Contribution ID: **54** Type: **Presentation**

Cosmological axion field and quark nugget dark matter model

Wednesday 20 June 2018 13:50 (20 minutes)

I overview the dark matter model offering a very natural explanation of 3 (naively unrelated) problems in cosmology: the observed relation $\Omega_{\rm DM} \sim \Omega_{\rm visible}$, the observed asymmetry between matter and antimatter in the Universe, known as the "baryogenesis" problem, and also,
the so called "Solar Corona Mystery". 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 dimensional parameter of the system, $\Lambda_{\rm QCD}$, which explains how the two, naively distinct, problems could be intimately related, and could be solved simultaneously within the same framework. The 80 years old "Solar Corona Mystery" also finds its natural resolution in this framework.

The talk is based on two recent preprints:

1. "Solar Corona Heating by the Axion Quark Nugget Dark Matter,"
   arXiv:1805.01897 [astro-ph.SR], written in collaboration with astro people
2. "New mechanism producing axions and how CAST can discover them"
   arxiv:1805.05184[hep-ph], written in collaboration with particle physics experimentalists.

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Session Classification: Plenary presentations