Poster flash talks

School on DM & Nu 2024 (dark matter, neutrino)

Thursday, June 11th

- **Camila Belén Martínez** (Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires (FCEN-UBA)): *Reconstruction of muon tracks in the South Atlantic Anomaly region*
- **Gustavo Alves** (University Of Sao Paulo): *Could SBND-PRISM probe Lepton Flavor Violation?*
- **Letícia Maria Valença Guedes** (UFRN): *Constraining Gamma-ray Lines from Dark Matter Annihilation*
- **Nicolás Avalos** (Instituto Balseiro): *The search for Dark Matter in DMSQUARE (Argentina) and CONNIE (Brazil)*
- **Walter Rodriguez (**Pontificia Universidad Catolica del Peru): *Non-pointing photons from Long-Lived Particles at the ATLAS ECal in the Dimension-5 Type-I Seesaw*
- **Javier Silva Malpartida** (Pontifica Universidad Católica del Perú): *From Wimps to Fimps with low reheating temperatures*
- **Edson da Silva Souza** (UNICAMP): *Alleviating the present tension between T2K and NOνA with neutrino New Physics at source*

Reconstruction of muon tracks in the South Atlantic Anomaly region

Camila Belén Martínez[1], Santiago Perez[1 2]
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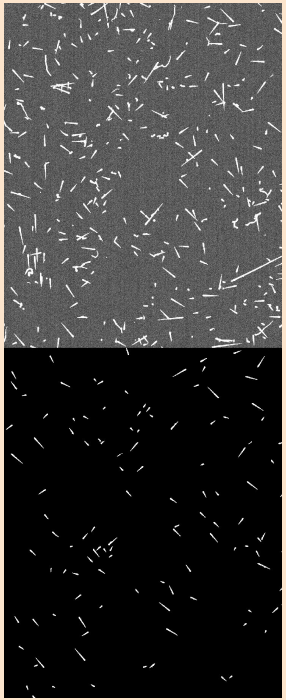
for the CONNIE Collaboration

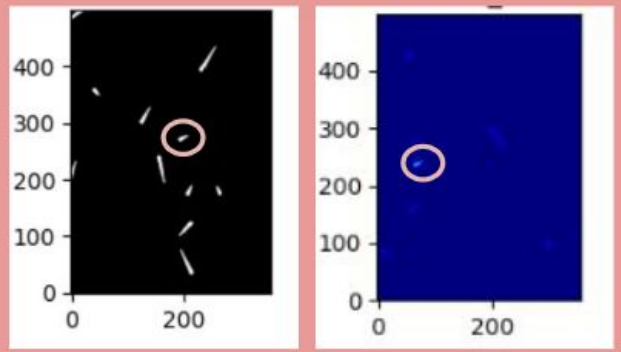


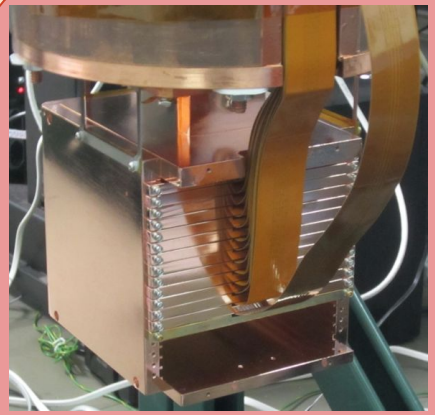
Selecting

&

filtering muons

Identifying muon coincidences as it goes through the stack





Applications:

- **Sensor calibration**
- **Dark Matter detection**

Could SBND-PRISM probe Lepton Flavor Violation?

ArXiv:2405.00777

Main Question

Can we probe lepton flavor violation with neutrinos beyond oscillations?

