

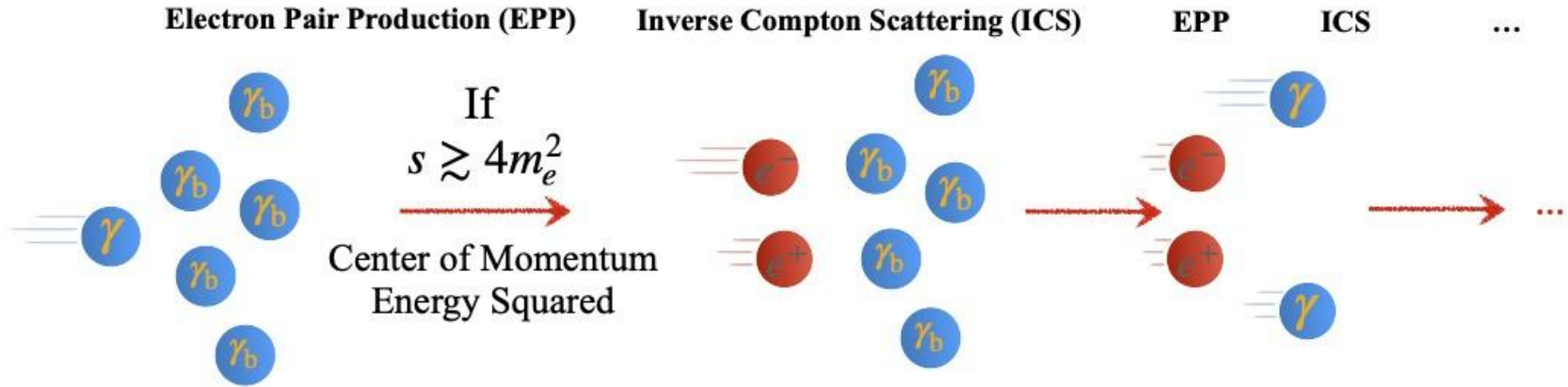
Poster flash talks

Wednesday, June 10th

- **Amir Farzan Esmaeili** (PUC-Rio): *Neutrinos from muon-rich ultra high energy electromagnetic cascades: The MUNHECA code*
- **Diego Silva Vieira Gonçalves** (UFABC): *Search for low-background signatures of flavor-violating scalars at the HL-LHC*
- **Emilse Cabrera Capera** (PUC-Rio): *Limits on (3+2) sterile neutrino scenario using IceCube data*
- **Jorge Schifferli Verdugo** (Universidad Técnica Federico Santa María): *Exploring Unitarity-Completing Extensions of a Vector Dark Matter Model via $SO(4)$ Symmetry*
- **Lucas Magno Dantas Ramos** (University of Sao Paulo): *Probing Conversion-driven Freeze-out at the LHC*
- **Murillo Gregorio Grefener da Silva** (Universidade de São Paulo): *Dark matter spike and gamma-ray boost around the black hole at the Galactic center*
- **Pedro Ventura** (IF – USP): *Significance of reactor neutrino signals: a statistical study*

THE ELECTROMAGNETIC CASCADE (CHAIN INTERACTIONS)

Amir Farzan Esmaeili



γ_b : Background photon field
CMB for high redshift propagation
Or X-ray inside astrophysical sources

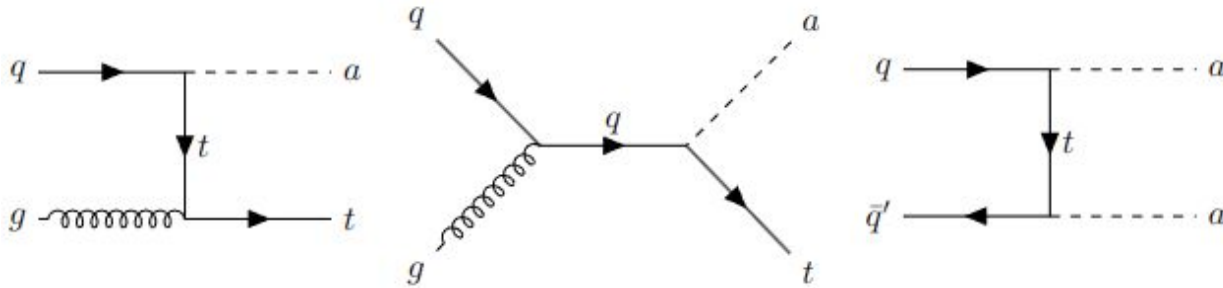
This can happen in INSIDE ASTROPHYSICAL SOURCES Also

