

Analysis of Neutrino follow-up observations with MAGIC

With the first measured correlation of an extremely high-energy neutrino event and a flaring gamma-ray source in September 2017, multimessenger astronomy has become more important than ever. The stereoscopic IACT system MAGIC, located at La Palma, Canary Islands, is involved in neutrino follow-up campaigns since 2012. The MAGIC telescopes are sensitive for gamma events with energies from the 8764;30 GeV range up to tens of TeV. When a potential astrophysical neutrino is detected by IceCube, an alert with the reconstructed coordinates is published. MAGIC, making use of an automated alert response system, performs follow-up observations in search of a correlated gamma-ray flux. The reconstructed neutrino direction is given with an uncertainty, typically around 0.29702;−19702; . As the angular resolution of MAGIC is much smaller, the analysis for discovering sources in a given region has to be modified. In case of a non detection, in order to interpret the data correctly, an information about flux upper limits in the whole IC event error region should be given. Here we present a method to produce sky maps for identifying point sources or deriving flux upper limits on the desired sky region, based on a maximum likelihood approach included in the SkyPrism software. Examples of results from MAGIC observations of IC-170922A and other IceCube alerts will be shown.

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