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Surprising Muon and Tau Airshower from Earth edges and Moon

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The neutrino detection require an associated lepton birth signal. Because of the weak interaction and because of the abundant cosmic ray noises, in last century huge undergroung detector were preferred for the single lepton traces. However highest energies leptons (above tens-hundred TeV), electron or tau secondaries, might produce in air huge airshowers: such a huge amplified signal, in number and in area, makes PeV-EeV tau neutrinos better and easier to be discovered above the ground. Tau and UHECR airshowering at high altitude are often splitted by geomagnetic forces into two main pair spiral showers. Because of the Earth opacity to highest energy neutrino, Tau airshower were considered from deep valleys or Earth edges while sitting on mountains, balloons or satellites. Several present and future ongoing experiment should track such showering at horizons. Moreover also our far Moon offer a calorimeter to reveal UHE neutrinos: namely the possibility for tens or a hundred TeV muon neutrino to interact inside a few km in Moon crust, escape toward us as a muon, to decay in flight as an electron, leading on top of our atmosphere to a gamma-like shower just centered inside the moon shadows. Similar but much more rare higher energy tau (GZK EeVs) neutrino may shine to us unexpected UHECR, even in cluster, just toward the Moon. The widest Grand like array detector in construction on Earth could be in future be able to reveal such Moon-like astrophysical muon-electron signals. Future widest UHECR array might also reveal lunar tau secondariy traces.

Collaboration name

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