Symposium Gemeinsame Probleme in Fusions- und astrophysikalischen Plasmen (SYGP)

gemeinsam veranstaltet von
Fachverband Extraterrestrische Physik (EP) und
Fachverband Plasmaphysik (P)

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Übersicht der Hauptvorträge und Fachsitzungen

(Hörsaal V55.22, Poster.V)

Hauptvorträge

SYGP 1.1	Mon	10:30–10:55	V55.22	**Gemeinsame Forschungsprojekte in Fusions- und astrophysikalischen Plasmen** — •Sibylle Günter, Sami K. Solanki
SYGP 1.2	Mon	10:55–11:20	V55.22	**Liquid metal experiments on the creation and action of cosmic magnetic fields** — •Frank Stefani, Gunter Gerbeth, Andre Giesecke, Thomas Gundrum, Martin Seilmayer, Agris Gailitis, Marcus Gellert, Günther Rüdiger
SYGP 1.3	Mon	11:20–11:45	V55.22	**The thermal noise of the universe** — •Reinhard Schlickeiser, Peter H. Yoon
SYGP 1.4	Mon	11:45–12:10	V55.22	**The role of magnetic fields in core collapse supernovae** — •Ewald Mueller
SYGP 1.5	Mon	12:10–12:35	V55.22	**Magnetic instabilities in stars** — •Rainer Arlt
SYGP 1.6	Mon	12:35–13:00	V55.22	**Small-scale vortices and shocks in the solar atmosphere** — •Manfred Schüssler, Robert H. Cameron, Rainer Moll

Fachsitzungen

SYGP 1.1–1.6	Mon	10:30–13:00	V55.22	**Invited Talks**
SYGP 2.1–2.5	Mon	16:00–16:30	Poster.V	**Posters**
SYGP 3.1–3.10	Mon	16:30–19:00	V55.22	**Contributed Talks**

Die Posterfläche steht den ganzen Zeitraum zwischen den beiden Vortragssitzungen zur Verfügung, so dass die Poster also bereits Mittag aufgehängt werden können.

SYGP 1: Invited Talks

Time: Monday 10:30–13:00 Location: V55.22

Invited Talk SYGP 1.1 Mon 10:30 V55.22
Gemeinsame Forschungsprojekte in Fusions- und astrophysikalischen Plasmen — •Sibylle Günter[1] und Sami K. Solanki[2] — [1]Max-Planck-Institut für Plasmaphysik, Garching — [2]Max-Planck-Institut für Sonnensystemforschung, Katlenburg-Lindau

Es gibt viele Gemeinsamkeiten zwischen Fusions- und astrophysikalischen Plasmen, vor allem die Tatsache, dass es sich meist um sehr stoßarme Plasmen handelt. Daher finden sich wesentliche Effekte wie beispielsweise schnelle Rekonnexion, resonante Wechselwirkung zwischen Teilchen und Wellen, das Auftreten suprathermischer Teilchen und turbulenter Transport in beiden Gebieten. In astrophysikalischen Plasmen gibt es ein viel breiteres Spektrum solcher Phänomene, aber Laborplasmen erlauben meist bessere Diagnostik und aktive Beeinflussung der Plasmen. Eine engere Zusammenarbeit, wie es sie früher zwischen diesen beiden Gebieten gab, wäre daher sehr wünschenswert. Im Vortrag wird ein Überblick über Ergebnisse einer gemeinsamen Forschungsinitiative zwischen den Max-Planck-Instituten für Plasmaphysik und Sonnensystemforschung vorgestellt. Im nächsten Jahr wird eine neue Forschungsinitiative gemeinsam mit der Princeton University begonnen: das Max-Planck/Princeton research center for plasma physics (auf deutscher Seite zusätzlich das MPI für Astrophysik und aus Princeton die astrophysikalische Fakultät der Universität und das Plasma Physics Laboratory (PPPL)). Es wäre wünschenswert, wenn diese Initiative Keimzelle für eine engere Kooperation zwischen den beiden Gebieten auch in Deutschland würde. Im Vortrag werden die wesentlichen Themen für dieses Zentrum vorgestellt.