**What happens at Ultra High Energies?
Muons? Pions? Neutrinos?**

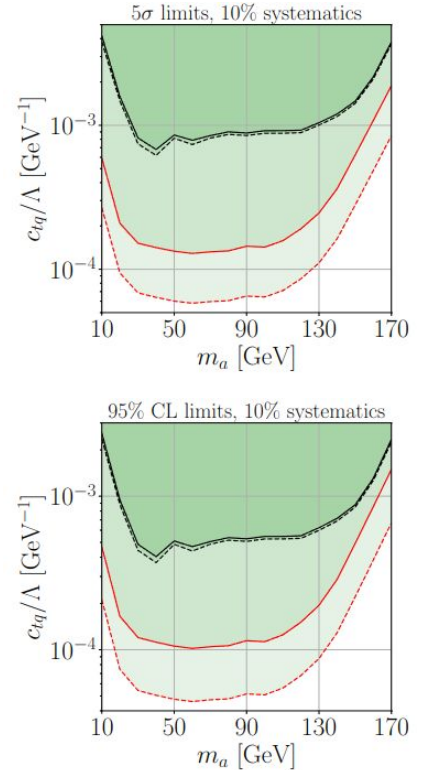
Search for low-background signatures of flavor-violating scalars at the HL-LHC

A.Alves, A.G.Dias, E.S.Almeida & D.S.V.Gonçalves

Phys.Rev.D 109 (2024) 5



We explore flavor-violating scalars (flavons) in single and double production modes at the 13 and 14 TeV Large Hadron Collider. Focusing on the flavon mass region $m_a < m_t$, we find couplings that fit the $(g - 2)_{e,\mu}$ discrepancies and avoid experimental constraints. We determine the potential of the LHC to exclude or discover this New Physics scenario with clean signatures ($\tau^\pm \tau^\pm$) and the simultaneous observation of resonances in the $\tau\ell$ invariant mass.



Limits on (3+2) sterile neutrino scenario using IceCube data

Emilse Cabrera with Arman Esmaili and Alexander Quiroga

Pontifícia Universidade Católica de Rio de Janeiro | emilse.cabrera.c@gmail.com | arXiv: 2405.10419