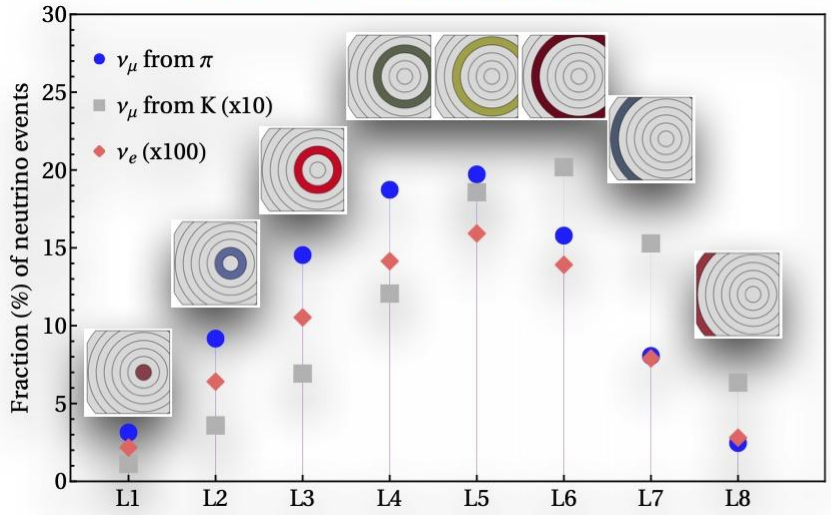
Main Idea

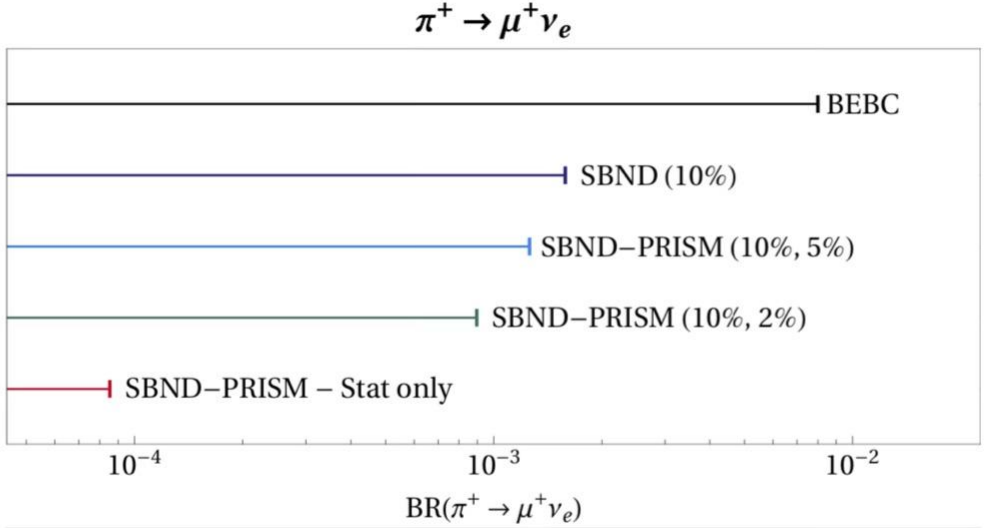
Neutrino experiments produce several neutrino events, this gives us information about the flavor composition at the source.

Caveat

Neutrinos oscillate and experiments are designed to probe this phenomenon which is intrinsically flavor violating and can mask LFV at source.

SBND-PRISM





Constraining Gamma-ray Lines from Dark Matter Annihilation

For more information see our paper:

Letícia Maria Valença Guedes

Fermi-LAT and H.E.S.S. data towards the Galactic Center

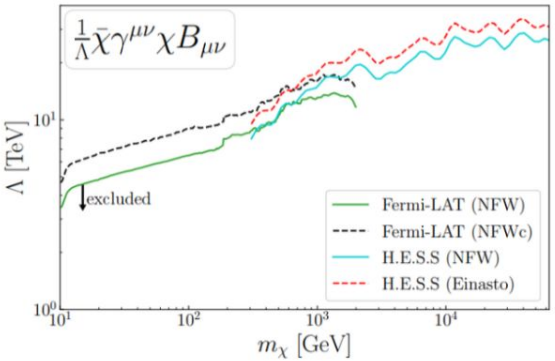
$$\underbrace{\frac{d\Phi}{d\Omega dE}}_{Diff.Flux} = \frac{\overbrace{\sigma v}^{Anni.\,Cross\,Section}}{8\pi m_\chi^2} \times \underbrace{\frac{dN}{dE}}_{Energy\,Spectrum} \times \int_{l.o.s} ds \; \underbrace{\rho^2(\vec{r}(s,\Omega))}_{Dark\,Matter\,Distribution}$$

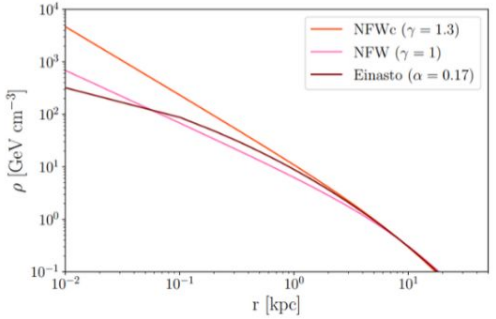
$$\left(\frac{dN}{dE}\right)_{\gamma\gamma} = 2 \times \delta(E - E_{\gamma\gamma})$$

