# T 34: Neutrinophysik 3

Zeit: Dienstag 11:00–12:10 Raum: VSH 118

**Gruppenbericht** T 34.1 Di 11:00 VSH 118

**The OPERA Experiment: Concluding the Neutrino Oscillation Analysis** — •Annika Hollnagel for the OPERA-Hamburg-Collaboration — Universität Hamburg, Institut für Experimentalphysik

The long-baseline neutrino oscillation experiment OPERA has been designed for the direct observation of $\nu_\tau$ appearance in the CNGS $\nu_\mu$ beam.

The OPERA detector was located at the LNGS underground laboratory, with a distance of 730 km from the neutrino source at CERN. It was a hybrid apparatus built of about 150000 Emulsion Cloud Chamber modules providing micrometric resolution and Electronic Detector elements for online readout, interaction location, and the measurement of particle charge and momentum.

CNGS beam data taking lasted from 2008 to 2012, and the detector has now been decommissioned.

With the observation of 5 $\tau$ neutrino events, the experiment was able to report the discovery of $\nu_\mu \rightarrow \nu_\tau$ oscillations at a significance larger than $5\sigma$. Combining all oscillation channels accessible at OPERA - including $\nu_e$ appearance and $\nu_\mu$ disappearance - the neutrino oscillation analysis will conclude in 2017.

**Gruppenbericht** T 34.2 Di 11:20 VSH 118

**Neutrino Physics within the SHiP Experiment** — •Caren Hagner, Daniel Bick, Stefan Bieschke, Joachim Ebert, and Walter Schmidt-Parzefall — Universität Hamburg, Institut für Experimentalphysik, Luruper Chaussee 149, 22761 Hamburg

The SHiP experiment (Search for Hidden Particles) requires a high intensity beam dump, which could be realized by a new facility at the Cern SPS accelerator. In total $2 \times 10^{20}$ protons of 400 GeV will hit the molybdenum-tungsten target and produce, amongst others, neutrinos of all flavors from decaying mesons. Therefore an additional neutrino subdetector, based on the high resolution emulsion cloud chamber technology of Opera, Chorus and Donut, will be placed upstream of SHiPs detector for the hidden sector. We expect a total of O(2M) $\nu_\mu$ events, O(1M) $\nu_e$ events and O(5K) $\nu_\tau$ events. A main goal is the measurement of $\nu_\tau$ cross sections, where the present statistics of a few events will be increased by three orders of magnitude. The first observation of $\bar{\nu}_\tau$ is also within reach. Neutrino-nucleon deep-inelastic scattering is another challenging topic, especially the first measurement of structure functions $F_4$ and $F_5$.

T 34.3 Di 11:40 VSH 118

**Coherent elastic neutrino nucleus scattering as a window to new physics** — •Thomas Rink — Max-Planck-Institut für Kernphysik, Heidelberg, Deutschland

With the next generation of low-energy Germanium detectors **C**oherent **E**lastic **N**eutrino **N**ucleus **S**cattering is close to first confirmation. Besides establishing a new neutrino reaction channel which is predicted by the standard model for over forty years now, CENNS provides also many opportunities to test recent theoretical models including eV-mass sterile neutrinos as well as non-standard neutrino interactions. Further, another possibility of measuring the Weinberg angle would be established, complementing the rare data situation at lowest energies. This talk shows that the combination of highest possible neutrino fluxes, a sophisticated shielding design and lowest detection energies proves well to reach this aim. By referring to a feasibility study adapted to this requirements, prospects of measuring the signal itself are presented and an outlook of constraining the mentioned BSM models is given. The critical influence of quenching, the conversion of nuclear recoils to ionization signals within the crystal, in such attempts shall be emphasized.

T 34.4 Di 11:55 VSH 118

**Investigation of the target of the COMET muon to electron conversion-experiment** — •Andreas Jansen, Dominik Stöckinger, and Kai Zuber — TU Dresden, Institut für Kern- und Teilchenphysik, Germany

COMET is an experiment searching for coherent neutrinoless transition of muons to electrons in the surrounding of atomic nuclei. Since this process violates charged lepton flavor conservation it is highly suppressed in the Standard Model and therefore it provides an excellent channel to search for new physics. With an expected single-event sensitivity of $3 \cdot 10^{-15}$, Phase-I of COMET aims to improve the current world's best limit by a factor of 100.

The number of stopped muons is attained by measuring characteristic X-rays from muonic atoms. To maximize the number of stopped muons the target consists of multiple thin aluminum disks. In order to account for this complex structure, a replication of the original setup was designed to measure the detection efficiency and solid angle dependencies in regard to each single disk.

The talk will present the design of the test setup built at TU-Dresden, the underlying Monte-Carlo simulations as well as the acquired data and the performed analysis.