

Raman Scattering Wings of H α in Symbiotic Stars

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In this work, we argue that the broad H α wings prevalently seen in symbiotic stars are formed through Raman scattering of Ly β photons by atomic hydrogen. Assuming a flat incident UV radiation around Ly β , we generate template wing profiles around H α that are Raman scattered in a plane-parallel HI region. Profile fitting analyses are performed to show that the template wing profiles are in excellent agreement with the observed ones that are provided by van Winckel et al. (1993) and Ivison et al. (1994). The wing flux is determined by the scattering HI column density and the incident Ly β flux strength and profile. From our profile analysis it is proposed that the Raman scattering component may be identified with the neutral envelope with a column density ranging $10^{18-20} \text{ cm}^{-2}$ that surrounds the binary system. We briefly discuss alternative candidates for the wing formation mechanism and observational implications of Raman scattering in symbiotic stars and in other astronomical objects including planetary nebulae, post AGB stars and active galactic nuclei.