PDR Modeling of the LWS Fine Structure Lines in Ultraluminous Galaxies

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Abstract

We compare ISO LWS observations of the [CII] 158 μm and, where observed, the [OI] 63 and 146 μm fine-structure lines in a sample of ultraluminous infrared galaxies (ULIGs) to the results of recent theoretical models of extragalactic photodissociation regions (PDRs). The PDR models are up-to-date versions of those of Wolfire, Tielens, & Hollenbach (1990), which include, among other things, the photoelectric heating effects of small grains/PAHs. Applying the models to Arp 299, we address the PDR origin of the fine-structure lines and the physical properties of the PDR component. In our sample of ULIGs, the [CII] line flux is $\sim$10% of that found in normal and starburst galaxies in the local universe. We use the PDR models, along with the results of photoionization models, to address possible origins for the [CII] deficit.

References

Wolfire, M., Tielens, A.G.G.M., & Hollenbach, D. 1990, ApJ, 358, 116