Raman O VI Spectroscopy of Asymmetric Accretion Flows in Symbiotic Stars

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Abstract

Being binary systems of a mass losing giant and a hot white dwarf, symbiotic stars are unique objects to exhibit various activities linked to the accretion of some fraction of the slow stellar wind from the giant companion. About a half of symbiotic stars are known to exhibit broad emission features at 6825 Å and 7082 Å formed through inelastic or Raman scattering of far UV O VI $\lambda\lambda$1032 and 1038 with atomic hydrogen. The Raman scattered features have an interesting property that the profiles are mainly determined by the relative motion of the far UV emission region with respect to the H I region and mostly independent of the observer's line of sight. This unique property allows one to take an edge-on view of the accretion stream from the vantage point in front of the mass donor. Raman O VI features usually exhibit double or triple peak profiles with much more enhanced red peak than the blue counterpart. A natural interpretation is provided by invoking asymmetry in the accretion flow around the white dwarf, where the O VI density is higher on the entering side than on the opposite side. Moving away from the giant, the entrance side is responsible for the formation of the red part. One further complication found in Raman O VI features is that their profiles differ in such a way that the blue part is relatively more suppressed in Raman 6825 than in Raman 7082. This profile difference is also attributed to the same asymmetry in the accretion stream around the white dwarf. In this presentation, I want to review how high resolution spectroscopy of Raman scattered O VI features can be used to probe the mass transfer processes that take place in symbiotic stars.