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WR 155 AND ITS SURROUNDING ISM: WHERE IS THE BUBBLE?

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Stellar winds of massive stars seem rarely to leave easily identifiable and explained dynamical imprints on the surrounding interstellar medium. The sensible, classically-predicted wind bubbles are few and far between. As part of a concerted effort to solve the puzzle that this presents, we carefully investigate the gas and dust environment of the Wolf-Rayet star WR155. An arc of material seen in ^{12}CO data, faintly in infrared images, and more faintly yet in the HI images is the most likely signpost of the star's interaction with its environment.

1. OBSERVED STRUCTURES IN THE ISM

The data discussed here were obtained as part of the Canadian Galactic Plane Survey, a multi-wavelength imaging survey of the northern plane.

The most intriguing feature is seen in CO at −9 km/s (all velocity are with respect to the Local Standard of Rest). The filament to the northeast is 0.18° from the star (8.64pc at d=2.75kpc), whereas the ridge pointing away to the southeast is only 0.13° away (6.24pc at d=2.75kpc). The arc of CO between these two ridges is well-delimited by two concentric ellipses centred on WR155: the inner one with major axis 0.18° and minor axis 0.13°, and the outer one with major axis 0.24° and minor axis 0.18°, both at 40° east of north, giving the arc a width of between 2.4 and 2.9 pc.The northeastern CO filament which points directly away from the star is reminiscent of the cometary globule seen above the OCl 352 cluster in the W4 HII region. In that case, a dense head was shielding a narrow tail from the dissociating and ionizing radiation of the cluster. Here, there is a dense head and a narrow, less dense tail, but does the shadowing explanation make sense considering the presence of the arc of CO to the southeast of the head?The southeastern filament does not point to WR155's current position, nor does it have the suggestive head-tail morphology of the NE filament.

The IRAS 100 μm data also show the NE filament and the arc, but the SE filament is not as distinct. Interestingly, there is additional emission to the NW of WR155 which fits between the concentric ellipses described above, suggestive of a partial shell.

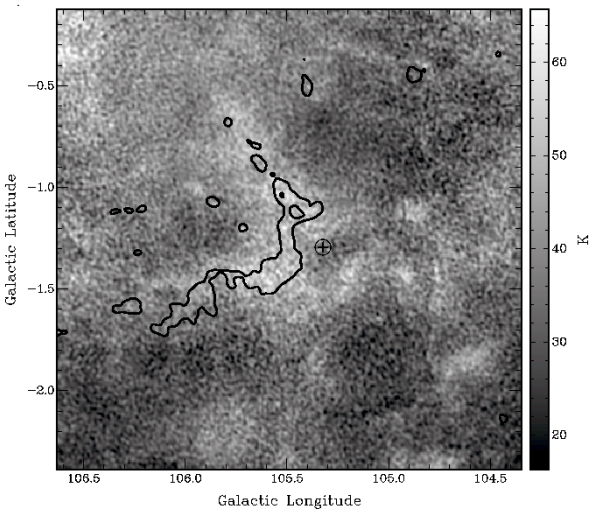

Fig. 1. HI emission (grey) and CO (contours at 0.5K, 2K) at −8.88 km/s. WR155's position is indicate by ⊕.

The HI data show a hint of a structure at −9 km/s accompanying those seen in CO and at 100 μm. There is a ridge of HI coincident with the NE CO ridge, though it is wider and less well defined. The HI emission enhancement to the southwest lies within the ring defined by the 2 ellipses, suggesting that it may be part of a shell around WR155 when looked at in conjunction with the IR and CO data. However, on its own, the HI data is far from convincing evidence of a shell.

2. CONCLUSION

We have not yet unraveled the mystery of WR155's environs but it is clear that we are far from the standard stellar wind bubble described by Weaver et al. (1977). WR155 suggests that looking for idealized bubbles is a fool's quest and that we could learn much more about the physics of the interstellar medium by looking at what does surround high-mass stars rather than looking for what we think should be there.

REFERENCES

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