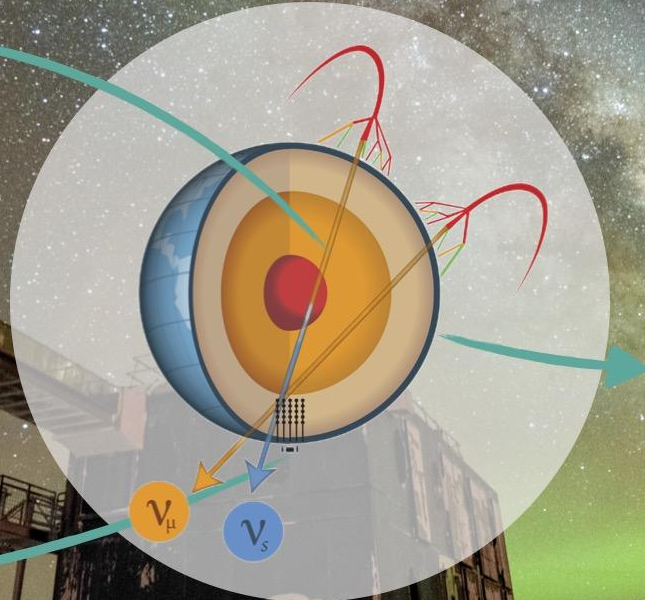


$P(\bar{\nu} \rightarrow \bar{\nu})$

MSW and parametric Resonances

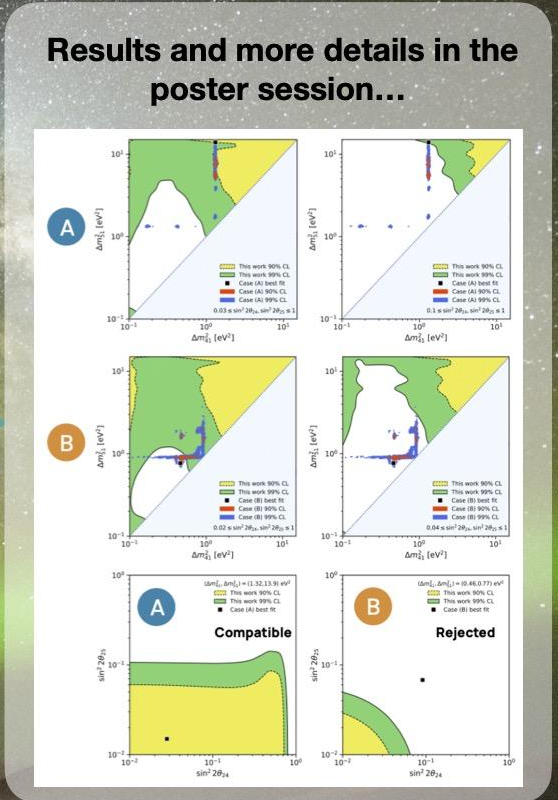
Cayley-Hamilton Formalism

TeV



IC86 (2011-2012)

$\eta_{ijk}, \phi_{ik}^{\nu, atm}$



Exploring Unitarity-Completing Extensions of a Vector Dark Matter Model via SO(4) Symmetry

Jorge Schifferli V. & Carolina Arbelaez & Alfonso R. Zerwekh



Minimal Spin 1 DM model.
(Unitarity Issues)

Unification of electroweak and DM sector.

UV completion via $\mathfrak{su}(2) \oplus \mathfrak{su}(2) \simeq \mathfrak{so}(4)$.

$$D_\mu = \partial_\mu - ig (A_{1\mu} \oplus A_{2\mu})$$

$$SU(2)_1 \times SU(2)_2 \times U(1)_Y$$

$$\downarrow \langle \Phi \rangle \neq 0$$

$$SU(2)_L \times U(1)_Y$$

$$\downarrow \langle \phi_1 \rangle = \langle \phi_2 \rangle \neq 0$$

$$U(1)_{em}$$

Probing Conversion-driven freeze-out at the LHC

A. Lessa, J. Heisig and L. Ramos*
 *IFUSP - University of São Paulo
 arXiv - 2404.16086

t-channel DM models:

$$\mathcal{L}_{\text{int}} \supset \lambda_X Y \bar{q}_R X + \text{h.c.}$$

Abundance usually set by coannihilations

If $\lambda_X \sim 10^{-6}$, DM can still thermalize but DS CE breaks down: Conversions set relic abundance and open parameter space

