Is the first outflow found here really driven by young stellar objects? Is there any material in infalling? What processes are in the sources (BN, Source I and n) ejected from the explosion 500 yrs ago?

An investigation was made using ALMA science verification data with a spatial resolution of ~1.5" and sensitivity of about 0.07 K and ?0.18 K for continuum and line, respectively. Six dust cores were detected. The gas consists of emissions of jet-propelled cores at the ridge and dense cores in east and south of the region. The outflow has multiple lobes, which seem to originate from explosive ejections, and is not driven by young stellar objects.

Four infrared bubbles were found in the IRAC emissions. These bubbles, the distributions of the previously found H2 jets, the young stellar objects, and molecular gas all together suggest that BN is the explosive center. The burst time was estimated to be _1300 yr. B? is at far north-west of the explosive center 500 yrs ago.

Strong signatures of gravitational collapse toward Source I was detected. Combining with the outflow and disk found previously we can see it is forming through accretion-disk-outflow typically. Blue profile toward the hot core was detected, showing material is infalling. These and together with the possible relatives of Source I and the hot core make it difficult to explain the Source I coming from outside of the hot core.

The related paper: (Wu, Liu, and Qin 2014, ApJ, 791, 123)