Angular power spectrum analysis on current and future high-energy neutrino data

To constrain the contribution of source populations to the observed neutrino sky, we consider isotropic and anisotropic components of the diffuse neutrino data. We simulate through-going muon neutrino events by applying statistical distributions for the fluxes of extra-galactic sources and investigate the sensitivities of current (IceCube) and future (IceCube-Gen2 and KM3NeT) experiments. I will show that the angular power spectrum is a powerful probe to assess the angular characteristics of neutrino data and demonstrate that we are already constraining rare and bright sources with current IceCube data.

In addition, I will investigate the decay and annihilation of very heavy dark matter as a potential neutrino source, as suggested by the observed excess in the High-Energy Starting Event dataset. We apply our angular power spectrum analysis to this HESE data for different channels, allowing us to interpret the observed neutrino sky and perform a sensitivity forecast.

Primary author: Ms DEKKER, Ariane (GRAPPA - University of Amsterdam)

Co-authors: ANDO, Shin'ichiro (University of Amsterdam); CHIANESE, Marco (GRAPPA, University of Amsterdam)

Presenter: Ms DEKKER, Ariane (GRAPPA - University of Amsterdam)

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