

# Phenomenology 2020 Symposium



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## Dynamics of millicharged dark matter in supernova remnants

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Dark matter could have a small electromagnetic charge, provided the charge-to-mass ratio is much less than that of electrons or protons. This candidate, commonly known as millicharged dark matter (mDM), would form a plasma and interact with the interstellar medium and electromagnetic fields within galaxies. In general, understanding the dynamics of mDM requires consideration of collective plasma effects. It has been proposed that mDM can be accelerated in supernova remnants, forming a dark cosmic ray population that would leave distinct experimental signatures. In this work, we study a microphysical model where mDM is shocked by a supernova remnant and isotropized in the frame of the expanding fluid. We find a range of mass-to-charge ratio that the isotropization length for electromagnetic plasma instabilities is much shorter than the size of the supernova remnant. This is a necessary, though not sufficient, first step for formation of a Fermi-accelerated mDM component, and determining the size of this component requires further study.

### Summary

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