Invited Talk SYGP 1.2 Mon 10:55 V55.22
Liquid metal experiments on the creation and action of cosmic magnetic fields — •Frank Stefani[1], Gunter Gerbeth[1], Andre Giesecke[1], Thomas Gundrum[1], Martin Seilmayer[1], Agris Gailitis[2], Marcus Gellert[3], and Günther Rüdiger[3] — [1]Helmholtz-Zentrum Dresden-Rossendorf, Germany — [2]Institute of Physics, Salaspils, Latvia — [3]Leibniz-Institut für Astrophysik, Potsdam, Germany

The success of the large-scale dynamo experiments in Riga and Karlsruhe at the end of 1999 has boosted strong worldwide activity to simulate the creation and action of cosmic magnetic fields in the liquid metal laboratory. With some focus on our own projects, we review the recent efforts to study hydromagnetic dynamo action and related magnetic instabilities, such as the magnetorotational instability (MRI) and the Tayler instability (TI). We sketch our plans to set-up the new liquid sodium facility DRESDYN that will include a dynamo experiment based on precession, and a Taylor-Couette experiment for the combined investigation of MRI and TI.

Invited Talk SYGP 1.3 Mon 11:20 V55.22
The thermal noise of the universe — •Reinhard Schlickeiser[1] and Peter H. Yoon[2] — [1]Institut für Theoretische Physik, Lehrstuhl IV: Weltraum- und Astrophysik, and Research Department Plasmas with Complex Interactions, Ruhr-Universität Bochum, D-44780 Bochum, Germany — [2]Institute for Physical Science and Technology, University of Maryland, College Park, MD 20742, USA, and School of Space Research, Kyung Hee University, Yongin-Si, Gyeonggi-Do, 446-701, Korea

Fluctuations occur in all laboratory and space plasmas, including unmagnetized and those in thermal equilibrium, Using the system of the Klimontovich and Maxwell equations for collision-poor unmagnetized plasmas, general expressions for the electromagnetic fluctuation spectra (electromagnetic field, charge and current densities) from uncorrelated plasma particles are derived, which are correct within the theory of special relativity. The general expressions hold for collective and non-collective fluctuations, and for weakly amplified and weakly propagating (including aperiodic) fluctuations. Earlier claimed mathematical divergencies, when calculating the fluctuations from growing modes do not occur.

Probably the most important unmagnetized space plasma is the early intergalactic medium, ionized from the earliest generation of stars at redshift about 20, which transformed the Universe from darkness after recombination to light. We determine the thermal noise of the universe in weakly amplified and aperiodic modes, where the latter might be the source of electromagnetic dark forces.

Invited Talk SYGP 1.4 Mon 11:45 V55.22
The role of magnetic fields in core collapse supernovae — •Ewald Mueller — Max-Planck-Institut fuer Astrophysik, 85748 Garching, Deutschland

Simulations of core collapse supernovae pose a true challenge as they require a proper treatment of multi-dimensional neutrino radiation hydrodynamics, and possibly magneto-hydrodynamic processes. In my talk I will address the current status of core collapse supernova modeling, discuss magneto-hydrodynamic processes that can amplify a magnetic seed field during a core collapse supernova explosion, and present recent results from MHD core collapse simulations.

Invited Talk SYGP 1.5 Mon 12:10 V55.22
Magnetic instabilities in stars — •Rainer Arlt — Leibniz-Institut für Astrophysik Potsdam, Germany

MHD instabilities are ubiquitous phenomena in astrophysics. In many cases they are the key to understanding the enhanced viscosity and transport observed in stars, accretion disks and the interstellar medium. Here we address kink-type instabilities and the magneto-rotational instability in the context of stars, look for enhanced transport of angular momentum and possible dynamo effect from the instabilities.

Invited Talk SYGP 1.6 Mon 12:35 V55.22
Small-scale vortices and shocks in the solar atmosphere — •Manfred Schüssler, Robert H. Cameron, and Rainer Moll — Max-Planck-Institut für Sonnensystemforschung, Katlenburg-Lindau, Germany

We report on the occurrence of vortices and shocks in realistic simulations of solar surface convection. In regions of weak magnetic field, the top layers of the photosphere are dominated by shocks driven by convective upflows. A completely different mechanism for local heating occurs in areas threaded by a sizeable vertical magnetic field: viscous dissipation associated with vortex flows extending high into the photosphere. These results are relevant for understanding the different temperature structure in weakly and strongly magnetized regions of the solar atmosphere.

