



Contribution ID: 535

Type: **Parallel talk**

## **Axion-like particles constraints obtained by MAGIC observations of the Perseus cluster**

*Tuesday 29 August 2023 16:15 (15 minutes)*

The search for axion-like particles (ALPs) is a hot topic in physics since axions were proposed as a solution for the strong CP problem. The axion mass and coupling to standard model particles extend over a wide range and can be constrained by collider experiments as well as by astrophysical and cosmological observations. ALPs are candidates for dark matter particles, making their search even more exciting. The MAGIC telescopes, operating in the very-high-energy gamma-ray range, search for dark matter in several astrophysical environments and in this work we present the results of ALPs searches in the Perseus Galaxy clusters and the constraints we obtained.

When propagating through magnetic fields, very high-energy gamma rays can convert to ALPs, leaving signatures in the observed spectral energy distribution. We have analysed  $\sim 40$  hours of data from the the MAGIC observations of the Perseus Cluster, in particular, the radio galaxy NGC1275 and the BL Lac object IC310. Given its proximity and strong magnetic field, which extends up to several hundreds of kpc, Perseus is a perfect candidate for the search of ALPs. By searching for distinctive spectral signatures and using a new statistical approach to the analysis, we confirmed constraints on ALPs with masses in the neV- $\mu$ eV range and established the most stringent limits for ALPs with masses around 40 neV. Our results open the road for performing similar studies using the new generation of gamma-ray ground-based instruments.

### **Submitted on behalf of a Collaboration?**

Yes

**Primary author:** MANGANARO, Marina

**Co-authors:** D'AMICO, Giacomo (Department for Physics and Technology, University of Bergen); BATKOVIĆ, Ivana (University of Padova and INFN Padova); Prof. DORO, Michele (University of Padova)

**Presenter:** MANGANARO, Marina

**Session Classification:** High-energy astrophysics and cosmic rays

**Track Classification:** High-energy astrophysics and cosmic rays