



Canadian Association
of Physicists

Association canadienne
des physiciens et physiciennes

Contribution ID: 4497

Type: Oral not-in-competition (Graduate Student) / Orale non-compétitive (Étudiant(e) du 2e ou 3e cycle)

(G) Searching for a mixed-phase Mili-charged Dark Sector at MoEDAL-MAPP

Tuesday 28 May 2024 17:00 (15 minutes)

There exists a large body of indirect evidence for the existence of Dark Matter (DM) but, to date, no direct evidence has been found. Because of this, there is a wide range of open parameter space which has given rise to many different models. One class of models proposes that dark matter is composed of particles that have their own interactions and only minimally couple to the standard model through one or more “portal” interactions. One category of such models include a vector portal term that kinetically mixes dark gauge fields with standard model gauge fields. These models are characterized by Dark Matter having a component consisting of a Mili-charged particle - particles having an effective electric charge that is a fraction of the electron’s electric charge. Direct detection of dark matter at accelerators is a high priority to narrow down possible models. Detecting or ruling out some possible DM models is a part of the experimental program for the MoEDAL experiment located at the LHC. The MAPP extension to the MoEDAL experiment, now approved for run 3, focuses on searching for Mili-Charged Particles (mCPs), and Long-Lived Particles (LLP). The vector portal that gives rise to mili-charged Dark Sector components has two possible phases: the Holdom phase, which is characterized by a massless dark vector gauge field, and the Okun phase, which has a massive dark vector gauge field. This talk will focus on a ‘mixed’ phase, which assumes both a massless and massive dark vector field. We will then look at Drell-Yan production of Dark mCPs and explore their phenomenology within the context of MoEDAL-MAPP.

Keyword-1

BSM Physics

Keyword-2

Dark Matter Searches

Keyword-3

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Session Classification: (PPD) T3-1 Colliders 1 | Collisionneurs 1 (PPD)

Track Classification: Technical Sessions / Sessions techniques: Particle Physics / Physique des particules (PPD)