

Physikalisches Kolloquium

Thursday, 13.11.14, 17:15, HS 100
Reception with coffee & cookies 16:45



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Physics of the multi-phase turbulent Interstellar Medium and the puzzle of the long gas depletion timescales

Abstract

Interstellar space is filled with a dilute mixture of charged particles, atoms, molecules and dust grains, called the interstellar medium (ISM). The average particle density of the ISM is 1 cm^{-3} which represents a density lower than can be created on Earth. The ISM therefore represents a fascinating laboratory to study the physics of highly attenuated gases, chemical processes and atomic, molecular and solid state physics under extreme conditions and numerous other questions of natural sciences. The physics of the ISM plays a crucial role in many areas of astronomy.

Star formation is one of the most important fundamental processes in the ISM. Observations show that stars form in dense, cold molecular clouds, evolve and at the end of their life return gas and metals to the ISM. In addition, stellar radiation heats the ISM and destroys molecular clouds.

Stellar winds and supernovae drives turbulence in the ISM which again might generate new molecular clouds. Despite its importance, this self-regulated, highly non-linear interaction between the ISM and the stellar component of galaxies is not well understood up to now. For example, galaxies, like the Milky Way contain large quantities of cold, dense molecular gas that should collapse gravitationally and burst into stars on a timescale of order a few million years. As galaxies have ages of 10 billion years, all galaxies should by now be burned out. The opposite is observed.

My talk will focus on some of these puzzles. I will summarize recent ideas and present numerical simulations that have the potential to provide crucial steps towards a consistent theory of the dynamics of the interstellar medium and its condensation into stars.



All of you interested in physics are cordially invited!