

# Limits on the flux of tau neutrinos from 1 PeV to 3 EeV with the MAGIC telescopes

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## Abstract content

A search for tau neutrino induced showers with the MAGIC telescopes is presented. The MAGIC telescopes located at an altitude of 2200 m a.s.l. in the Canary Island of La Palma, can point towards the horizon or a few degrees below, across an azimuthal range of about 80 degrees. This allows to search for a signature of particle showers induced by earth-skimming cosmic tau neutrinos in the PeV to EeV energy range arising from the ocean. In this talk we show how such air showers can be discriminated by MAGIC from the background of very inclined hadronic showers by using Monte Carlo simulations. The analysis of about 30 hours of data taken towards the sea leads to a 90% C.L. point source limit for tau neutrinos in the energy range from  $1.0 \times 10^{15}$  eV to  $3.0 \times 10^{18}$  eV of about  $E_{\nu_\tau}^2 \times \phi(E_{\nu_\tau}) < 2.0 \times 10^{-4}$  GeV cm<sup>-2</sup> s<sup>-1</sup>, for an assumed power-law neutrino spectrum with spectral index  $\gamma=-2$ . However, with 300 hours and in case of an optimistic neutrino flare model, limits of the level down to  $E_{\nu_\tau}^2 \times \phi(E_{\nu_\tau}) < 8.4 \times 10^{-6}$  GeV cm<sup>-2</sup> s<sup>-1</sup> can be expected. This is first time that such limit has been calculated with realistic assumptions and using background data collected by MAGIC, which gives a realistic illustration of the potential of the Cherenkov technique for this topic of research.

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