Sufficiently inclusive LHC searches can place bounds via the mediator decay

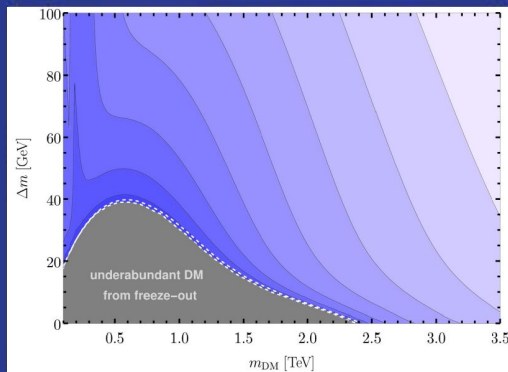
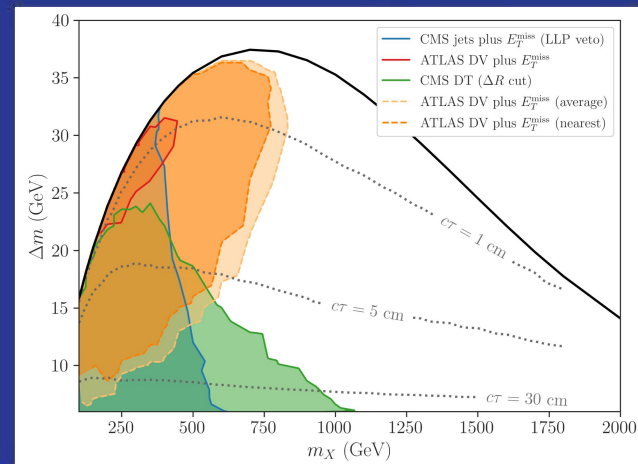
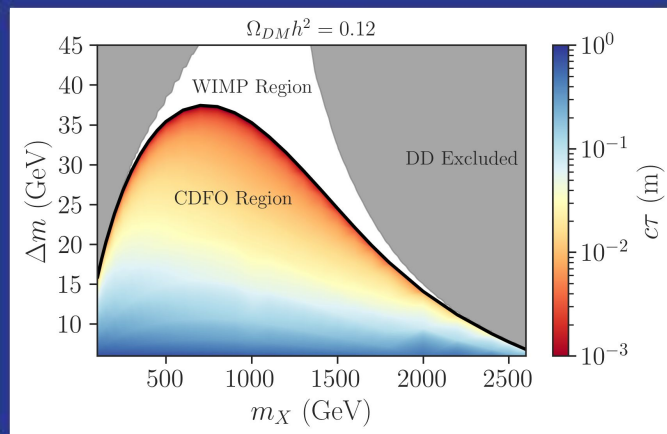
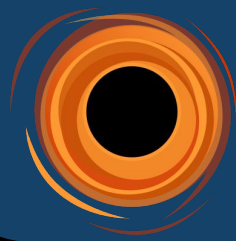


Image taken from J. Harz presentation at ICHEP2022





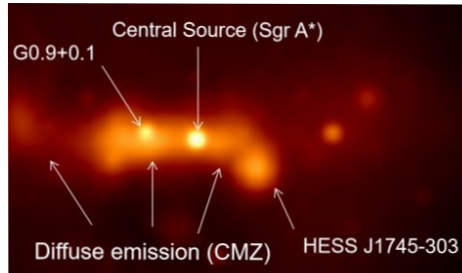
DARK MATTER SPIKE AND GAMMA-RAY BOOST AROUND THE BLACK HOLE AT THE GALACTIC CENTER

SILVA, Murillo, VIANA, Aion

Instituto de Física de São Carlos - Universidade de São Paulo

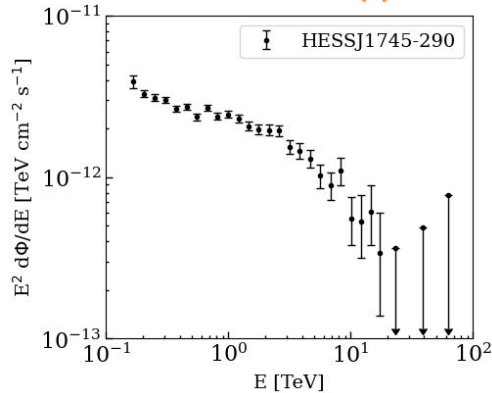
murilloggsilva@usp.br

GALACTIC CENTER

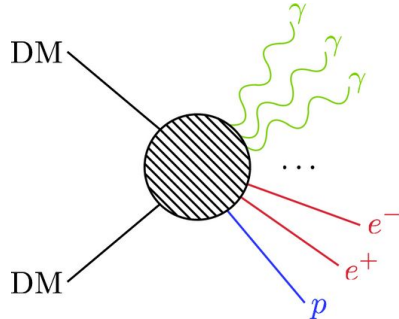


arXiv:1908.06162

power-law with exponential cut-off at around 10 TeV (?)

