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Axion Quark Nuggets dark matter and Matter-Antimatter asymmetry in the Universe as two sides of the same coin: theory, observations, future experimental searches

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In this talk I want to discuss the (unorthodox) scenario when the baryogenesis is replaced by a charge separation 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. In this framework, both types of matter (dark and visible) have the same QCD origin, form at the same QCD epoch, and both proportional to one and the same fundamental dimensional parameter of the system, which explains how the two, naively distinct, problems could be intimately related, and could be solved simultaneously within the same framework. I specifically focus on several recent papers written with AMO, Nuclear physics and Astro-physics people to apply these generic ideas to two recent proposals: 1. on broadband strategy in the axion searches; 2. on the Distributing Acoustic Sensing (DAS) instruments and how they can detect the infrasound and seismic events produced by the AQN dark matter.

The talk is based on: 1.D.Budker, V.V.Flambaum and A.Zhitnitsky, "Axion Quark Nuggets. SkyQuakes and Other Mysterious Explosions," [arXiv:2003.07363 [hep-ph]].
2.D.Budker, V.V.Flambaum, X.Liang and A.Zhitnitsky, "Axion Quark Nuggets and how a Global Network can discover them," Phys. Rev. D 101 no.4, 043012 (2020) [arXiv:1909.09475 [hep-ph]].