

Preparatory Group Dark matter searches

Diego Restrepo
Instituto de Física
Universidad de Antioquia



GRUPO DE
FENOMENOLOGÍA DE INTERACCIONES FUNDAMENTALES

UNIVERSIDAD
DE ANTIOQUIA
1 8 0 3

General consensus

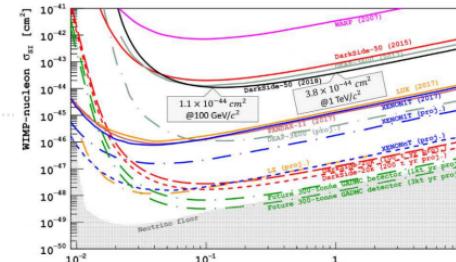
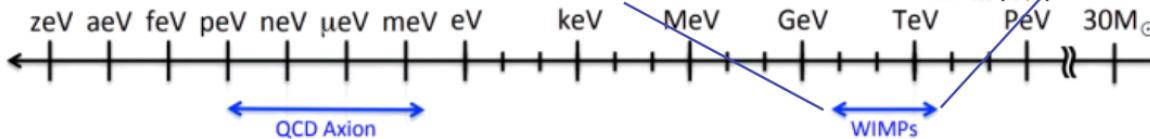
As the WIMP paradigm becomes experimentally disfavoured, there is nowadays no single compelling theoretical framework for DM, opening up a significantly wider potential parameter space to explore.



Too small mass
⇒ won't "fit"
in a galaxy!



DM Summary: S. Asai and M. Carena

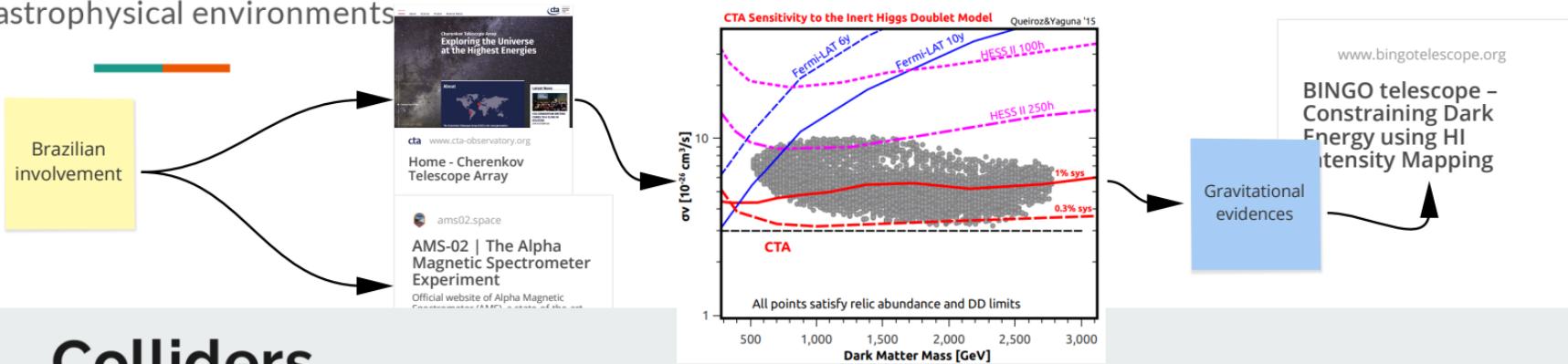


With intersections to neutrino physics and dark photons searches

SIMPs / ELDERS

Indirect detection

observation of stable particles fluxes produced by dark matter annihilation or decay in dense astrophysical environments



