

UNIVERSIDADE FEDERAL DO RIO GRANDE DO NORTE



VISIBLE AND INVISIBLE SEARCHES FOR SUB-GEV DARK SECTORS

PRESENTED BY:

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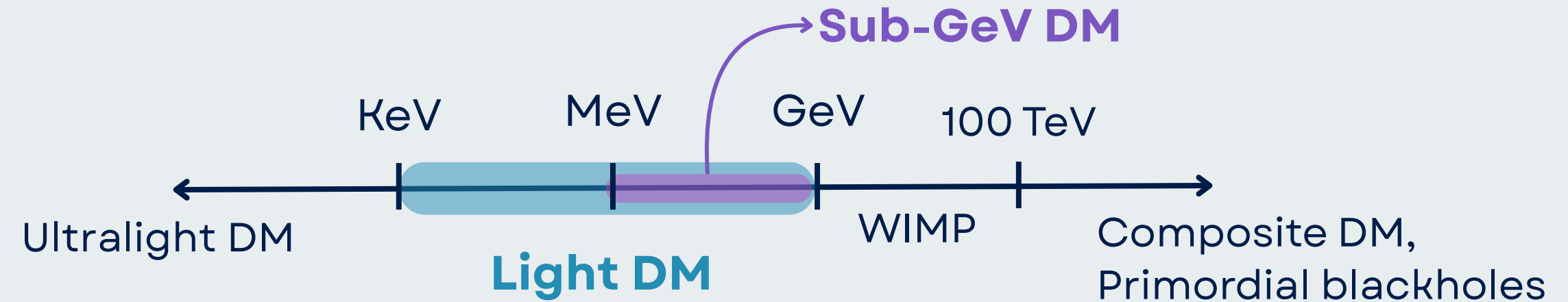
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LIGHT DARK SECTOR

DM MASS SCALE:



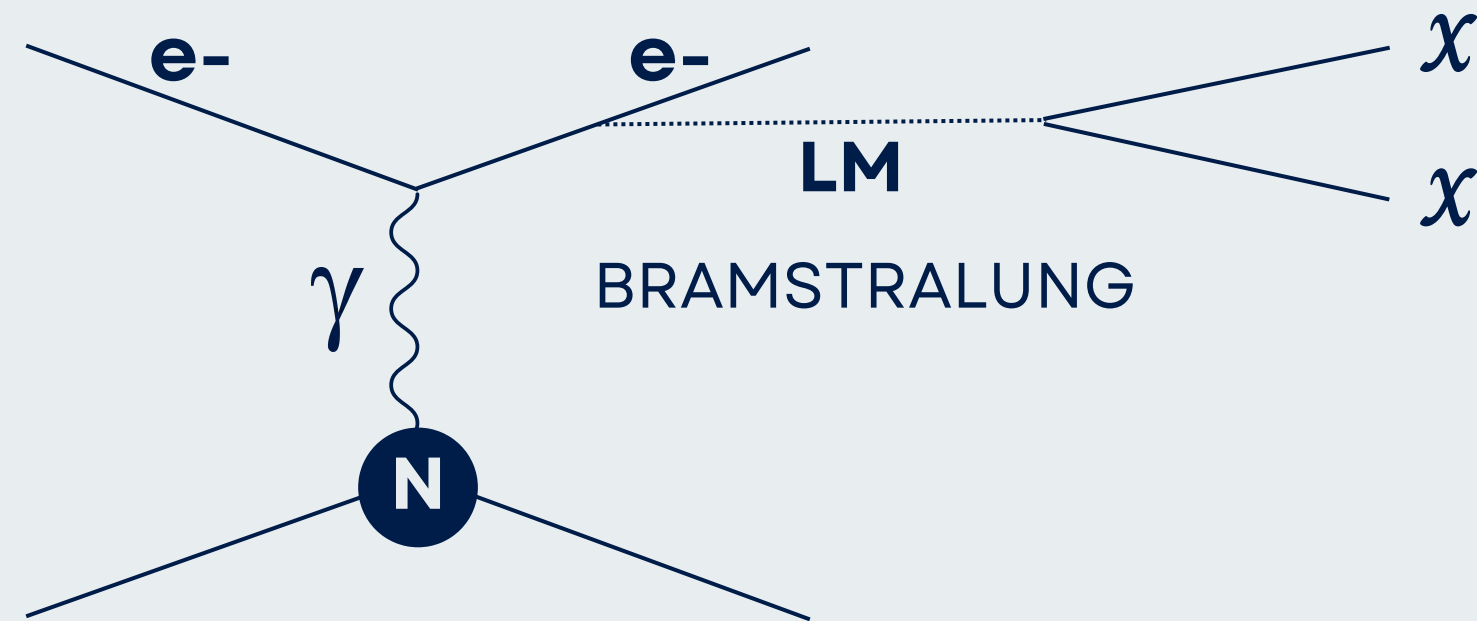
LIGHT DARK MATTER:

- Neutral electrical and color charges
 - DM as a thermal relic of the Big Bang
 - Abundance obtained via freeze-out
 - Sub-GeV mass range
 - Introduction of a **light “hidden” mediator (LM)**
- Just like WIMPs

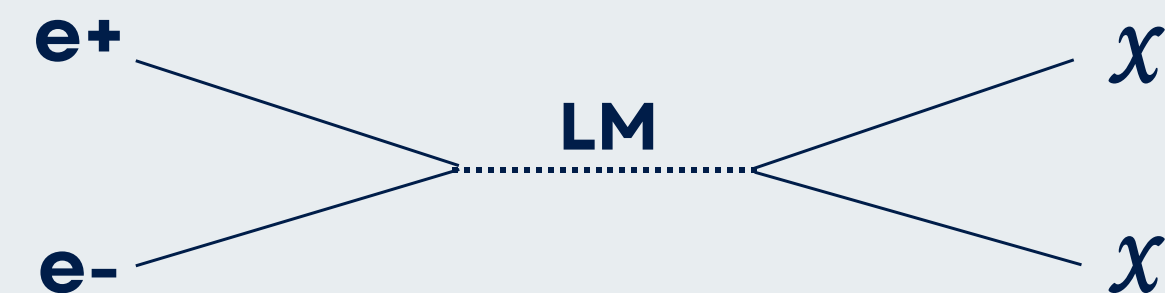


THE SEARCH

NUCLEUS SCATTERING



RESONANT ANNIHILATION



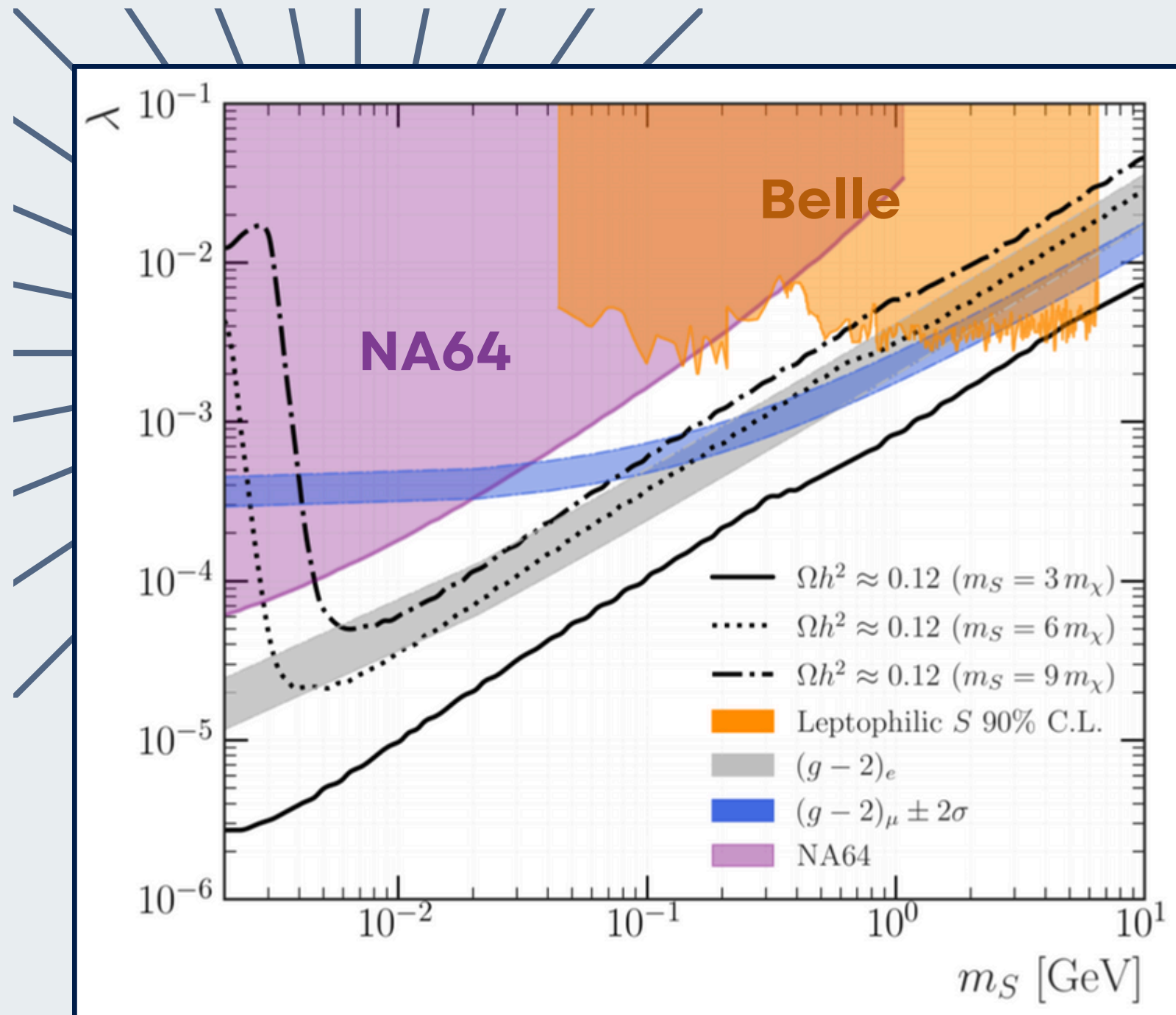
NA64:

- Created for the dark photon search
- Lower beam energy (100 GeV e^-)
- Focused on the search for **leptophilic** hidden mediators

VARIETY OF MEDIATOR (SCALAR,
PSEUDOSCALAR, VECTORIAL)

AND DM TYPES (FERMIONIC, SCALAR)