EFT Models for scalar and fermion DM

$$\frac{1}{\Lambda_{F1}} \bar{\chi} \gamma^{\mu\nu} \chi B_{\mu\nu}$$

$$\langle \sigma_{\chi\bar{\chi}\to\gamma\gamma}\, v_{\rm rel} \rangle = \frac{8}{\pi} \cos^4(\theta_W) \frac{m_\chi^2}{\Lambda_F^4}$$

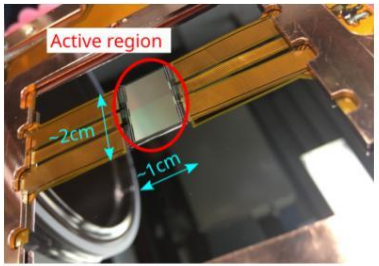




The search for Dark Matter in DMSQUARE (Argentina) and CONNIE (Brazil)

Nicolás E. Avalos (nicolas.avalos@ib.edu.ar)

Instituto Balseiro (CNEA/UNCUYO) & CONICET

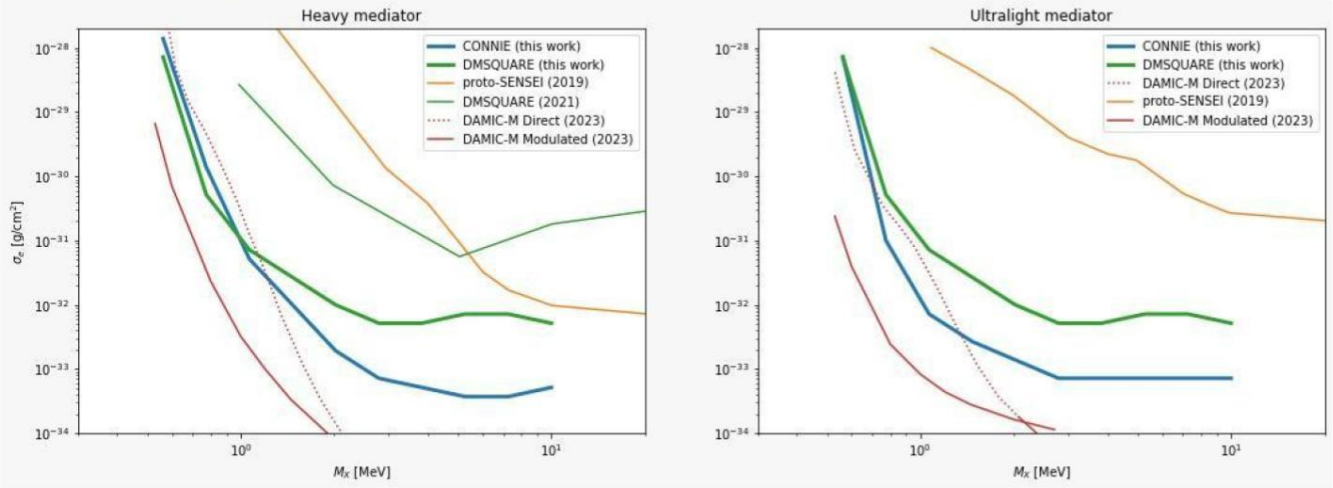


How do we search for Dark Matter?

