

First detection of a tagged neutrino in the NA62 experiment

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Neutrino tagging is a new experimental approach for accelerator-based neutrino experiments. The method consists in associating a neutrino interaction with the meson decay (i.e. or) in which the neutrino was originally produced. The properties of the neutrino can then be estimated kinematically from the decay incoming and outgoing charged particles. The reconstruction of these particles relies on recent progress and developments in silicon particle detector technology. The method is particularly suited to study neutrino interactions in short baseline experiments, and preliminary works indicate that they could also be used to study neutrino oscillations at long baseline experiments. A proof-of-principle of this method has been performed using the NA62 experiment as a miniature tagged neutrino experiment. The intense kaon beam of NA62 abundantly produces neutrinos through the decay. The two spectrometers of the experiment are used to reconstruct the and and the neutrino interaction is detected in the 20 ton of liquid krypton of the electro-magnetic calorimeter. The results of the analysis based on the data collected in 2022 are presented, where one tagged neutrino candidate has been detected for the first time in history.

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