SYGP 2: Posters

Time: Monday 16:00–16:30 Location: Poster.V

SYGP 2.1 Mon 16:00 Poster.V
Impact plasma study for middle velocity micro sized particle — •Yanwei Li[1,2,3], Ralf Srama[1,2], Yiyong Wu[3], and Sebastian Bugiel[2] — [1]Universität Stuttgart, Stuttgart, Germany — [2]Max Planck Institute for Nuclear Physics, Heidelberg, Germany — [3]Harbin Institute of Technology, Harbin, China

Micron-sized olivine and iron particles have been accelerated in order to characterize their impact plasma. The experiments were carried out at the 2MV accelerator at the Max Planck Institute for Nuclear Physics in Heidelberg. The particle diameters and velocities were 0.3~1.2μm and 3~7km/s, respectively. The targets were polished Aluminum surfaces. Based on the experimental results, impact charge has a relationship with particle mass m and velocity v like Q=kmαvβ. The velocity range chosen generates does not lead to a full particle vaporization but rather generate a large amount of ejected fragments. The charge generation mechanism and its interaction with ejected particles is discussed. These fragments affect the impact charge values and lead the difficulties to find out the values of k, α and β. Furthermore, olivine particles could create more impact charge compared to iron particles. Two physical phenomena are considered: the influence of the particle shape and the ionization energy of the materials. The ionization energy of magnesium, iron and aluminum strongly affects the charge yield of the hyper-velocity impact process.

SYGP 2.2 Mon 16:00 Poster.V

Senkrechte Wellen in magnetisierten Plasmen — •Dominik Ibscher und Reinhard Schlickeiser — TPIV, Ruhr-Universität Bochum, 44780 Bochum, Deutschland

Mit Hilfe der kinetischen Theorie werden Wellen untersucht, die sich senkrecht zu einem homogenen ungekrümmten Magnetfeld ausbreiten. Nach einer kurzen Einführung zur mathematischen Beschreibung von Plasmen werden die Dispersionsrelationen für gyrotrope Verteilungsfunktionen vorgestellt. Diese werden für senkrechte Wellen im nichtrelativistischen Grenzfall näher analysiert. Dadurch lassen sich schließlich allgemeine Kriterien zur Stabilität des Plasmas ableiten. Diese werden auch für die Spezialfälle von Plasmen mit isotroper und Bi-Maxwellverteilung genauer analysiert.

SYGP 2.3 Mon 16:00 Poster.V

Experimental investigations on expanding magnetic flux ropes — •Philipp Kempkes[1], Felix Mackel[2], Sascha Ridder[2], Thomas Tacke[2], and Henning Soltwisch[2] — [1]MPI for Plasma Physics, 17491 Greifswald — [2]Ruhr-Universität Bochum, 44780 Bochum

Twisted magnetic flux ropes show complex dynamic behaviour on different temporal and spacial scales. A prominent example for these confiugurations are arch-shaped solar prominences which can be stable for long periods before becoming eruptive. The FlareLab experiment is designed to investigate the evolution of expanding arch-shaped magnetic flux ropes. Recently, the experiment has been equipped with a new plasma source which provides more flexibility in the magnetic field configuration. It is aimed at following the model considerations proposed by Titov and Démoulin [1] as a descriptive model for a certain class of solar phenomena. First results obtained with the improved plasma source are presented in this contribution. Differences of the magnetic topology as compared to the previous plasma source design are shown and the corresponding influence on the discharge evolution is investigated.

[1] V.S. Titov and P. Démoulin, Astron. Astrophys. **351**, 707 (1999)

SYGP 2.4 Mon 16:00 Poster.V

On solar wind ion kinetics in correlation with short-wavelength transverse waves — Sofiane Bourouaine and •Eckart Marsch — Max-Planck-Institut für Sonnensystemforschung, 37191 Katlenburg-Lindau

We present new results from a study with Helios data of the correlations between the temperature anisotropies of solar wind protons and alpha-particles and their differential streaming and the average power of waves at short wavelengths (about 10 to 100 proton inertial lengths). We find that both the normalized differential ion speed as well as the proton temperature anisotropy increase with growing relative wave power. Moreover, as long as the normalized (to the Alfven speed) differential speed stays below 0.5, the alpha-particle temperature anisotropy also correlates positively with the mean relative amplitude of the transverse fluctuations. In addition we obtain that the alpha-to-proton temperature ratio anti-correlates with the helium ion abundance. All these findings appear to be consistent with expectations from kinetic theory for the resonant interaction of the ions with Alfvén/ion-cyclotron waves, and for the resulting wave dissipation.

