Contribution ID: **77** Type: **Invited Oral**

Expanding the Reach of Argon-Based Dark Matter Searches

Sunday, 15 February 2026 11:00 (30 minutes)

Liquid argon has proven to be a powerful medium for detecting GeV-scale dark matter, as demonstrated by the DEAP-3600 and DarkSide-50 experiments. Building on these successes, DarkSide-20k is now under construction at LNGS as the first flagship detector of the Global Argon Dark Matter Collaboration. With a 50-tonne ultra-pure argon target and exceptionally low backgrounds, DarkSide-20k, in about 10 years of data-taking, will scan for any WIMP interaction in argon above the neutrino fog for WIMP masses above a few GeV and up to 10^5 GeV.

To push noble liquid experiments sensitivity **below the GeV scale**, new detection strategies are required. At Queen's University, we are investigating the use of **molecular dopants**—introduced at part-per-million concentrations into liquid argon—**to enhance ionization yield and lower the effective energy threshold**. Identifying the optimal dopant mixture would enable a next-generation experiment proposed for SNOLAB within the coming decade. Such an experiment could exclude, or potentially discover, sub-GeV dark matter interacting as faintly as solar neutrinos within roughly one year of data-taking, **opening a new observational window on the fundamental composition of the Universe**.

Your current academic level

Faculty/research staff

Your email address

michela.lai@queensu.ca

Affiliation

Queen's University

Supervisor email

michela.lai@queensu.ca

Supervisor name

n/a

Primary author: LAI, Michela (Queen's University)

Presenter: LAI, Michela (Queen's University)

Session Classification: Dark Matter

Track Classification: Dark matter searches