

SUBARU near-infrared multi-color images of Class II Young Stellar Object, RNO91

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Abstract. RNO91 is class II source currently in a transition phase between a protostar and a main-sequence star. It is known as a source of complex molecular outflows. Previous studies suggested that RNO91 was associated with a reflection nebula, a CO outflow, shock-excited H₂ emission, and disk type structure. But the geometry of RNO91, especially its inner region, is not well confirmed yet. High resolution imaging is needed to understand the nature of RNO91 and its interaction with outflow. Thus, we conducted near-infrared imaging observations of RNO91 with the infrared camera CIAO mounted on the Subaru 8.2-m Telescope. We presented *JHK* band and optical images which resolved a complex asymmetrical circumstellar structure. We examined the color of RNO91 nebula and compared the geometry of the system suggested by our data with that already proposed on the basis of other studies. Our main results are as follows; 1. The *K*-band images show significant halo emission detected within $\sim 2''$ around the peak position while less halo emission is seen in shorter wavelength images such as *J* and optical. The nebula appears to become more circular and more diffuse with increasing wavelengths. The cut-off at 300AU derived from our radial surface brightness is consistent with the size of the polarization disk suggested by Scarrott, Draper & Tadhunter (1993). These consistencies indicate that this optically thick region is attributed to a disk-like structure. 2. At *J* and optical, several bluer knot-like structures are detected around and beyond the halo emission. These bluer knots seen in our images are comparable to the size of the envelope detected in HCO⁺ emission surrounding RNO91 (Lee & Ho 2005). It is thus natural to suggest that these bluer knots are the near-infrared light scattered by an envelope structure which is disrupted by molecular outflows. 3. The pseudo-true color composite image has an appearance of arc-shaped emission extending to the north and to the east through RNO91. On the counter part of this arc-shaped structure, the nebula appears to become more extended to the southwest from the central peak position in *J* band and optical images. We interpret these whole structures as a bottom of bipolar cavity seen relatively edge-on opening to the north and south directions.

Keywords. stars:individual (RNO91), stars:pre-main-sequence, ISM:reflection nebulae

References

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