38th INTERNATIONAL CONFERENCE ON HIGH ENERGY PHYSICS
AUGUST 3 - 10, 2016
CHICAGO

Contribution ID: **662** Type: **Oral Presentation**

Probing neutrino decay with ultra high energy neutrinos (15' + 2')

Saturday, 6 August 2016 12:26 (17 minutes)

The IceCube experiment at the South Pole has been observing ultra high energy neutrinos in the TeV-PeV range and beyond. At such high energies, these neutrinos allow new physics searches, which can be complementary to searches at collider experiments. In this work, we discuss an analysis of IceCube data in the context of neutrino decay.

We use the first three years of data from IceCube to probe neutrino decay. We consider a distribution of diffuse ultra high energy neutrinos from active galactic nuclei (AGNs), based on a standard astrophysical model. We consider flavour mixing of these neutrinos through the usual oscillations as well as because of neutrino decay. For neutrinos from the Northern sky, the flux attenuation and energy shift due to interactions with earth matter is significant at the energies under consideration. We take these effects into account in our analysis. Finally, we compare the theoretically expected events with experimental data, to put bounds on the neutrino decay lifetime.

We show our results for specific source flavour ratios of astrophysical neutrinos, and for a number of possible decay scenarios. Our analysis allows us to put a model-independent bound on the decay lifetime. The results are also shown as a function of the flavour ratios of neutrinos, to show how departure from standard physics scenarios can manifest themselves in the data.

Primary author: Dr RAUT, Sushant (KTH Royal Institute of Technology)

Co-authors: BLENNOW, Mattias (KTH Royal Institute of Technology); CHOUBEY, Sandhya (Harish-Chandra Research Institute)

Presenter: Dr RAUT, Sushant (KTH Royal Institute of Technology)

Session Classification: Neutrino Physics

Track Classification: Neutrino Physics