[구IM-01] Binary Nature Revealed in Circumstellar Spiral-Shell Patterns

Hyosun Kim[1,2], I-Ta Hsieh[1], Sheng-Yuan Liu[1], Ronald E. Taam[1,3]
[1]ASIAA, [2]EACOA fellow, KASI, [3]Northwestern Univ.

With the advent of high-resolution high-sensitivity observations, spiral patterns have been revealed around several asymptotic giant branch (AGB) stars. Such patterns can provide possible evidence for the existence of central binary stars embedded in outflowing circumstellar envelopes. It is, however, not generally recognized that the binary induced pattern, vertically extended from the orbital plane, exhibits a ring-like pattern with an inclined viewing angle. I will first review the binary-induced spiral-shell patterns on the AGB circumstellar envelopes with the effect of inclination angle with respect to the orbital plane, of which large inclination cases reveal incomplete ring-like patterns. I will describe a method of extracting such spiral-shell from the gas kinematics of an incomplete ring-like pattern to place constraints on the characteristics of the (unknown) central binary stars. This first success may open the possibility of connecting the ring-like patterns commonly found in the AGB circumstellar envelopes and in the outer parts of (pre-)planetary nebulae and pointing to the conceivable presence of central binary systems, which may give a clue for the onset of asymmetrical planetary nebulae.

[구IM-02] [Fe II] 1.64 μm features of Jets and Outflows from Young Stellar Objects in the Carina Nebula

Jong-Ho Shinn[1], Tae-Soo Pyo[2], Jae-Joon Lee[1], Ho-Gyu Lee[3], Hyun-Jeong Kim[4], Bon-Chul Koo[4], Hwankyung Sung[5], Moo-Young Chun[1], A.-Ran Lyo[1], Dae-Sik Moon[6], Jaemann Kyeong[1], Byeong-Gon Park[1], Hyeonoh Hur[5], Yong-Hyun Lee[4]
[1]Korea Astronomy and Space Science Institute, [2]National Astronomical Observatory of Japan, [3]University of Tokyo, [4]Seoul National University, [5]Sejong University, [6]University of Toronto

We present [Fe II] 1.64 μm imaging observations for jets and outflows from young stellar objects over the northern part (~24′x45′) of the Carina Nebula, a massive star forming region. The observations were performed with IRIS2 of Anglo-Australian Telescope and the seeing was ~1.5″. Eleven jets and outflows features are detected at eight different regions, and are termed as Ionized Fe Objects (IFOs). The [Fe II] features have knotty or elongated shapes, and the detection rate of IFOs against previously identified YSOs is 1.4%. Four IFOs show anti-correlated peak intensities in [Fe II] and Hα, where the ratio I([Fe II])/I(Hα) is higher for longish IFOs than for knotty IFOs. We estimate the outflow mass loss rate from the [Fe II] flux using two different methods. The jet-driving objects are identified for three IFOs (IFO-2, -4, and -7). The ratios of the outflow mass loss rate over the disk accretion rate for IFO-4 and -7 are consistent with the previously reported values (10^{-2}-10^{+1}), while the ratio is higher for IFO-2. This excess may result from underestimating the disk accretion rate. Other YSO physical parameters show reasonable relations or trends.