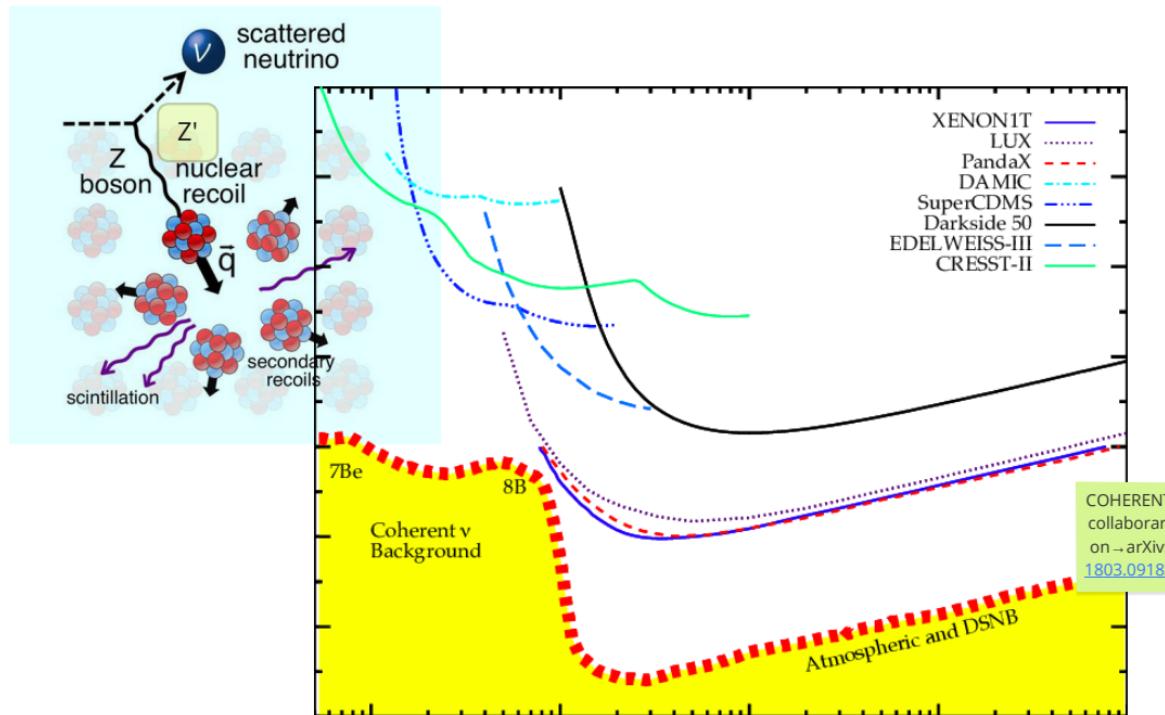
Colliders

Missing transverse energy signal at LHC and long lived particles

- CMS
- ATLAS
- LHCb
- Future Colliders

Coherent elastic neutrino-nucleus scattering

- New physics contributions from dark sectors
- Bakground for direct detection experiments (CEvNS - Neutrino floor)



Dark photons

The dark photon is a hypothetical spin-1 gauge boson that couples strongly to dark matter, but couples only weakly to charged SM particles

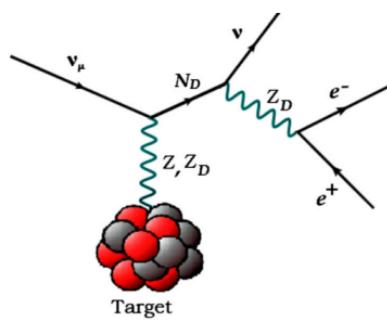
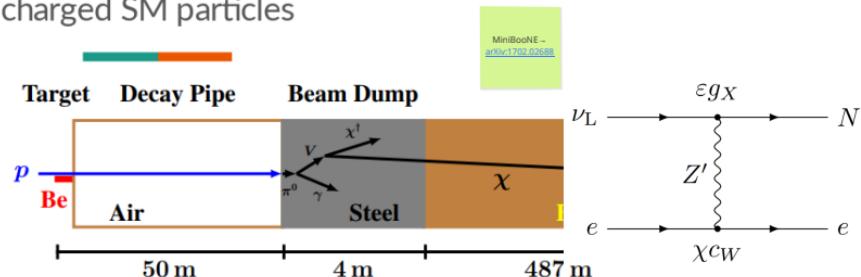
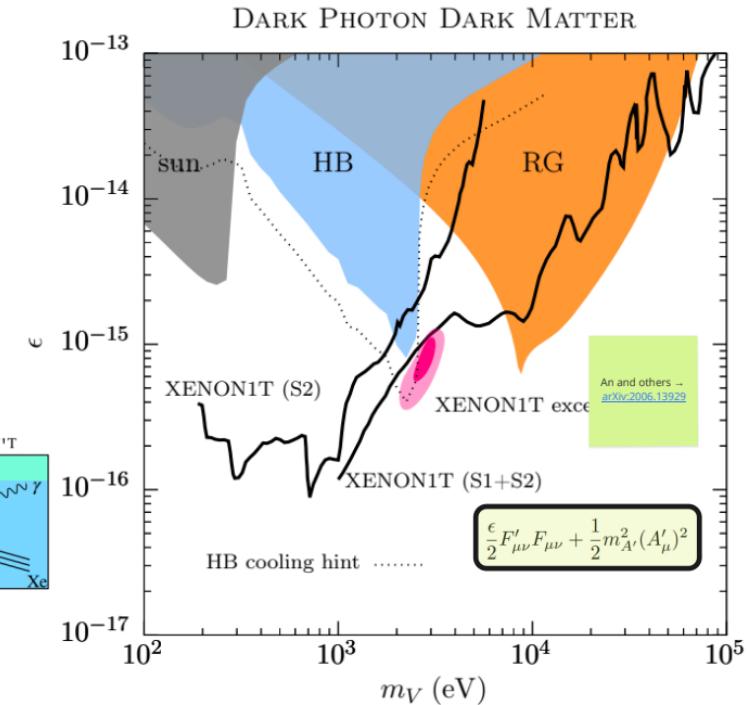


