Results on Low-Mass Weakly Interacting Massive Particles from a 11 kg d Target Exposure of DAMIC at SNOLAB

ICRC2021 Contribution Executive Summary

Michelangelo Traina, LPNHE, Sorbonne Université
on behalf of the DAMIC collaboration

Q: What is this contribution about?
A: The latest WIMP (Weakly Interactive Massive Particle) search carried out by the DAMIC (DArk Matter In CCDs) collaboration at the SNOLAB underground laboratory, on a 11 kg d exposure dataset.

Q: Why is it relevant / interesting?
A: We report on the construction of the first comprehensive background model for a CCD detector, and on the intriguing result of the above-mentioned WIMP search: the observation of a low-energy excess of events.

Q: What have we done?
A: We have constructed a background model by means of GEANT4 simulations over more than 1000 isotope-volume combinations, by fitting experimental data in an ad hoc range. The resulting model has been extrapolated to the ROI range, where we employ it to search for light WIMPs ($m_\chi < 10$ GeV/c^2) using a profile likelihood ratio hypothesis test.

Q: What is the result?
A: Our data is consistent with the background-only scenario down to 200 eV; below the fit prefers a statistically-significant bulk signal component. Despite such excess, we place the strongest exclusion limit on the WIMP-nucleon scattering cross section with a silicon target for $m_\chi < 9$ GeV/c^2.