EP 2: Astrophysik / ISWI

Zeit: Montag 16:30–18:15 Raum: HS 9

EP 2.1 Mo 16:30 HS 9

The LISA Mission: A Window on the Dark Universe — •Simon Barke, Gerhard Heinzel, and Karsten Danzmann — Max-Planck-Institut für Gravitationsphysik (Albert-Einstein-Institut) Hannover

To understand the Universe astronomers rely almost completely on electromagnetic radiation. Unfortunately many exciting objects do not emit any light at all. But according to Einstein's general relativity, all accelerated masses produce gravitational waves - perturbations of spacetime propagating at the speed of light. The detection of these gravitational waves will provide astronomers with an entirely new sense.

The planned LISA mission will be the first gravitational wave detector in space and hence not limited by seismic noise like its ground-based counterparts. With LISA's unprecedented sensitivity at very low frequencies it will be able to trace the formation, growth, and merger history of massive black holes throughout the Universe as well as survey compact stellar-mass binaries, and study the structure of our own Galaxy.

LISA is under intensive study for more than a decade. This talk will give an overview of the mission design, its current status, and present new developments due to the programmatic situation at NASA and ESA.

EP 2.2 Mo 16:45 HS 9

Gamma-ray diagnostics of Type Ia supernovae — •Alexander Summa, Alexei Ulyanov, Markus Kromer, Sonja Boyer, Friedrich K. Röpke, Stuart A. Sim, Ivo R. Seitenzahl, Michael Fink, Karl Mannheim, Rüdiger Pakmor, Franco Ciaraldi-Schoolmann, Roland Diehl, Keiichi Maeda, and Wolfgang Hillebrandt — Institut für Theoretische Physik und Astrophysik, Universität Würzburg, and other institutes

Although the question of progenitor systems and detailed explosion mechanisms still remains a matter of discussion, it is commonly believed that Type Ia supernovae (SNe Ia) are production sites of large amounts of radioactive nuclei. Besides the fact that the gamma-ray emission due to radioactive decays is responsible for powering the light curves of SNe Ia, gamma rays themselves are of particular interest as a diagnostic tool because they provide a direct way to obtain deeper insights into the nucleosynthesis and the kinematics of these explosion events. Focusing on two of the most broadly discussed SN Ia progenitor scenarios – a delayed detonation in a Chandrasekhar-mass white dwarf (WD) and a violent merger of two WDs – we use three-dimensional explosion models and perform radiative transfer simulations to obtain synthetic gamma-ray spectra. We examine the different spectra with respect to their distinct features and draw connections to certain characteristics of the explosion models. Applying diagnostics, such as line and hardness ratios, the detection prospects for future gamma-ray missions with higher sensitivities in the MeV energy range are discussed.

Hauptvortrag EP 2.3 Mo 17:00 HS 9

Space Weather: Forecast, Hindcast or Nowcast? — •May-Britt Kallenrode — Universität Osnabrück, Fachbereich Physik, Barbarastr. 7, 49080 Osnabrück, Deutschland

Different effects of the Sun and the interplanetary medium on Earth's natural and technical environment are summarized under the term Space Weather. As with ordinary weather, science tries to observe and understand in real time (nowcast), tries to make predictions on different spatial and temporal scales (forecast), and tries to understand long term evolutions in the sense of a space climatology (hindcast). This talk will try to sort our present understanding of space weather in terms of physical processes and statistical observations. With the complexity of different players in space weather in mind, the possibilities and limitations of a space weather forecast will be explored.

Hauptvortrag EP 2.4 Mo 17:30 HS 9

Zeitgemäße technische Umsetzung eines bodengestützten solaren Röntgen Flare Monitoring Netzwerkes — Thomas Bayer[1] und •Michael Danielides[2] — [1]Hungerstorf 40, 17139 Faulenrost — [2]E.-M. Arndt- Strasse 11, 17129 Bentzin

Schon lange bevor über Weltraumwetter gesprochen wurde, war den Funkern bewusst, dass die Sonne unsere Hochatmosphäre verändert und somit die Ausbreitung der Funkwellen maßgeblich beeinflusst. Neben den sich regelmäßig wiederholenden Effekten wie die Änderung der Ionisationsrate der Hochatmosphäre zur Tages- und Nachtzeit oder auch der Einfluss des Sonnenfleckenzyklus, gibt es eher plötzlich und noch nicht einfach vorhersagbare Effekte, die einen gravierenden Einfluss auf die Übertragung der Funkwellen haben.

Das hier vorgestellte InFlaMo(Indirekter solarer Röntgen Flare Monitor)- System ist eine zeitgemäße technische Umsetzung eines bodengestützten Beobachtungssystems, welches die Auswirkungen der solaren Röntgenstrahlung auf die Ionosphäre detektiert, aufzeichnet und die Daten an ein projekteigenes Portal sendet. Mit diesen Informationen besteht die Möglichkeit zeitnah, z.B. die HF- Ausbreitungsvorhersagen oder in die Navigationsfehlerkorrekturen zu aktualisieren. Dies bietet einen signifikanten Mehrwert für Wissenschaftler, Funkamateure und Funkdienste.

EP 2.5 Mo 18:00 HS 9

Quasi-stable radiation belt in the slot region, measurements of MATROSHKA / DOSTEL — •Johannes Labrenz[1], Sönke Burmeister[1], Thomas Berger[2], Rudolf Beaujean[1], Bernd Heber[1], and Günther Reitz[2] — [1]Christian Albrechts Universität zu Kiel — [2]German Aerospace Center, DLR, Institute of Aerospace Medicine, Radiation Biology Department, Cologne

MATROSHKA (MTR) is an ESA experiment facility under the science and project lead of DLR Cologne. The radiation exposure inside a human phantom is measured by active and passive detectors. The DOSimetry TELescope (DOSTEL), built at CAU Kiel in cooperation with DLR Cologne, is a particle telescope consisting of two Si-semiconductor detectors. Count rates as well as energy deposition spectra are measured by this instrument. The active instruments were operating during the first mission phase (MTR-1) where the phantom was mounted outside the Zvzeda module (Service Module SM) of the ISS from Feb. 2004 to Aug. 2005. In 2008 the active instruments were operating again during the third mission phase (MTR-2B) inside the SM of the ISS. The DOSTEL measurements showed the expected enhanced dose rates during transits through the inner radiation belt (SAA) over the South Atlantic and transits through the outer radiation belt at the highest magnetic latitudes. In Sept. and Oct. 2004, during the MTR-1 phase, an additional radiation belt in the so called slot region appeared. In this work the measurements of this quasi stable slot region belt will be presented.