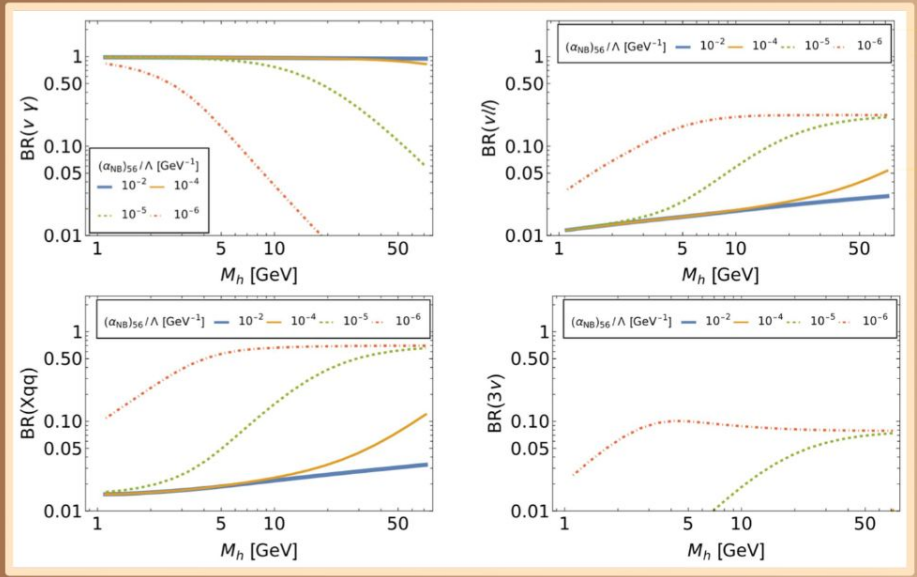
Isn't CONNIE a reactor neutrino experiment?

How would we know that we "saw" dark matter?

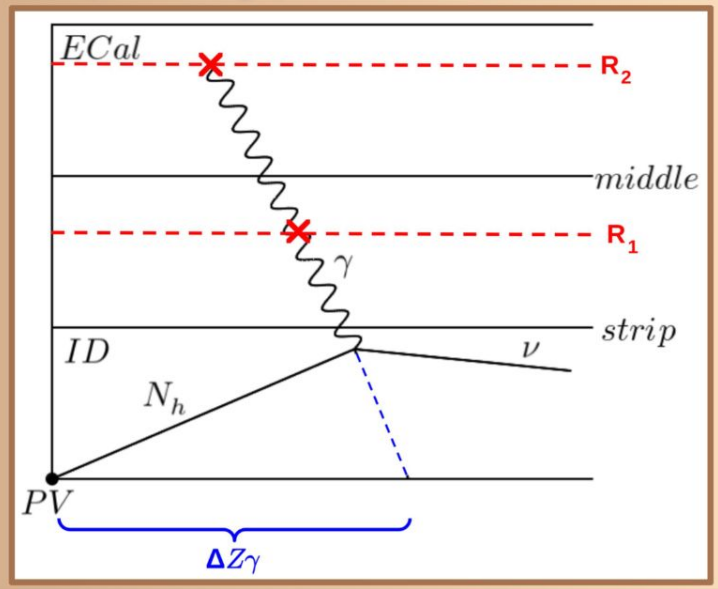
Can we "find" Dark Matter during coffee break or lunch?



Non-pointing photons from Long-Lived Particles at the ATLAS ECal in the Dimension-5 Type-I Seesaw



- The photon coming from the decay is not generated in the primary vertex.
- A search for its signal within the ATLAS ECal is performed to find the non-pointing parameter.