SYGP 2.5 Mon 16:00 Poster.V

Fragmentation of current sheets and vortex sheets in stationary incompressible MHD — •Dieter H. Nickeler[1,2], Marian Karlicky[1], Miroslav Barta[1], and Thomas Wiegelmann[2] — [1]Astronomical Institute Ondrejov, 25165 Ondrejov, Czech Republic — [2]MPS, Katlenburg-Lindau, Germany

Fragmentation of current sheets and vortex sheets is an important process connected with eruptive space plasma processe, including magnetic reconnection. Slow changes of magnetic structures in the solar atmosphere and planetary magnetospheres by variation of boundary conditions or other external parameters lead often to the formation of current and vortex sheets. These current or vortex sheets can trigger micro-instabilities, which cause resistivity or viscosity on fluid scales. Consequently resistive instabilities like magnetic reconnection can occur and the systems evolves dynamically. The notion of quasi-magnetohydrostatic evolution can explain the quasi-static phase of many space plasma before an eruption occurs. Examples are eruptive flares, coronal mass ejections and magnetospheric substorms. Within this investigation we use the theory of (quasi-)steady MHD by including nonlinear, stationary plasma flows and show how stationary plasma flows along the magnetic field lines can also be responsible for the existence or generation of fragmentation of current and vortex sheets.

SYGP 3: Contributed Talks

Time: Monday 16:30–19:00 Location: V55.22

SYGP 3.1 Mon 16:30 V55.22

Dynamos in convectively driven turbulence — •Wolf-Christian Müller[1] and Manfred Schüssler[2] — [1]Max-Planck-Institut für Plasmaphysik, Boltzmannstr. 2, 85748 Garching — [2]Max-Planck-Institut für Sonnensystemforschung, Max-Planck-Str. 2, 37191 Katlenburg-Lindau

Different efforts to increase the understanding of magnetic field amplification in magnetohydrodynamic turbulence in the framework of the inter-institutional research initiative of the Max-Planck-Institutes for Plasma Physics and Solar System Research are presented. This talk focuses on basic turbulence properties which are also of importance from an astrophysical viewpoint, like the impact of physical modelling on turbulent dynamos, turbulent energy transport, and Lagrangian as well as dynamo-related characteristics of convective MHD turbulence.

SYGP 3.2 Mon 16:45 V55.22

Velocity-space diffusion of solar wind protons in oblique waves and weak turbulence — •Eckart Marsch and Sofiane Bourouaine — Max-Planck-Institut für Sonnensystemforschung, 37191 Katlenburg-Lindau

The fast solar wind is permeated by all kinds of plasma waves which have a broad range of wavelengths and occur on many different scales. Kinetically, a plasma wave induces ion-wave interactions which can within quasilinear theory be described as a diffusion process. The impact this may have on the shape of the proton velocity distribution function (VDF) is studied. We first analyse theoretically some of the possible kinetic effects of the waves on the ions. Then the model predictions are compared with the detailed in-situ plasma measurements made by the Helios spacecraft in 1976 at 0.3 AU and found to comply favourably with resonant diffusion of protons in obliquely propagating magnetohydrodynamic waves. In particular, the shape at the edges of the VDFs at positive proton velocities in the wind frame can well be explained by cyclotron-resonant diffusion of the protons in oblique fast magnetoacoustic and Alfven waves propagating away from the Sun.

SYGP 3.3 Mon 17:00 V55.22

Electron transport in the fast solar wind — •Håkan Smith[1,2], Eckart Marsch[1], and Per Helander[2] — [1]Max-Planck-Institut für Sonnensystemforschung, Katlenburg-Lindau — [2]Max-Planck-Institut für Plasmaphysik, Greifswald

A conventional fluid approach is in general insufficient for a correct description of electron transport in weakly collisional plasmas such as the solar wind. The classical Braginskii or Spitzer-Härm theory is only valid when the Knudsen number (mean free path divided by length scale of density or temperature variation) is less than 0.01. For realistic Knudsen numbers in the solar wind, the electron distribution function develops a suprathermal tail, and the departure from a local Maxwellian can be significant at the energies which contribute the most to the heat flux moment. In the present study we solve the Fokker-Planck equation for electrons in one spatial dimension and two velocity dimensions. The equation is solved by means of a finite element method in energy and pitch-angle, and finite differences in the spatial dimension. The ion temperature and density profiles are assumed to be known, but the electric field is calculated self-consistently to guarantee quasi-neutrality. It is found that the heat flux and the thermal force are both around half their respective Braginskii values. Moreover, the particle and heat fluxes are sensitive to the applied boundary condition at the outer boundary and to the ion coronal temperature profile. The heating of electrons purely by collisions with ions is inefficient because of the low collisionality. To obtain coronal electron temperatures of 1 MK one needs very hot (around 3 MK) ions.

