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Modeling MIR Molecular Gas Tracers of Truncation in Highly Irradiated Planet-forming Disks.

Most stars and planetary systems form within massive star-forming regions, where radiation is dominated by the intense FUV photons from
newly-formed OB stars. However, most Planet Forming Disks (PFD) studied to date are not highly irradiated [1][2]. Recent observations from the James Webb Space Telescope (JWST) of XUE-1, a low-mass PFD located in the high-mass star-forming region NGC 6357, revealed the presence of abundant H2O, HCN, CO, CO2, and C2H2. These molecules trace warm gas and
are typically found to be confined to the inner 5-10 AU of PFDs. However, the observed line fluxes were not very strong, suggesting that the disk may be truncated due to photoevaporation caused by the highly irradiated environment [3].

To investigate this hypothesis, a parameter study using the radiation thermochemical model ProDiMo [4] was conducted to explore the effect of disk truncation and Polycyclic Aromatic Hydrocarbons (PAH) fractions on the spectra of irradiated PFDs. This study aims to analyze the flux-continuum ratio of the identified molecules across the parameter space and explore the regions from which each molecule emits. This approach will provide valuable insights into how disk truncation and PAH fractions affect the strength of flux spectra in highly irradiated PFD[5].

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