



9th July 2015 - 10:00

Building 99, Seminar Room I+II (EG)

Annemieke Petrignani

Leiden University, The Netherlands

Shapes and sizes of aromatic hydrocarbons in space

Polycyclic aromatic hydrocarbons (PAHs) are the most abundant complex molecules in space. They are believed to contain 10-20% of the total cosmic carbon. They play an active role in the evolution of interstellar gas and are possible pre-biotic roots of life. Their mid-IR emissions, referred to as the aromatic infrared bands (AIBs), have been observed in the interstellar medium of many galaxies. Nevertheless, up to this day, little is known about their shapes and sizes. In fact, no identification of any individual PAH have been made to date. Observations are providing IR spectra with unprecedented sensitivity and resolution and will be even more ground-breaking with the launch and operation of the James Webb Space Telescope. Models lack the molecular specificity to extract the molecular information embedded in these archival and future observational data. The models are also largely unvalidated and experimental data is lacking. I aim to characterise the anharmonic behaviour of PAHs in the mid-IR, measure large PAHs in the gas phase, and identify the low-lying vibrational modes of PAHs in the far-IR to determine new size and shape dependent signatures. A high-resolution setup in Amsterdam allows us to enter the realm of anharmonicity in the mid-IR where we aim to understand the (small) spectral variations observed in the AIBs. The FELIX Laboratory in Nijmegen offers 3 free electron lasers (FELs) that allow important extensions on gas-phase spectroscopy on PAHs; 1) studying large gas-phase PAHs using FELICE and 2) studying low-vibrational modes of gas-phase PAHs using FELIX and FLARE.

Host: Melanie Schnell - CFEL Molecular Physics seminar