

30 Years of Photodissociation Regions:

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INVITED TALK

PDRs in Circumstellar Media

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Planetary Nebulae (PNe) constitute one of the latest stages of evolution of low and intermediate mass stars (1-8 M_{\odot}). By the ejection of the outer layers, PNe seed back enriched gas, as well as molecules and dust to the interstellar medium. In the short-lived planetary nebula phase, the ionized gas is the result of the interaction of the previously ejected envelope with the far ultraviolet (FUV) photons emitted by the hot (30 000-100 000 K) central star (Bernard-Salas & Tielens 2005). The study of circumstellar PDRs is of great importance for a proper understanding of the evolution of the ejected material, especially the excitation conditions under the influence of UV photons from the hot central nucleus. The ultraviolet photons will process the dust and photo-dissociate the molecules previously ejected, and as the stellar temperatures become higher some ionization will occur. This ionization gives rise to warm gas (10^4 K) which cools through the emission of copious amounts of FUV and visible line emission, which give these nebulae their optical prominence. Shocks may also photo-dissociate molecules, heat the gas and cause copious amounts of [CII] and [OI] emission, and are the result of the interaction of the fast stellar wind, which dominates the late-AGB phase (Sahai & Trauger 1998), with the slow AGB wind. This interaction is very important since it sculpts the nebula in its beautiful shapes. In this talk I will discuss how PDRs can be used to trace the evolution of the AGB ejecta during the PN phase, their morphology, and how PNe present an ideal setting for PDR studies including the effects of variations in dust properties, elemental abundances, and shocks.

REFERENCES

- Bernard-Salas, J., and Tielens, A.G.G.M. (2005) *A&A*, 431, 523
Sahai, R., and Trauger, J.T. (1998) *AJ*, 116, 1357