Dissertation Prize 2016

In 2015, the GNN dissertation prize was awarded for the first time. For the 2016 dissertation prize, ten theses have been submitted – seven on IceCube analyses and three on Antares analyses. As in 2015, the prize committee had a difficult job to determine the winner(s): the quality of literally all theses was extremely high!

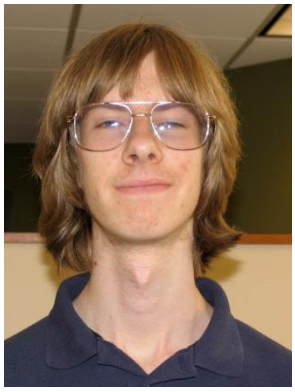
The committee has applied three criteria: 1) the scientific quality (which of course was weighted highest), 2) the form and the didactic level and 3) the introduction and the description of the general context.

Three winners have been elected, presented below in alphabetic order.

Lars Mohrmann (DESY Zeuthen) defended his thesis *"Characterizing Cosmic Neutrino Sources (A Measurement of the Energy Spectrum and Flavor Composition of the Cosmic Neutrino Flux Observed with the IceCube Neutrino Observatory)"* in November 2015 at the Humboldt University Berlin.

Lars has assembled several data sets that were originally collected for separate studies and studied them in a combined analysis. The results were published in ApJ 809, 98 (2015), arXiv:1507.03991, and provide all-flavor spectra and flavor composition of the measured cosmic neutrinos. The derived flavor composition strongly disfavors a scenario in which only electron neutrinos are produced, e.g. in the decay of high-energy neutrons. These results constitute the most precise characterization of the cosmic neutrino flux observed with IceCube so far.

Agustín Sánchez Losa (IFIC Valencia) defended his thesis *"Search for high energy cosmic muon neutrinos from variable gamma-ray sources and time calibration of the optical modules of the ANTARES telescope"* in September 2015.
One part of Agustín's work was improving and automating the time calibration of the ANTARES detector. In the second part, he looked for transient signals from a variety of astrophysical objects: GeV gamma-ray flares in blazars (using Fermi data), TeV flares in blazars (using IACT data), Crab nebula gamma-ray flares (Fermi data), X-ray binaries during gamma/X-ray flares (using various satellite data). A time dependent analysis was applied to ANTARES data (2008 – 2012), looking for neutrinos coincident with the flares. The likelihood with its dedicated treatment of the time information allowed a possible time lag between the high-energy photon and the neutrino signal. Results were published in JCAP 1512 (2015) 12, 014, arXiv:1506.07354.



Chris Weaver (University of Wisconin, Madison) has defended his thesis *"Evidence for Astrophysical Muon Neutrinos from the Northern Sky"* in February 2015. Results were published in Phys. Rev. Letters 115 (2015) 081102; arXiv:1507.04005. This work is the culmination of a series of previous analyses of the diffuse flux of muon neutrinos with Amanda and with IceCube, this time breaking through the wall and convincingly demonstrating a high-energy cosmic neutrino component among the 35,000 muon neutrinos from the Northern sky (3.7σ significance). To within errors, the spectral index is consistent with that derived from IceCube's HESE events. The result of Chris' work has been one of the inputs for the combined analysis of Lars Mohrmann (see above).

The Prize consist of a certificate, a gratification of 300 Euro and a specially designed gift with the name of the winner and a sign "2016 GNN Dissertation Prize".

GNN thanks APPEC for sponsoring this year's prize!