

EP 10: Astrophysics II

Time: Friday 14:00–15:00

Location: H5

EP 10.1 Fri 14:00 H5

Structure formation in isothermal supersonic plasmas: magnetic helicity inverse transfer — ●JEAN-MATHIEU TEISSIER¹ and WOLF-CHRISTIAN MÜLLER^{1,2} — ¹Technische Universität Berlin, Berlin, Deutschland — ²Max-Planck/Princeton Center for Plasma Physics, Princeton, NJ, USA

The interstellar medium exhibits large-scale magnetic structures and a wide range of turbulent sonic Mach numbers (from subsonic to Mach numbers of order 10 and beyond), with different turbulent drivers. A mechanism to explain the presence of large-scale structures is the inverse transfer of magnetic helicity, a quadratic ideal invariant describing some topological aspects of the magnetic field. Its inverse transfer has been investigated in direct numerical simulations (DNS), up to this work, only in incompressible and low Mach number cases. We present results from DNS in the isothermal case with Mach numbers ranging up to about 10 with different turbulence drivers and point out differences and similarities with the incompressible case, in particular with respect to spectral scaling laws and Fourier shell-to-shell transfers.

Our work suggests that some incompressible dynamical balances are extended in the supersonic regime and that the driving type affects the dynamics more significantly than the turbulent Mach number alone.

EP 10.2 Fri 14:15 H5

Der AGN TXS 0506+056 als Quelle hochenergetischer Neutrinos — ●MAXIMILIAN ALBRECHT und FELIX SPANIER — Universität Heidelberg - ITA

Aktive Galaktische Kerne sind bereits seit längerer Zeit in der Diskussion als mögliche Beschleuniger hochenergetischer kosmischer Strahlung. Als der Blazar TXS 0506+056 infolge einer groß angelegten Multimessenger-Kampagne als Quelle des vom IceCube-Teleskop 2017 detektierten hochenergetischen Muon-Neutrinos (IceCube-170922A) identifiziert wurde, war dies ein erster Hinweis auf mögliche Korrelationen der erhöhten spektralen Aktivität solcher Quellen und ihrer Neutrinoproduktion. Studien dieser Korrelation durch Simulation der im Jet stattfindenden Beschleunigungsprozesse und ihrer Photon- und Neutrinoemission, lassen daher durch den Vergleich mit den beobachteten Flüssen Rückschlüsse auf die Zusammensetzung des Jet-Plasmas zu.

In diesem Beitrag sollen die Ergebnisse einer Modellierung des Ausbruchs von TXS 0506+056 aus dem Jahr 2017 anhand der vorhandenen Multimessenger-Daten mit dem Zwei-Zonen-Modell UNICORN-0D vorgestellt werden. Im Gegensatz zu vorherigen Modellen wurde dabei die Emission der Host-Galaxie berücksichtigt. Dann konnte mit-

tels Dopplerfaktor, Magnetfeld und den Proton- und Elektronendichten der Quelle die erwartete IceCube Detektion ermittelt und mit den Daten verglichen werden.

EP 10.3 Fri 14:30 H5

The MAGIX Trigger Veto System — ●SEBASTIAN STENDEL for the MAGIX-Collaboration — Johannes Gutenberg University Mainz, Institute for Nuclear Physics, Germany

The MAGIX setup will be used for Dark Photon searches using the visible as well as the invisible decay channel. The MAGIX trigger veto system will enable the fast timing characteristics needed for investigating the visible Dark Photon decay channel $A^* \rightarrow e^+e^-$. It will further be used for energy-loss measurements and will provide the basic hit and position information for the triggered readout of the MAGIX time projection chamber. The MAGIX trigger veto system will consist of one segmented trigger layer of plastic scintillator bars and a flexible veto system of additional scintillation detectors and lead absorbers placed beneath the trigger layer. The data readout will use the ultrafast preamplifier-discriminator NINO chip developed for use in the ALICE detector followed by FPGAs programmed as TDCs.

EP 10.4 Fri 14:45 H5

Representation of Subatomic Particles as focal points and the repercussion on extra-terrestrial gravitation. — ●OSVALDO DOMMANN — Stephanstr. 42, 85077 Manching

An approach is presented where a subatomic particle (SP) is represented as a focal point of rays of Fundamental Particles (FPs) that move from infinite to infinite. The energy of a subatomic particle is stored at its FPs as rotation defining angular momenta. With this representation all SPs interact permanently through the angular momenta of their FPs, according to the Mach principle that postulates that physical laws are determined by the large-scale structure of the universe. The approach explains gravitation as the result of the physical reintegration of migrated electrons and positrons to their nuclei. Gravitation is so composed of a Newton and an Ampere component, with the Newton component dominant at sub galactic distances and the Ampere component at galactic distances. A positive Ampere component explains the speed flattening of galaxies and a negative Ampere component the expansion. As with this approach SPs are permanently interacting through their FPs, there is no need to introduce carrier particles in the theoretical model to explain their interactions, carriers like gluons, gravitons, W and Z Bosons, etc. All four known forces are the result of electromagnetic interactions. More at: www.odomann.com