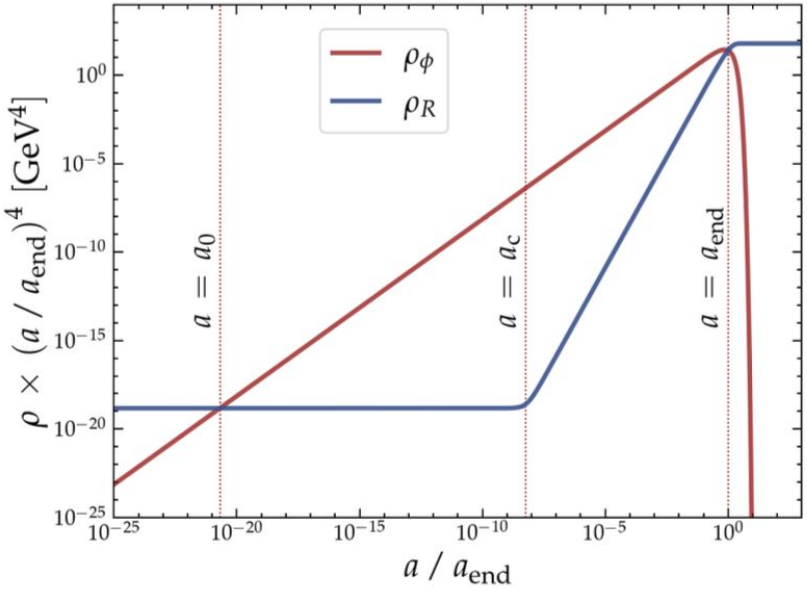


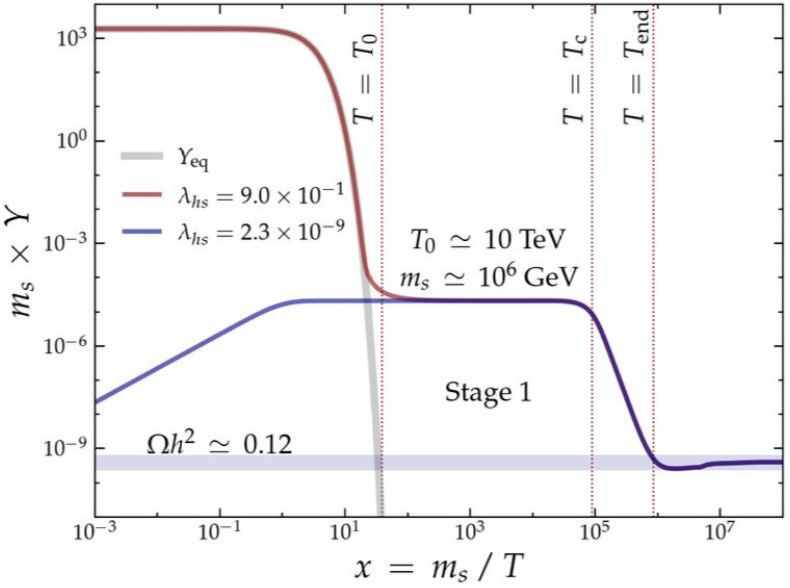
- D-5 introduces new interactions between sterile neutrinos and SM particles.
- Decay in a photon and a SM neutrino provides the best BR for collider searches.

Walter Rodríguez

WIMPs and FIMPs in Non-Standard Cosmology

Nicolás Bernal, Joel Jones-Perez, Roberto Lineros and Javier Silva-Malpartida





We explore the dark matter genesis in scenarios where a matter component dominates the early universe

Alleviating tension: NOνA and T2K with NSI at source (π-decay)

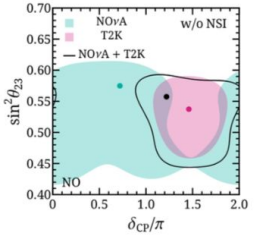
https://arxiv.org/abs/2310.18401

Edson da Silva Souza UNICAMP-IFGW-GEFAN

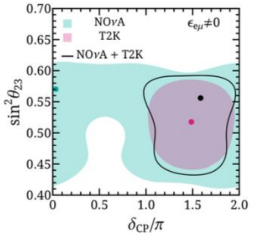
$$\mathcal{L}^{\rm NSI} = \mathcal{L}^{\rm SM}_{(\pi^+ \to l^+_\alpha + \nu_\alpha)} + \sqrt{2}\, G_F\, V^{\rm CKM}_{ud} [\epsilon_P]_{\alpha\beta} \left(\bar{u}\gamma^5 d\right)\left(\bar{\ell}_\alpha P_L \nu_\beta\right) + \text{h.c.}$$

$$\pi^+_{\rm PS} \to e^+ + \nu_\mu \;:\; \epsilon_{e\mu} \qquad \pi^+_{\rm PS} \to \mu^+ + \nu_e \;:\; \epsilon_{\mu e}$$

Probability NSI: $P^{\rm NSI} = R^{\rm NSI}_{\alpha\beta}/\phi_\alpha \sigma_\beta$ for $\mathcal{M}^S_{\alpha k} = U^*_{\alpha k}\mathcal{A}^S_L + [\epsilon_{\rm NSI} U]^*_{\alpha k}\mathcal{A}^S_{\rm NSI}$



$\chi^2_{\rm min}$	Standard Osc. NO	Standard Osc. IO
NOνA	51.8	52.5
T2K	79.6	83.8
NOνA + T2K	140.8	139.6
$\chi^2_{\rm PG}$ / $N_{\rm par}$	9.4 / 4	3.3 / 4
$p_{\rm PG}$-value	5%	51%



$\chi^2_{\rm min}$	$\epsilon_{e\mu}$ NO	$\epsilon_{e\mu}$ IO
NOνA	48.3	50.4
T2K	75.0	77.3
NOνA + T2K	131.3	135.2
$\chi^2_{\rm PG}$ / $N_{\rm par}$	8 / 6	7.5 / 6
$p_{\rm PG}$-value	24%	28%