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Search for light dark matter and exploration of the dark sector with the DAMIC-M detector



- Thèses, Stages, Formation et Enseignement - Propositions de thèses antérieures - Propositions de thèses 2019 -
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Title: Search for light dark matter and exploration of the dark sector with the DAMIC-M detector

Advisors: [Antoine Letessier Selvon](#), [Paolo Privitera](#)

Team: Rayonnement Cosmique et Matière Noire; experiment: DAMIC.

Description:

The Dark Matter group at LPNHE is involved in the Dark Matter In CCD experiment at the Modane underground laboratory (DAMIC-M). DAMIC-M employs an innovative detector technique – Charge Coupled Devices (CCDs) – to search for the existence of light dark matter and explore the dark sector with unprecedented sensitivity.

The project is funded by an European Research Council grant to cover over 5 years all phases of development and operation. The first years will be dedicated to research and development on the detector (CCD skipper and associated electronics), the control of background and the optimization of the installation from detailed simulations of the experimental setup. We will then proceed to the installation, commissioning and operation of the detector at Modane. We expect to collect data for about one year, and then proceed with the analysis and publication of the results.

The thesis work will focus on two aspects. One is the evaluation by Monte Carlo simulations of environmental and radiogenic backgrounds as well as ways to reduce them. The other is the exploration of the dark sector exploiting the very low threshold, excellent energy resolution and very fine spatial granularity of the detector.

We look for students with a background in particle physics or astroparticle physics having a strong interest in Monte Carlo methods and instrument development. The thesis will start in October 2019.

The student will be required to regularly present his work in the working meetings of the collaboration. An internship with the DAMIC-M group at LPNHE will familiarize the student with the project and the tools required for its implementation.

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Location: LPNHE, Paris

Possible trips: Université de Chicago, Laboratoire Souterrain de Modane (LSM)