Dissertation Prize 2018

The 2018 GNN Dissertation Prize (now awarded the 4th time) goes to Gary Binder and Lew Classen.

Gary Binder (UC Berkeley) completed his thesis *Measurements of the Flavour Composition and Inelasticity Distribution of High-Energy Neutrino Interactions in IceCube* in December 2017. For this analysis, he developed a new technique to separately reconstruct the energies of the cascade and the track in 2,650 starting track events, and, from those, determine the total neutrino energy and the inelasticity. He then compared the inelasticity distribution with predictions from the standard model, finding good agreement at energies from 1 TeV to over 100 TeV. He then made a series of fits using the measured starting-track inelasticity in addition to the usual zenith angle and neutrino energy proxy, to explore aspects of neutrino interactions and of the character of the astrophysical neutrino flux. One study measured the neutrino flavour ratio, and another compared the spectral indices of the astrophysical neutrino flux as measured using tracks and with cascades. Another fit measured charm production in the neutrino interactions, while a fourth fit measured the neutrino/antineutrino ratio of atmospheric neutrinos. Gary is now a postdoc at the Colorado School of Mines.

Lew Classen (now postdoc at the University Münster) defended his thesis *The mDOM – a multi-PMT digital optical module for the IceCube-Gen2 neutrino telescope* in June 2017 at the University Erlangen-Nürnberg. From the very beginning, Lew has been a driving force in the development of the multi-PMT optical module (mDOM) for future IceCube extensions. He made numerous investigations of various mechanical and electronic components and worked on their optimization. This involved studies of diverse type ranging from finite-element mechanical stress simulations of the pressure vessel to setting up a detailed mDOM simulation in GEANT4. In particular, he characterized key components like PMT-type candidates in very detail and performed extensive investigations of the optical properties of different pressure vessels glasses and optical gels. Lew's work was essential for the mDOM being now considered the baseline optical module for the IceCube-Upgrade.