

Colloquium

SFB 956

Conditions and Impact of Star Formation

30 November 2020

Monday 3:30 pm

Physikalische Institute Köln

Video stream / Host: Stephan Schlemmer

Kelvin Lee

Department of Chemistry, Massachusetts Institute of Technology

GOTHAM: A Meeting of Laboratory Spectroscopy, Observations, and Machine Learning

The recent discovery of benzonitrile towards the cold, dark molecular cloud TMC-1 with the 100 m Green Bank Telescope sparked interest into understanding the role small aromatic molecules play in the chemistry and physics of the interstellar medium. On the spectrum of molecular complexity, these species are intermediate between the small, several atom large molecules that are routinely as tracers, and the peculiar behemoths like the fullerenes and the ubiquitous polycyclic aromatic hydrocarbons (PAH). Beyond mere chemical curiosities, understanding how these molecules are formed and destroyed is relevant to how a substantial amount of material—in particular carbon—is transported and transformed in the interstellar medium, as well as gas phase synthetic routes to prebiotic molecules.

In this talk, I will present the latest results from the GOTHAM (GBT Observations of TMC-1: Hunting Aromatic Molecules) project, a large scale spectral line survey focusing on characterizing the chemical inventory of TMC-1 in the context of small aromatic molecules. I will discuss new molecular detections from this collaboration, which have been facilitated by new workflows in high resolution laboratory spectroscopy and signal analysis. Finally, I will present new machine learning methods I have developed to automate the discovery of new molecules, with the aim of providing guidance to laboratory, observation, and chemical modeling work in GOTHAM and subsequent campaigns.

