Colloquium

SFB 956

Conditions and Impact of Star Formation

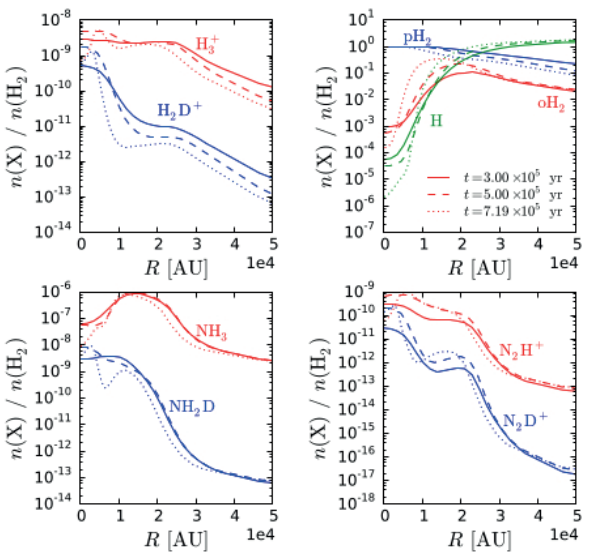
5 November 2018

Monday 3:00 pm

Physikalische Institute Köln

Lecture Hall III

Zülpicher Straße 77 | 50937 Köln



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Models of Isotope and Spin-state Chemistry in Star-forming Clouds

The high density and low temperature in the central areas of star-forming cloud cores leads to the efficient depletion of various molecules onto the surfaces of interstellar dust grains. This severely limits the number of available tracer molecules that we can use to obtain information on, e.g., the gas temperature in these conditions. Fortunately, the onset of depletion allows deuterium chemistry to proceed, and indeed the abundances of deuterated molecules tend to peak toward high-density regions where depletion is strong. This provides us with unique observational tools to study the physical properties of star-forming cores, and hence it is highly desirable to develop detailed models of deuterium chemistry in order to understand the observations. Deuterium chemistry is strongly affected by spin-state chemistry, and in fact spin states can play a role in the formation of heavier species, such as ammonia, as well.

In this talk I will discuss in detail the connection of isotope (in particular deuterium) and spin-state chemistry, and will describe how studies of these topics allow us to understand the initial stages of the star-formation process better. I will introduce several past and present modeling efforts in this context, and will also outline future prospects that will further enhance our understanding of interstellar chemistry.