Symposium Plasma-Astrophysik (SYPA)

gemeinsam organisiert
vom Fachverband Extraterrestrische Physik (EP),
vom Fachverband Plasmaphysik (P) und
von der Astronomischen Gesellschaft e.V.

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Übersicht der Hauptvorträge und Fachsitzungen

(Hörsaal HS 2)

Hauptvorträge

SYPA 1.1	Di	16:30–17:00	HS 2	**Magnetic Reconnection and Stochastic Plasmoid Chains in High-Lundquist-number Plasmas** — •Nuno Loureiro
SYPA 1.2	Di	17:00–17:30	HS 2	**Self-regulated evolution of the multi-phase interstellar medium in galaxies** — •Andreas Burkert
SYPA 1.3	Di	17:30–18:00	HS 2	**Turbulence in the Circumgalactic and Intergalactic Medium** — •Jens Niemeyer
SYPA 1.4	Di	18:00–18:30	HS 2	**Contributions of the VKS experiment to dynamo research** — •Jean-François Pinton

Fachsitzungen

SYPA 1.1–1.4	Di	16:30–18:30	HS 2	**Plasma-Astrophysics**

SYPA 1: Plasma-Astrophysics

Zeit: Dienstag 16:30–18:30 Raum: HS 2

Hauptvortrag SYPA 1.1 Di 16:30 HS 2

Magnetic Reconnection and Stochastic Plasmoid Chains in High-Lundquist-number Plasmas — •Nuno Loureiro — Instituto de Plasmas e Fusão Nuclear, IST, Lisbon, Portugal

Over the last few years, the theoretical understanding of magnetic reconnection in large-scale fluid systems has undergone a major paradigm shift. The steady-state model of reconnection described by the famous Sweet-Parker (SP) theory, which dominated the field for $\sim$ 50 years, has been replaced with an essentially time-dependent, bursty picture of the reconnection layer, dominated by the continuous formation and ejection of multiple plasmoids. Whereas in the SP model reconnection was predicted to be slow, a major implication of this new paradigm is that reconnection in fluid systems is fast, i.e., independent of the Lundquist number of the system ($S = LV_A/\eta$, where L is the system size, V_A the Alfvén velocity and η the resistivity), provided that the system is large enough.

In this talk, I will review the recent developments in reconnection that led to this essentially new framework. Both the linear theory describing the instability of current layers to plasmoid formation (including a new development which suggests that current sheets may also be unstable to the Kelvin-Helmholtz instability) and a nonlinear, statistical theory describing the dynamics of a stochastic plasmoid chain will be analyzed. I will discuss results from direct numerical simulations that both confirm and extend the theory, with particular emphasis on the plasmoid size and width distribution functions. New results extending the above investigations to fully 3D systems will be presented.

Hauptvortrag SYPA 1.2 Di 17:00 HS 2

Self-regulated evolution of the multi-phase interstellar medium in galaxies — •Andreas Burkert — University Observatory Munich, Scheinerstr. 1, 81679 Munich, Germany

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. 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. Galaxy formation and evolution, the formation of stars, cosmic nucleosynthesis, all these processes are intimately coupled to the physics of the ISM. However, despite its importance, its structure and evolution is still poorly understood. As summarized in this talk, the situation is however improving rapidly. New observations with powerful telescopes have revealed that the ISM is a turbulent, multiphase gas, filled with structures on all resolvable spatial scales. This has lead to a paradigm shift in our understanding of the ISM, where the old equilibrium model is being replaced by a highly dynamical picture of strongly coupled, interacting and turbulently mixed gas phases that are far from equilibrium and that are continuously stirred by energetic processes like supernova explosions, spiral density waves and/or galactic disk instabilities. Numerical simulations can now explore these processes in great details, providing the basis to develop a comprehensive, physical understanding of the multi-phase ISM.

Hauptvortrag SYPA 1.3 Di 17:30 HS 2

Turbulence in the Circumgalactic and Intergalactic Medium — •Jens Niemeyer — Institut für Astrophysik, Universität Göttingen, Friedrich-Hund-Platz 1, 37077 Göttingen

Galactic winds couple the metal enriched gas in galactic star formation regions with the surrounding circumgalactic and intergalactic medium. Turbulence produced during this process controls the amount of chemical and thermal mixing. It also provides a diagnostic tool for upcoming observations. Hydrodynamical simulations with appropriate subgrid-scale models help to understand the complex interactions of galaxies with their environment.

Hauptvortrag SYPA 1.4 Di 18:00 HS 2

Contributions of the VKS experiment to dynamo research — •Jean-François Pinton — CNRS & ENS de Lyon, France

I will review contributions of the VKS experiment concerning : - the influence of boundary conditions on self-generation, - the conditions and development of dynamical regimes, - the estimation of the proximity to dynamo threshold from below.