

## LENA - Low Energy Neutrino Astronomy

We propose LENA (Low Energy Neutrino Astronomy), a large  $\sim 50$ kt liquid scintillator neutrino detector for particle-astrophysics, located in a deep underground laboratory. Main scientific goals of LENA are: the search for proton decay, thus probing grand unified theories; the measurement of the diffuse Supernova neutrino background; the precise determination of thermo-nuclear fusion processes by measuring solar neutrinos with high statistics; a measurement of geo-neutrinos probing Earth's models; in case of an actual galactic Supernova type II an accurate measurement of the time development and flavour content of the emitted neutrino burst. Furthermore we propose the use of LENA as a detector for a long baseline neutrino oscillation experiment. A high sensitivity on the mixing angle  $\Theta_{13}$  can be achieved [5]. The physics potential of LENA was determined in several Monte-Carlo studies [1,2,3] and several feasibility studies for different liquid scintillator candidates were performed recently [4]. An actual overview of the physics program and technological developments can be found in [4] as well. A possible location for LENA is currently investigated within the European LAGUNA design study.

Literature:

- [1] T. Marrodan Undagoitia et al., "Search for the Proton Decay  $p \rightarrow K\bar{K}\bar{K}$  in the large liquid scintillator low energy astronomy detector LENA", Physics Review D 72, (2005), 075014
- [2] M. Wurm et al., "Detection potential for the diffuse supernova background with the large liquid scintillator detector LENA", Phys. Rev. D75 (2007), 023007
- [3] K. Hochmuth et al., "Probing the Earth's interior with the LENA detector", hep-ph/0610048
- [4] T. Marrodan-Undagoitia et al., "LENA: A multi purpose detector for low energy neutrino astronomy and proton decay", J. Phys. Conf. Ser 120 (2008) 052018
- [5] J. Peltoniemi, arXiv:0911.4876

### Summary

LENA:

- Search for proton decay
- DSNB neutrino measurement
- Supernovaburst neutrinos
- Solar neutrinos
- Geo-neutrinos
- Long baseline neutrino oscillations

**Primary author:** Prof. OBERAUER, Lothar (TUM)

**Co-authors:** Prof. VON FEILITZSCH, Franz (TUM); Dr POTZEL, Walter (TUM)

**Presenter:** Prof. OBERAUER, Lothar (TUM)