Contribution ID: **33** Type: **not specified**

ALPs explain the unphysical redshift-dependence of blazar spectra

Tuesday 23 June 2015 18:35 (25 minutes)

So far about 41 blazars have been detected with the IACTs and their emitted energy spectra analyzed. They differ from the observed ones because of photon absorption due to the EBL. It turns out that the most energetic emitted spectra belong to the most distant blazars, and so their lack at smaller distances looks unphysical, since no conventional explanation works. Yet, the existence of ALPs yields a simple way out of this conundrum for realistic values of the model parameters, provided they oscillate to photons in extragalactic magnetic fields in the 0.1 nG range. As a consequence, blazars with very energetic emitted spectra are present at any distance, as naturally expected. Remarkably, for the same choice of the ALP properties also two other puzzling astrophysical effects are naturally explained. Both ALPS II and the CTA will be able to check our prediction.

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