SFB 1601 Student Seminars – Summer 2025

Date & Time: *2th July, 2025 (Wednesday), 15:00 - 16:30*
Venue: *New Theoretical Building, Conference Room 0.02, University of Cologne* [Map link]
Social event: *KOSMA room, Main Building, University of Cologne. (From 16:30)*

15:00 - 15:05	Welcome + Introduction	
15:05 - 15:30	Probing the Role of Feedback in the Most Prolific Dusty Massive Star Forming Galaxy at Cosmic Noon	Aaron Beyer (Ph1)
15:35 - 16:00	Action Spectroscopy in Multipole Ion Traps	Julian Böing (Ph1)
16:05 - 16:30	From Telescope to Laboratory: The Journey of Integrating a Prototype	Prachi Misra (Ph1)
16:30 - 17:00	Open discussion about the Student Council & its activities + Feedback	
17:00 —	Snacks and Social Event	

Coffee and drinks will be provided during the seminar. You can bring your own cup of coffee.

List of Abstracts

Probing the Role of Feedback in the Most Prolific Dusty Massive Star Forming Galaxy at Cosmic Noon

Speaker: Aaron Beyer, Ph1

The mass growth of galaxies from the early universe until today is governed by the life-cycle of gas within them. Accreted gas cools and forms into stars, while feedback from active galactic nuclei and massive stars can act against the gas reservoir and delay rapid star formation. Tracing this process is possible by observing molecular lines of CO, H_2O and several ionized molecules with ALMA and the high resolution accessible by strong lensing of galaxies. We investigate feedback by characterizing the gas flows in and out of the some of the most prolific dusty star forming galaxies (SFR > 1000$M_\odot$/yr) down to ~250pc scales. This study allows us to see how different the most extreme galaxies at cosmic noon are to nearby galaxies and open up a new way of exploring the gas impacted by feedback at scales comparable to low-z studies.

Action Spectroscopy in Multipole Ion Traps

Speaker: Julian Böing, Ph1

Multipole ion traps in combination with action spectroscopic methods are powerful tools for spectroscopic investigations at cryogenic temperatures. The newest method in this field is the Leak-Out-Spectroscopy, which allows nearly background-free measurements on bare ions with very high sensitivity. This talk should give an introduction to this interesting field of research using the example of $NCCO^+$.

From Telescope to Laboratory: The Journey of Integrating a Prototype

Speaker: Prachi Misra, Ph1

In astrophysics, rotational spectroscopy is an indispensable tool for identifying molecules based on their unique spectral fingerprints. These signatures allow for the detection and study of molecules in space using radio telescopes.

Chirped-Pulse Fourier Transform Microwave spectroscopy is a laboratory technique that enables the acquisition of broadband, high-resolution, and high-sensitivity rotational spectra. This work presents an updated version of a home-built chirped-pulse spectrometer operating in the 75–110 GHz millimeter-wave range. The detector employs a heterodyne receiver originally developed for emission spectroscopy, which lacked sideband separation. As a result, mirror lines of rotational transitions of the target molecule appeared in the measured spectra, complicating spectral assignments.

To address this limitation, a prototype digitizer platform known as the Universal-Board (U-Board), originally designed for telescope backend applications, was integrated into the setup. This work outlines the integration process and presents proof-of-concept measurements using methyl cyanide that demonstrate the improved sensitivity and performance of the upgraded instrument. Additional results highlight the enhanced flexibility of the prototype for diverse spectroscopic applications.