EP 1: Astrophysik

Zeit: Montag 14:00–16:00 Raum: HS 9

Hauptvortrag EP 1.1 Mo 14:00 HS 9

Probing quasars with large surveys and long-term monitoring programs — •Helmut Meusinger — Thueringer Landessternwarte, Tautenburg, Germany

50 years after the discovery of quasars, the active galactic nuclei (AGN) community is in the midst of a flood of high-quality data from large surveys. AGNs are efficiently selected in the mid-IR, radio, and X-ray domain and optical surveys provide spectra for huge numbers of (largely unobscured) high-luminosity AGNs. A major contribution comes from the Sloan Digital Sky Survey (SDSS) with its excellent photometric and spectroscopic data, including multi-epoch photometry. Variations of the optical/UV flux density over time, one of the key characteristics of AGNs, have long been considered to provide insight into the geometry and physics of quasars. Statistical trends seem to support a picture where accretion in a standard disk is the dominant underlying process for the UV/optical quasar variability. Quantitative discrepancies between observed and predicted trends, however, imply modifications beyond the simplest model. Moreover, other processes contribute to the observed variability as well, including those on longer timescales. Extreme deviations from the mean quasar spectrum indicate peculiar spectral types that may hold important clues to quasar structure and evolution. Using a neural network for the selection of peculiar spectra and combining the results with near-IR, mid-IR, and radio data, the SDSS is shown to be uniquely suited to collect and study substantial samples of unusual and hitherto unknown quasar types.

EP 1.2 Mo 14:30 HS 9

Hadronic modeling of AGN variability — •Matthias Weidinger[1] and Felix Spanier[2] — [1]Theoretische Physik IV, Ruhr-Universität Bochum — [2]ITPA, Universität Würzburg

While synchrotron emission being responsible for the first peak in the typical double-humped spectral energy distribution of blazars is beyond question, the situation in the very high energy regime is still a matter of debate. Compton up-scattering of internal (jet) photons works well for many, but - by far - not for all blazars. Either external radiation fields or non-thermal protons within the jet need to be present to explain the broadband emission of e.g. flat spectrum radio quasars consistently. A time-dependent hybrid emission model is introduced here. With the available contemporaneous data increasing steadily the information extracted from short time variability can be used to distinguish between the different models, without relying neutrino detections. The principle is explained using the blazar 1ES1011+496.

EP 1.3 Mo 14:45 HS 9

Cosmic Rays and Magnetic Fields in Halos of Spiral Galaxies — •Ralf-Juergen Dettmar — Ruhr-Universitaet Bochum

The distribution of cosmic rays and the structure of magnetic fields in halos of galaxies can be deduced from radiocontinuum polarization observations of the synchrotron radiation caused by cosmic ray electrons gyrating in the interstellar magnetic field. Recent advances in radioastronomical receiver technology have allowed for significant upgrades of major radio facilities such as the Westerbork Synthesis Radio Telescope (WSRT) or the Jansky Very Large Array (JVLA).

We report first results from observations of edge-on galaxies obtained with the new broad-band receivers. These new receivers not only provide higher sensitivity due to the increase in bandwidth, the large number of available frequency channels in the different bandpasses also allows for new analyses methods such as "Rotation Measure (RM) Synthesis".

The results for some prototypical galaxies with extended gaseous halos like NGC4631, M82, and NGC3079 will be presented and discussed in the context of cosmic ray propagation and magnetic field structure and generation.

EP 1.4 Mo 15:00 HS 9

Anisotropic diffusion of Galactic cosmic ray protons and their steady-state azimuthal distribution — •Frederic Effenberger, Horst Fichtner, Klaus Scherer, and Ingo Büsching — Theoretische Physik IV, Ruhr-Universität Bochum

Galactic transport models for cosmic rays involve the diffusive motion of these particles in the interstellar medium. Owing to the large-scale structured Galactic magnetic field, this diffusion is anisotropic with respect to the local field direction. We included this transport effect along with continuous loss processes in a quantitative model of Galactic propagation for cosmic ray protons that is based on stochastic differential equations. We calculated energy spectra at different positions along the Sun's Galactic orbit and compared them to the isotropic diffusion case. The results show that a larger amplitude of variation and different spectral shapes are obtained in the introduced anisotropic diffusion scenario, which in turn emphasizes the need for accurate Galactic magnetic field models.

EP 1.5 Mo 15:15 HS 9

Herschel's "Cold Debris Disks" — •Alexander Krivov[1] and Herschel DUNES consortium[2] — [1]Astrophysikalisches Institut und Universitäts-Sternwarte, FSU, Schillergäßchen 2-3, 07745 Jena — [2]Everywhere in the world

Infrared excesses associated with debris disk host stars detected so far, peak at wavelengths of ~100μm or shorter. However, six out of 31 excess sources in the Herschel OTKP DUNES have been seen to show little or no excesses at 100μm, but instead, significant - and in some cases extended - excess emission at 160μm. This excess emission has been suggested to stem from debris disks colder than those known previously. We re-consider whether some or even all of the candidates may be associated with unrelated galactic or extragalactic emission and conclude that it is highly unlikely that none of the candidates represents a true circumstellar disk. For true disks, both the dust temperatures inferred from the spectral energy distributions and the disk radii estimated from the images suggest that the dust is nearly as cold as a blackbody. This requires the grains to be larger than ~100μm, regardless of their material composition. To explain the dearth of small grains, we suggest that the cold disks are composed of unstirred primordial macroscopic grains. We show that such disks can survive for gigayears, largely preserving the primordial size distribution. They should be composed of solids larger than millimeters, but smaller than kilometers in size. Thus planetesimal formation, at least in the outer regions of the systems, has stopped before "cometary" or "asteroidal" sizes were reached.

EP 1.6 Mo 15:30 HS 9

The role of reprocessing in the pulse shape formation in binary X-ray pulsars — •Ute Kraus and Corvin Zahn — Institut für Physik, Universität Hildesheim

High-energy radiation from binary X-ray pulsars originates from accretion onto a strongly magnetized neutron star. It is observed pulsed due to the rotation of the star. The pulse shapes are characteristic for each source and in many cases are strongly dependent on photon energy. We model the energy-dependent pulse profiles of medium-luminosity X-ray pulsars taking full account of relativistic effects. In particular, we study the effects of reprocessing of radiation on the neutron star and in the upper accretion stream. We find that reprocessing in the stream may dominate the high-energy pulses. The energy-dependence of the model is in good qualitative agreement with observations.

EP 1.7 Mo 15:45 HS 9

Investigating the link between an iron-60 anomaly in the deep ocean's crust and the origin of the Local Bubble — •Michael Schulreich and Dieter Breitschwerdt — Zentrum für Astronomie und Astrophysik, TU Berlin, Berlin, Germany

Supernova explosions responsible for the creation of the Local Bubble (LB) and its associated HI cavity should have caused geological isotope anomalies via deposition of debris on Earth. The discovery of a highly significant increase of ^{60}Fe (a radionuclide that is exclusively produced in explosive nucleosynthesis) in layers of a deep sea ferromanganese crust corresponding to a time of 2.2 Myr before present, appears very promising in this context. We report on our progress in relating these measurements to the formation of the LB by means of 3D hydrodynamical adaptive mesh refinement simulations of the turbulent interstellar medium in the solar neighborhood. Our calculations are based on a sophisticated selection procedure for the LB's progenitor stars and take advantage of passive scalars for following the chemical mixing process.