

Colloquium

SFB 956

Conditions and Impact of Star Formation

9 April 2018

Monday 3:00 pm

Physikalische Institute Köln

Lecture Hall III

Zùlpicher Straße 77 | 50937 Köln

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The Manifold Roles of Cosmic Rays in Star-forming Environments

The study of the interaction of cosmic rays with the interstellar matter is a multi-disciplinary investigation that involves the analysis of several physical and chemical processes: ionisation of atomic and molecular hydrogen, energy loss by elastic and inelastic collisions, energy deposition by primary and secondary electrons, gamma-ray production by pion decay, the production of light elements by spallation reactions, and much more. Cosmic-ray ionisation activates the rich chemistry of dense molecular clouds and determines the degree of coupling of the gas with the local magnetic field, which in turn controls the collapse timescale and the star-formation efficiency of a molecular cloud. In recent years a wealth of observations from the ground and from space has provided information and constraints that still need to be incorporated in a consistent global theoretical framework. My goal is to use the results of chemodynamical models and state-of-the-art numerical simulations supplemented by dedicated observations to provide a unifying interpretation of the data with a model of cosmic-ray propagation specifically developed to make predictions that can be tested against the observations.

Finally, I will talk about my most recent study: a mechanism able to accelerate local thermal particles in protostars that can be used to explain the high ionisation rate as well as the synchrotron emission observed towards protostellar sources.

