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On the origin of ˜ 100 TeV neutrinos from the Seyfert galaxy NGC 7469

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The origin of TeV-PeV neutrinos detected by IceCube remains largely unknown. The most significant individual neutrino source is the Seyfert galaxy NGC 1068 with a soft spectrum. Another notable candidate is the Seyfert galaxy NGC 7469, which has been recently proposed as a potential neutrino
emitter. The likelihood fit of the IceCube data for this source returned a hard spectral index of ~ 1.9 and the excess is dominated by two high-energy events.
The energies of these two neutrinos are estimated to be $100 - 200$ TeV, implying a maximum proton energy $E_{p,\max} > 2\,\mathrm{PeV}$, significantly higher than that in NGC 1068.
In this paper, we analyze the {\it Fermi}-LAT observations of NGC 7469, which yield non-detection.
The size of the neutrino-emitting region can be constrained by the non-detection when the neutrino flux takes a high value in the allowed range.
We suggest that cosmic-ray protons are accelerated to PeV energies via turbulence or magnetic reconnection in the corona and produce $\sim 100 - 200$ TeV neutrinos via $p\gamma$ process.
In the turbulence acceleration scenario, the required maximum proton energy can be achieved with a magnetization parameter of $\sigma \sim 1$, while in the reconnection scenario, a magnetization parameter with $\sigma \sim 10$ is needed. In both scenarios, a pair dominated composition for the corona is preferred.
The difference in the neutrino spectrum between NGC 7469 and NGC 1068 could be due to a different magnetization parameter despite the fact that they belong to the same type of AGN.

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