

The PAH Revolution: Cold, Dark Carbon at the Earliest Stages of Star Formation

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Polycyclic Aromatic Hydrocarbons (PAHs) have been implicated as a large reservoir of reactive carbon in the interstellar medium since the 1980s. PAHs have been widely attributed as the carriers of the unidentified infrared bands where their aggregate vibrational emission spectra are extremely well matched to the observed line signals. Only in the last year have individual PAHs been detected in the ISM for the first time [1–3], however, allowing us to begin to investigate the detailed chemical pathways for the formation and destruction of these molecules. In this talk, I will discuss our detections of PAH molecules via their rotational transitions using Green Bank Telescope observations of TMC-1 from the GOTHAM collaboration [4]. I will discuss the efforts to model the chemistry of these PAHs, the necessity of complementary laboratory kinetics work such as the elegant single-collision studies being carried out by R. Kaiser and co-workers [5], our application of novel machine learning approaches to exploring the chemical inventory in TMC-1 [6], and finally the benefits of unbiased reaction screening studies in the laboratory with Microwave Spectral Taxonomy [7, 8].

References

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