Contribution ID: **18** Type: **not specified**

Search for a neutrino signal from LS I +61 303 with IceCube based on a time-dependent emission model

The IceCube neutrino observatory is nearly complete, with 79 of the planned 86 strings deployed. Projected to be fully completed next austral summer, it will cover an instrumented volume of 1kmˆ3 of deep ice, tagging neutrinos by detecting the Cerenkov light emissions of neutrino-induced leptons and hadronic showers.

We present a model-dependent point source search for a neutrino signal from LS I +61 303, a high mass X-ray binary system. The model considered here is based on MWL observations, notably Fermi, and assumes that the broad band activity of the system is due to high energy protons interacting with the dense matter and radiation field of the massive star. Making basic assumptions on the geometry of the binary system, the model predicts the time-dependence of the neutrino emissions.

These predictions are used to constrain the neutrino signal search. Assuming their validity, this alternative model-dependent approach has an enhanced discovery potential and is complementary to generic time-dependent and steady point sources searches. The model and the analysis method will be described, and sensitivities in addition to results based on the 22 and 40 string IceCube configurations will be presented.

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