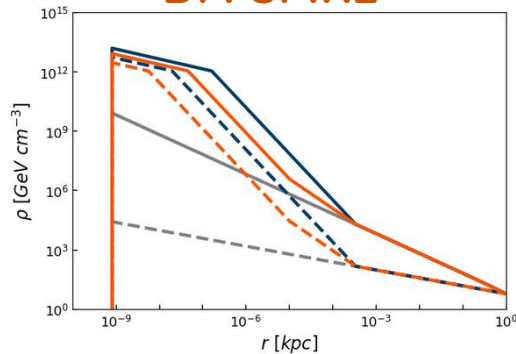


DM PARTICLE



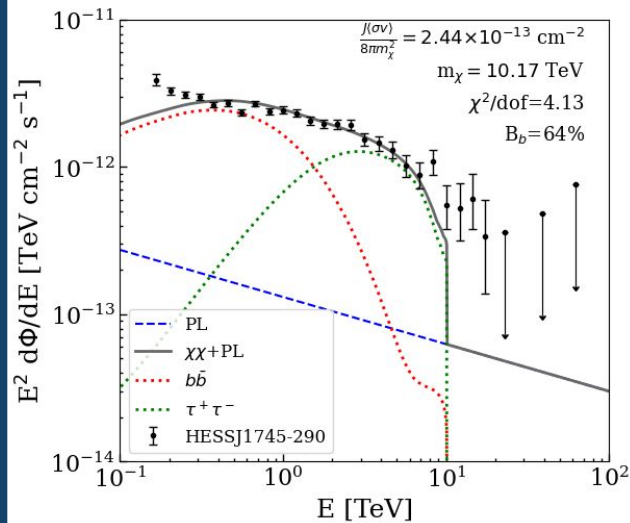
Rodd, N.L. (2018).
Listening to the Universe through Indirect Detection.
arXiv: High Energy Physics - Phenomenology.

DM SPIKE



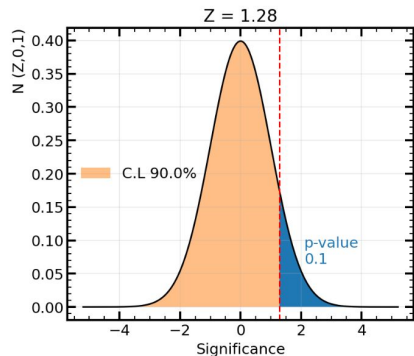
EXPLAINING

HESSJ1745-290 WITH DM



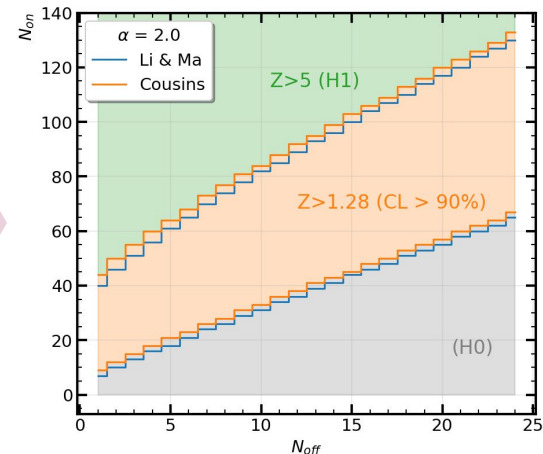
Significance of reactor neutrino signals: A statistical study

Hypothesis test



On-Off Problem

- N_{off} events are observed in t_{off} (background only);
- N_{on} events are observed in t_{on} (bkg + signal);
- $\alpha \equiv t_{\text{on}}/t_{\text{off}}$.



co.vNie



Background = 4000 dru , Nu signal Rate = 29.3 dru , $\alpha = 4.26$