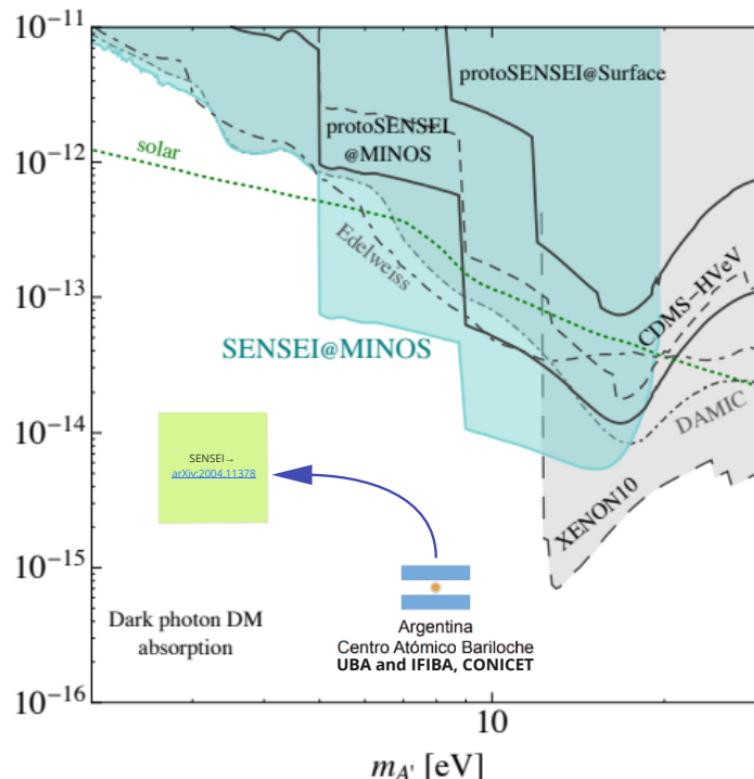
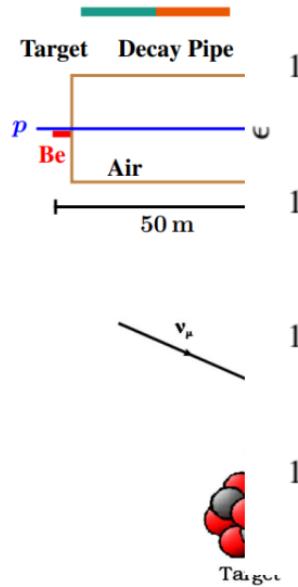
FIG. 1. Contributions to the cross section that in our model gives rise to MiniBooNE's excess of electronlike events.



Theoretical leadership from Brazil in the intersection of those areas with some ongoing experiments

Dark photon

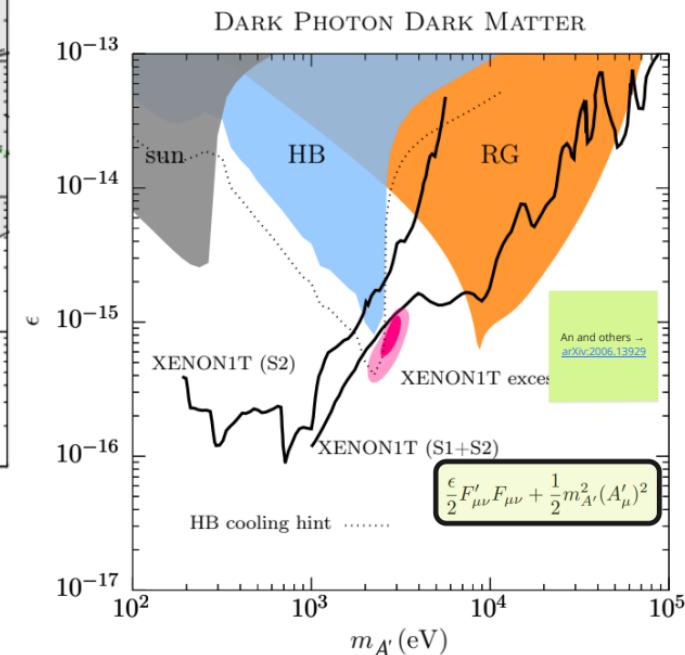
The dark photon is a charged SM particle



and others
[1807.09877](https://arxiv.org/abs/1807.09877)
[PRL]

