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## Some mysterious puzzles and the Axion Quark Nugget Dark Matter Model

*Tuesday 19 July 2022 17:20 (20 minutes)*

In this talk I want to overview the (unorthodox) scenario when the baryogenesis is replaced by a charge segregation process in which the global baryon number of the Universe remains zero. In this, the so-called axion quark nugget (AQN) dark matter model the unobserved antibaryons come to comprise the dark matter in the form of dense nuggets. I specifically discuss the applications to the DAMA/LIBRA experiment which shows 12 sigma evidence for an annual modulation in the  $(1-6) \sim$  keV energy range, strongly suggesting that the observed modulation has the dark matter origin. However, the conventional interpretation in terms of WIMP-nucleon interaction is excluded by other experiments. This proposal can be directly tested by COSINE-100, ANAIS-112, CYGNO and other similar experiments. I will also mention other possible manifestations of the same model such as the observed mysterious diffuse UV radiation in the galaxy, which can be also explained within the same framework with the same set of parameters.

The talk is based on several recent papers including:

1. A. Zhitnitsky,  
“DAMA/LIBRA annual modulation and Axion Quark Nugget Dark Matter Model,”  
Phys. Rev. D 101, 083020 (2020) [arXiv:1909.05320 [hep-ph]]
2. A. Zhitnitsky,  
“The mysterious diffuse UV radiation and axion quark nugget dark matter model”  
Phys. Lett. B 828, 137015 (2022) [arXiv:2110.05489 [hep-ph]]
3. A. Zhitnitsky, brief invited review:  
“Axion quark nuggets. Dark matter and matter -antimatter asymmetry: Theory, observations and future experiments”  
Mod. Phys. Lett. A, 36, 2130017 (2021) [arXiv:2105.08719 [hep-ph]]

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