

Some Recent Developments in Astroparticle Theory and Phenomenology

Friday, November 30, 2018 9:50 AM (50 minutes)

I will review two recent developments in astroparticle theory and phenomenology that are not meant to be exhaustive in any way, but are connected to some of the particle physics covered in this conference.

First, cosmic rays have been observed up to macroscopic energies of about 50 Joules, presumably in one elementary particle. The existence of such particles pose formidable challenges and exciting prospects at the same time: Their origin and sources have not been identified yet, but they already allow to test physics at center of mass energies unattained in the laboratory, albeit in a rather indirect way. We will give an overview over possible sources and acceleration mechanisms, issues related to cosmic ray mass composition and hadronic interaction models, and the role of secondary gamma-rays and neutrinos produced in primary cosmic ray interactions.

Second, axion-like particles, partly motivated by the strong CP problem, have recently gained attention as dark matter candidates and are searched for by shining light through a wall experiments and so called helioscopes and helioscopes based on their two-photon couplings. They also provide interesting open theoretical problems ranging from their production in the early Universe to the large scale dark matter distribution, down to “axion stars”, they would give rise to. Some of these aspects will be reviewed.

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