SYGP 3.4 Mon 17:15 V55.22

numerical modeling of ion distribution functions in presence of ion-cyclotron waves — •Omar Maj[1,2], Roberto Bilato[2], Marco Brambilla[2], and Eckart Marsch[1] — [1]Max-Planck-Institut für Sonnensystemforschung, D-37191 Katlenburg-Lindau, Germany — [2]Max-Planck-Institut für Plasmaphysik, D-85748 Garching, Germany

The kinetic physics of ions in presence of ion-cyclotron (IC) waves constitutes a topic of great interest for both fusion and space plasma physics.

On one hand, IC waves constitute an important heating mechanism in present-day magnetic fusion experiments, and appropriate numerical tools, based on the quasi-linear theory, have been developed for the quantitative description of their resonant interaction with magnetically-confined ions.

On the other hand, in situ measurements of ion distribution functions in the solar wind exhibit the typical signature of resonant interactions with a spectrum of waves at the ion cyclotron frequency. Such IC waves can provide both energy and momentum to the plasma, and, thus, are presently considered one of the main theoretical paradigms to explain the heating of the solar corona to the observed temperature and the acceleration of the solar wind out of the gravitational well of the Sun.

The purpose of this work is to apply numerical modeling tools developed for fusion plasmas to coronal plasmas, with the ultimate goal of understanding how well the quasi-linear theory can account for the observed shape of ion distribution functions.

SYGP 3.5 Mon 17:30 V55.22

The effect of small guide fields on the stability and bifurcation of collisionless current sheets — Kuang Wu Lee[1], Jörg Büchner[1], and •Frank Jenko[2] — [1]Max-Planck-Institut für Sonnensystemforschung, 37191 Katlenburg-Lindau, Germany — [2]Max-Planck-Institut für Plasmaphysik, Garching, Germany

Our recent investigation of modified Harris current sheet shows that, indeed, a current sheet bifurcation instability dominated by the electron dynamics. In the course of the nonlinear instability evolution a bifurcated current sheet structure is naturally evolving from an unstable single-peaked current sheet [Lee & Büchner 2012]. In space plasmas, however, in addition to the anti-parallel magnetic field that maintains the current sheet equilibrium, embedded current-aligned guide fields have to be taken into account. The understanding of the guide field influence on the current sheet bifurcation, which should be considered in the electron kinetic scale, is nevertheless poor. In fusion research typically very strong guide fields are present in the current direction. However, very often at the Sun and in the heliosphere the guide fields are relatively small, of the order of the antiparallel components. Also, instead of the commonly assumed single-peaked current concentrations frequently bifurcated current sheets (BCS) were observed. Hence, we conducted two-dimensional particle-in-cell (PIC-) code simulations to investigate the influence of a relatively small guide field on the stability of current sheets and the formation of BCS. A statistical mechanics analysis of the influence of a guide field dependence will be presented, and the electron dominant turbulent process will be discussed.

SYGP 3.6 Mon 17:45 V55.22

Gyrokinetic simulations of magnetic reconnection — •Daniel Told[1], Moritz Johannes Pueschel[1,2], Frank Jenko[1], and Jörg Büchner[2] — [1]Max-Planck-Institut für Plasmaphysik, EURATOM Association, D-85748 Garching, Germany — [2]Max-Planck-Institut für Sonnensystemforschung, D-37191 Katlenburg-Lindau, Germany

Fast magnetic reconnection, believed to be a mechanism for rearranging the magnetic topology and creating energetic particles in many astrophysical and laboratory plasmas, is investigated with the nonlinear gyrokinetic code GENE. After some code-code benchmarking, extensive linear studies are presented, covering all relevant parameter dependencies of two-dimensional slab reconnection. The results are shown to agree well with a standard fluid model, if its assumptions are strictly fulfilled. In many realistic applications, however, the results deviate substantially, stressing the need for a generalized model or numerical simulations.

Nonlinear simulations are performed for two scenarios: decaying and driven turbulence. In the former case, the initially injected energy cascades towards the largest scales of the system and forms isotropic field structures after the transient turbulent phase. On the other hand, if the system is driven through a Krook-type term in the gyrokinetic Vlasov equation, a fully turbulent, quasi-stationary state develops. In this case, structures and islands are formed whose properties depend significantly on the drive strength. In both cases, the creation of significant parallel electric fields, largely due to magnetic flutter, is observed.

