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Searching New Physics from Recent LHAASO Observations of High Energy Cosmic Photons

High energy particles from astrophysical sources have the potential to reveal new features of our Universe. I show that the recent observations of LHAASO on the highest-energy cosmic photon can put strong costraints on the superluminal Lorentz violation (LV) of photons while allowing the parameter space for subluminal LV. The direct observation of the 1.2 PeV photon from Crab Nebela indicates the existence of 2.4 PeV electron by LHAASO, and this puts strong constraints on the LV parameter of electrons. More over, the recent observation of over 10 TeV photons from GRB221009a by LHAASO can hardly be explained by the standard model due to the annihilation of the high energy photon with background EBL photons, I show that photon Lorenzt violation or axion-like particles provide possibilities to explain such novel observation.

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