

DIRECT EVIDENCE FOR A BIPOLAR STELLAR WIND IN NGC 2392

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ABSTRACT. Very high spectral resolution slit spectra have been used to investigate the kinematic structure of the double shell planetary nebula NGC 2392, the Eskimo Nebula. Each shell produces a spectrum corresponding to the projected radial velocity, a pattern which varies according to the position angle of the spectrograph's entrance slit. Multiple slit observations were used to determine that the inner shell is an incomplete prolate spheroid pointed almost at the observer and missing the tip ends. The outer shell is nearly spherical and more uniform.

We present evidence that the stellar wind is the dominant force in determining the kinematic structure of the shells and is producing a continuous bipolar flow of material at velocities up to at least plus and minus 190 km/s through the ends of the prolate spheroid. We argue that the distribution of material along the equator of the inner spheroid is evidence for equatorial loss of material from the central star during its second period of high mass-loss.