HK 32: Hauptvorträge

Zeit: Donnerstag 8:30–10:30 Raum: 1A

Hauptvortrag HK 32.1 Do 8:30 1A

Low Energy Neutrino Astronomy and Results from BOREXINO — •Lothar Oberauer[1] and Borexino Collaboration[2] — [1]TU München, James-Franck-Str 1, 85748 Garching — [2]INFN Italy, Germany, France, Poland, Russia, USA

Neutrinos can be used as probes from astrophysical objects. In this talk first results on the measurement of solar 7-Be neutrinos in the BOREXINO experiment at the Gran Sasso underground laboratory (Italy) will be shown. The result will be discussed in context with neutrino oscillations and prospects for measuring CNO- and pep-neutrinos will be discussed. Finally a short outlook on future possibilities in the field of low energy neutrino astronomy will be given.

Hauptvortrag HK 32.2 Do 9:00 1A

Direct Dark Matter Search — •Josef Jochum — Kepler Center for Astro and Particle Physics, Universität Tübingen

Many observations in astronomy and cosmology point to the existence of so called Dark Matter. Dark Matter is the largest fraction of matter and it composes 23% of the total energy content of the universe. The upper limits on the contribution of baryonic matter to the energy content of the universe are well below the content of Dark Matter, why new elementary particles are needed to explain the nature of Dark Matter. The identification of the nature of Dark Matter would not only answer an important question in cosmology, it as well contributes to physics beyond the standard model of particle physics. If for examply supersymmetric particles exist, they are very likeley to contribute to Dark Matter. Supersymmetric candidates for Dark Matter particles could be directly detected by scattering on nuclei. Extremely low scattering rates can be expected and a detection will only be possible with powerful techniques to distinguish ambient background. At present the most promising techniques are cryogenic detectors and liquid noble gas detectors. There has been large progress over the last years in improving the sensitivity for direct detection of Dark Matter particles and an increasing fraction of the parameter space for supersymmetric Dark Matter candidates is being explored. New larger scale experiments are being prepared with good chances to detect Dark Matter if it is connected to supersymmetry.

Hauptvortrag HK 32.3 Do 9:30 1A

Neutrino-less double beta decay — •Manfred Lindner — Max-Planck-Institut für Kernphysik, Heidelberg, Germany

The status of neutrino-less double beta and the potential of future experiments will be reviewed. Interpretations in terms of Majorana neutrino masses or other lepton number violating operators will be discussed.

Preisträgervortrag HK 32.4 Do 10:00 1A

Nucleosynthesis of intermediate and heavy elements in Supernova — •Gabriel Martinez-Pinedo — GSI Darmstadt — Träger des Gustav-Hertz-Preises

The main processes determining the nucleosynthesis of elements were already reviewed by Burbidge, Burbidge, Fowler and Hoyle and indepently by Cameron in 1957 but many open issues remain till today related to the nucleosynthesis of intermediate and heavy elements in supernovae. A core-collapse supernova explosion occurs when the iron core of a massive star becomes unstable and collapses to produce a neutron star. The liberated energy, mainly in neutrinos, heats the material surrounding the newly born neutron star to such a large temperatures that matter is completely dissociated. As the ejected matter expands and cools nucleons reassemble into nuclei. The composition of this matter depends of the ratio of protons to neutrons that is determined by the spectra and luminosities of the emitted (anti)neutrinos. Modern supernova simulations show that the early ejecta are proton rich. These ejecta are the site of a new nucleosynthesis process that we have denoted νp-process. In this process, the assembled nuclei have equal number of neutrons and protons with large beta decay half-lives and low proton capture probabilities which would inhibit the creation of heavier elements. However, the matter is under a strong antineutrino flux that converts some of the free protons into neutrons. These neutrons are immediately absorbed by the neutron deficient nuclei allowing for subsequent proton captures. In this way, isotopes like ^{92,94}Mo and ^{96,98}Ru can be synthesized whose production has long been a mystery.