T 601: Niederenergetische Neutrinos III

Zeit: Freitag 16:45–18:05 Raum: INF 308 Gr. HS

Gruppenbericht T 601.1 Fr 16:45 INF 308 Gr. HS

A multipurpose detector for low energy neutrino physics: LENA — •Teresa Marrodan Undagoitia, Franz von Feilitzsch, Marianne Goeger-Neff, Lothar Oberauer, Walter Potzel, Juergen Winter, and Michael Wurm — Physik-Deparment E15, Technische Universitaet Muenchen, James-Franck-str., 85748, Garching

Recently, an European collaboration has been formed (LAGUNA - Large Apparatus for Grand Unification and Neutrino Physics) to study the feasibility of a large volume detector for a wide field of physics. Key topics of this project are solar-, supernovae- and geoneutrinos. Concerning particle physics, both neutrino oscillation experiments and proton decay searches will be performed. Three technologies are currently under discussion, a 0.5 Mt water Cherenkov (MEMPHYS), a 100 kt liquid Argon (GLACIER) and a 50 kt liquid scintillator (LENA) detectors. During this talk the work of the LAGUNA collaboration will be presented. The focus will be placed on the physics and technical developments for LENA (Low Energy Neutrino Astronomy), the liquid scintillator detector proposed by the Technische Universitaet Muenchen. This work has been supported by funds of the DFG (Transregio 27: Neutrinos and Beyond), the Munich Cluster of Excellence and the Maier-Leibnitz-Laboratorium (Garching).

T 601.2 Fr 17:05 INF 308 Gr. HS

Looking into the centre of a supernova with LENA — •Jürgen Winter, Franz von Feilitzsch, Marianne Göger-Neff, Teresa Marrodan Undagoitia, Lothar Oberauer, Walter Potzel, and Michael Wurm — Physik-Department E15, Technische Universität München, James-Frank-Straße, 85748 Garching

One of the goals of the future 50 kt liquid-scintillator detector LENA (Low Energy Neutrino Astronomy) is the detection of neutrinos and antineutrinos from a galactic core-collapse supernova, where one expects roughly 20,000 events within ∼10s.

Discriminating between 7 possible reaction channels, and thus being able to measure both flux and energy spectrum for different neutrino flavours, information on SN modelling and neutrino properties can be gained. An interesting feature is the possible observation of MSW effect and the earth matter effect in the antineutrino sector.

A key technique for the discrimination of the different reactions is spatial event reconstruction. Therefore, information on photon arrival time, light pattern and the position of ∼12,000 photomultipliers is considered.

This work is supported by funds of the DFG (Transregio 27: Neutrinos and Beyond), the Cluster of Excellence "Origin and Structure of the Universe"and the Maier-Leibnitz-Laboratorium (Garching).

T 601.3 Fr 17:20 INF 308 Gr. HS

Search for the diffuse supernova neutrino background in LENA — •Michael Wurm, Franz von Feilitzsch, Marianne Göger-Neff, Teresa Marrodán Undagoitia, Lothar Oberauer, Walter Potzel, and Jürgen Winter — Physikdepartment E15, Technische Universität München, James-Franck-Str., 85748 Garching

The next-generation neutrino observatory LENA (Low Energy Neutrino Astronomy) is intended to be a $\sim$50 kton liquid-scintillator detector. Due to the large mass, the low energy threshold and the high-grade background discrimination, LENA will be sensitive to the low isotropic flux of diffuse supernova neutrinos (DSN) that has been generated by core-collapse supernovae (SN) throughout the universe.

According to current DSN model predictions, we expect $\sim$10 $\bar\nu_e$ signal events per year in LENA. These will be observed inside an energy window limited by the backgrounds due to reactor and atmosperic $\bar\nu_e$'s. Apart from a first detection of the DSN, we will show that 10 years statistics in LENA will be sufficient to provide information on both SN core-collapse models and the cosmological SN rate ($z<2$).

This work has been supported by the DFG in the Transregio 27 "Neutrinos and Beyond", by the Excellence Cluster "Origin and Structure of the Universe", and by the Maier-Leibnitz-Laboratorium (Garching).

T 601.4 Fr 17:35 INF 308 Gr. HS

Analysis of the optical properties of organic liquid scintillator for LENA — •Michael Wurm, Franz von Feilitzsch, Marianne Göger-Neff, Teresa Marrodán Undagoitia, Lothar Oberauer, Walter Potzel, and Jürgen Winter — Physikdepartment E15, Technische Universität München, James-Franck-Str., 85748 Garching

Future large mass liquid-scintillator experiments like LENA (Low Energy Neutrino Astronomy) make high demands on the optical properties of the scintillator solvent and wavelength shifters. For this reason, we investigated various scintillator samples based on the solvents PXE, Dodecane and LAB.

The performed laboratory measurements include the optical attenuation and scattering length of scintillation light in the solvent, and the fluorescence times of different scintillator mixtures. Setups and results will be presented.

This work has been supported by the DFG in the Transregio 27 "Neutrinos and Beyond", by the Excellence cluster "Origin and Structure of the Universe", and by the Maier-Leibnitz-Laboratorium (Garching).

T 601.5 Fr 17:50 INF 308 Gr. HS

Atmospheric neutrinos in ATLAS — •Joachim Kopp — Max-Planck-Institut fuer Kernphysik, Postfach 10 39 80, 69029 Heidelberg

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