SYGP 3.7 Mon 18:00 V55.22

3D gyrofluid simulations of explosive collisionless reconnection — •Alessandro Biancalani[1,2] and Bruce D. Scott[1] — [1]Max-Planck-Institut für Plasmaphysik, Euratom Association, D-85748 Garching, Germany — [2]Max-Planck-Institut für Sonnensystemforschung, Katlenburg-Lindau, Germany

The nonlinear dynamics of collisionless reconnecting modes is investigated, in the framework of a three-dimensional gyrofluid model. This is the relevant regime of high-temperature plasmas, where reconnection is made possible by electron inertia and has higher growth rates than resistive reconnection. The presence of a strong guide field is assumed, in a background slab model wih Dirichlet boundary conditions in the direction of nonuniformity. Values of ion sound gyro-radius and electron collisionless skin depth much smaller than the current layer width are considered. Strong acceleration of growth is found at the onset to nonlinearity, while at all times the energy functional is well conserved. Nonlinear growth rates more than one order of magnitude higher than linear growth rates are observed when entering into the small-Δ' regime.

SYGP 3.8 Mon 18:15 V55.22

A dedicated laboratory experiment on magnetic reconnection — •Adrian von Stechow[1], Hannes Bohlin[1], Olaf Grulke[1], and Thomas Klinger[1,2] — [1]Max-Planck-Institut für Plasmaphysik, EURATOM Assoziation, Greifswald — [2]Ernst Moritz Arndt-Universität Greifswald

Magnetic reconnection is a process in which a topological rearrangement of magnetic fields results in energy release on small length and time scales. This process takes place in the current sheet which forms at the boundary between opposed magnetic fields as can be found in fusion experiments as well as in space plasmas. The diagnostic of these phenomena is restricted either by technical limitations or harsh environments. In contrast, low temperature plasma experiments provide a wide range of well-defined plasma parameters which enables a controllable reconnection environment and bridges the gap between space and fusion experiments. Detailed spatiotemporal studies of microscopic plasma dynamics are of great significance, especially in the collisionless regime, in which the reconnection rate deviates considerably from that obtained in classical resistive MHD models. Here, small-scale effects such as kinetic instabilities and anomalous resistivity are believed to play an important role. To enable diagnostic access to these effects, the linearly magnetized plasma device VINETA has been upgraded. The addition of a new module of large dimensions allows for a closed reconnection field line configuration. The present status of this new dedicated reconnection experiment is presented along with planned measurement campaigns for the future.

SYGP 3.9 Mon 18:30 V55.22

Numerical simulations of expanding magnetic flux ropes — •Jürgen Dreher[1], Thomas Tacke[1], and Richard Sydora[2] — [1]Theoretische Physik, Ruhr-Universität Bochum — [2]University of Alberta, Edmonton, CA

Magnetic flux ropes play an essential role in astrophysical phenomena like solar prominences and mass ejections. The laboratory experiment FlareLab, which aims at investigating the behavior of such magnetized, current-carrying plasma arches, has recently been equipped with a new plasma source to control different magnetic field configurations.

We report on numerical simulations that are carried out complementary to the experiment in order to identify the relevant processes that lead to the observed morphology and dynamics under varying conditions. Starting with a low-pressure MHD model, we investigate the signatures of kink-like perturbations during the expansion phase as well as the influence of finite resistivity on the evolution and compare this with actual measurements. Further refinement of the simulation model towards a better match of the laboratory conditions, like including finite pressure and the Hall effect, will also be discussed.

SYGP 3.10 Mon 18:45 V55.22

Energy release in a solar coronal bright point region obtained through a new parallel implementation of LINMOD3D — •Eric Adamson[1], Jörg Büchner[1], and Antonius Otto[2] — [1]Max-Planck-Institut für Sonnensystemforschung, Katlenburg-Lindau, Germany — [2]Geophysical Institute, University of Alaska Fairbanks, Fairbanks,USA

LINMOD3D is a numerical simulation code for the investigation of the solar coronal plasma dynamics. Due to the strong inhomogeneities and interscale coupling effects inherent to the system, large grids and parallel computing are required in order to ensure proper numerical solution of the field and fluid equations. LINMOD3D has recently been optimized for its more efficient use on parallel computer architectures. This improvement allows a high spatial resolution and a stable run to track a long evolution of the solar atmosphere. We present results of LINMOD3D simulations addressing the effects of various parameter variations on the energy budget of the solar corona.