



COLLOQUIUM



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Herschel 158micron [CII] Observations of "CO-Dark" Gas in the Perseus Giant Molecular Cloud

Abstract

We have observed velocity-resolved [CII] 158 μm emission from both a dense and a more diffuse photodissociation region (PDR) in the Perseus giant molecular cloud (GMC) using the Heterodyne Instrument for the Far-Infrared onboard the *Herschel Space Telescope*. The goal of these observations was to assess the use of 158 μm [CII] emission as a tool. This specific line emission has been hypothesized as a good velocity-resolved tracer and possible diagnostic of diffuse molecular hydrogen that has no cospatial CO emission, known as "CO-dark" molecular gas. We detected [CII] emission from 80% of our total positions, with flat integrated intensity profiles spanning a wide range of optical extinction between 1 mag and 10 mag, and emission extending over 7pc from the center of the Perseus GMC. We compared the integrated intensity of [CII] and ^{12}CO emission with predictions from a 1-D, two-sided slab PDR model and showed that a simple core + envelope model without the "CO-dark" component can reproduce observations well. We also observe that the integrated intensity of [CII] emission is reasonably well correlated with the HI column density, as well as total gas column density, suggesting that HI plays an important role in explaining the [CII] emission emanating from Perseus. From these results we conclude that [CII] 158 μm emission may be a powerful diagnostic tool, but only when combined with other well-constrained data

3:00 p.m. – 4:00 pm Friday, February 28th McLane 162