

# Colloquium

SFB 956

Conditions and Impact of Star Formation

03.12.2012

Monday 5:00 pm

Physikalische Institute Köln

Lecture Hall III

Zülpicher Straße 77 | 50937 Köln

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## Sunblock Extreme – Astrophysics and Astrochemistry in Photo-dissociation Regions

The visible universe is dominated by stars. Their distribution, their starlight and their cycle of birth and death determine the structure of all galaxies. Only a few percent of the total baryonic matter exists in the form of gas and dust in molecular clouds, the interstellar medium (ISM). The ISM is despite its little mass fraction in permanent interaction with the surrounding stars: clouds collapse and form new stars, stellar winds and supernova explosions return material and enrich the ISM with heavier elements, and energetic starlight determines the chemical and physical structure of molecular clouds and thus controls the clouds capacity for further star formation.

The regions where the energy balance and the chemical composition of an interstellar cloud is dominated by far-ultraviolet photons are called photo-dissociation regions (PDRs) and their emission carries information on the local conditions in the gas and dust. Up to now, almost 180 different molecules have been identified in the ISM, some of them composed of more than 12 atoms.

How can such complex molecules form and survive in an hostile environment with very low temperatures and densities and under extremely intensive UV illumination, and what can we learn from their observation.

I will present our current understanding of the physical and chemical conditions in PDRs and discuss recent observational results from latest instruments and missions, such as Herschel and SOFIA as well as our efforts in modeling and interpreting the data. The latest progress in numerical PDR modeling will be discussed using example of the Cologne PDR model KOSMA- $\tau$ .