FIG. 1. Contributions to the cross section that in our model gives rise to MiniBooNE's excess of electronlike events.

to dark matter, but couples only weakly to

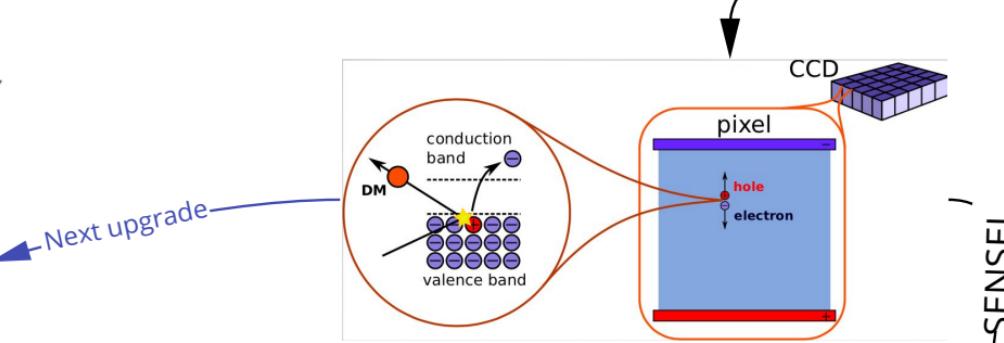
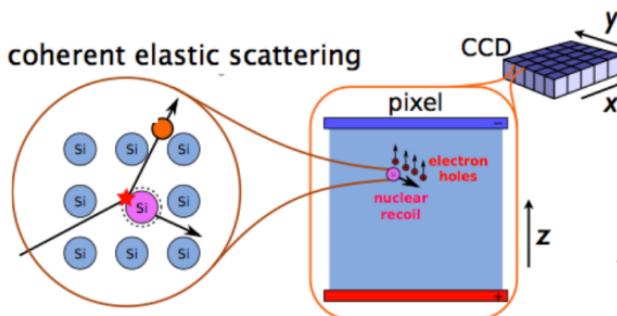


Theoretical leadership from Brazil in the intersection of those areas with some ongoing experiments

Direct detection

Very low WIMP masses or very heavy axions

Skipper-CCD technology, and to apply them to dark matter searches and neutrino physics experiments.



CONNIE experiment, I. Nasteva

The CONNIE collaboration



Coherent Neutrino-Nucleus Interaction Experiment

About 25 members



Argentina
Centro Atómico Bariloche
Universidad del Sur / CONICET



Paraguay
Universidad Nacional de Asunción



Brazil
Centro Brasileiro de Pesquisas Físicas
Universidade Federal do Rio de Janeiro



Switzerland
University of Zurich



Mexico
Universidad Nacional Autónoma de México



USA
Fermilab National Laboratory



damic.uchicago.edu

DAMIC-M: Dark Matter
In CCDs at Modane |
DAMIC-M

Argentina
Centro Atómico Bariloche
UBA and IFIBA, CONICET

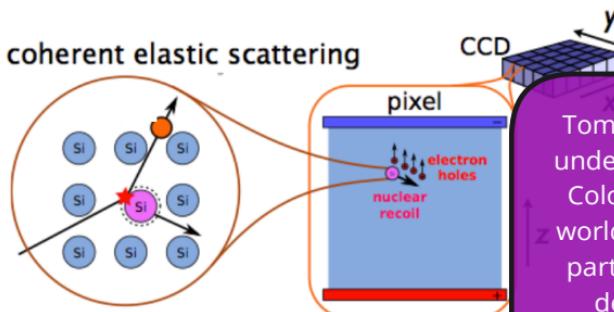
UBA WP: install a
laboratory to
investigate particle
detectors based on
Skipper-CCD
technology

Direct detection

Very low WIMP masses or very heavy axions

Skipper-CCD technology, and to apply them to dark matter searches and neutrino physics experiments.

coherent elastic scattering



Tomorrow: "As a community, we understand that the absence of a Colombian participation on the worldwide effort of detecting DM particles via direct and indirect detection experiments is a big issue that has to be solved in the near future."



The CONNIE collaboration

Coherent Neutrino-Nucleus Interaction Experiment



About 25 members

Argentina
Centro Atómico Bariloche
Universidad del Sur / CONICET

Paraguay
Universidad Nacional de Asunción

Brazil
Centro Brasileiro de Pesquisas Físicas
Universidade Federal do Rio de Janeiro

Switzerland
University of Zurich

Mexico
Universidad Nacional Autónoma de México

USA
Fermilab National Laboratory



damic.uchicago.edu

DAMIC-M: Dark Matter
In CCDs at Modane |
DAMIC-M

UBA WP: install a laboratory to investigate particle detectors based on Skipper-CCD technology