RESULTS



LAGRANGIAN:

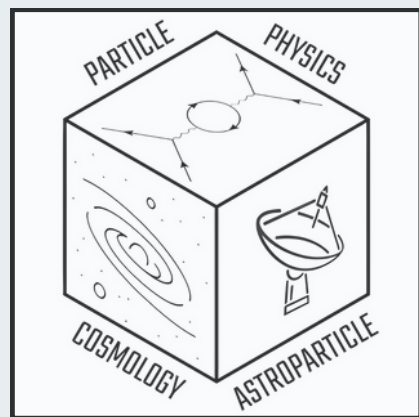
$$\mathcal{L}_{eff} = \frac{1}{2}(\partial_\mu S)^2 - \frac{1}{2}m_s^2 S^2 + \underbrace{\sum_{\ell=e,\mu,\tau} \lambda \bar{\ell} \ell S}_{\text{Visible}} + \underbrace{g_X \bar{\chi} \chi S}_{\text{Invisible}}$$

Universal coupling \rightarrow
 Visible
 Invisible

COMPUTATIONAL TOOLS:

- Feynrules
- FeynCalc
- Python
- MadGraph
- MadDM

**THANK
YOU**



PARTICLE AND ASTROPARTICLE GROUP

Youtube: Astroparticles Natal

Website: [astroparticle IIP](http://astroparticle.iip)

Natal, Rio Grande do Norte (“sun city”)

