Poster flash talks

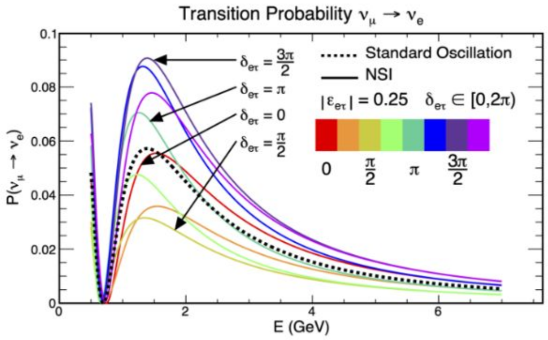
Tuesday, June 9th

- **Andrea Carolina Barros Sarmiento** (Universidad del Atlántico): *NOvA Constraints on CP-violating Non-Standard Interactions*
- **Eliana Depaoli** (FCEN – UBA & CNEA): *BSM Physics in Nuclear Power Reactors.*
- **Guilherme de Araújo Nogueira** (State University of Campinas): *Higher-order QCD in Higgs in to gluon-gluon*
- **Juan Felipe Jiménez Román** (Instituto de Física – Universidad Nacional Autónoma de México): *Model for Direct Detection of Dark Matter with SU(2) Custodial Symmetry*
- **Manuel Mollerach** (Universidad de Buenos Aires): *New approach to measure the self-coupling of the Higgs boson at the LHC*
- **Matheus Maia de Araújo Paixão** (IIP-UFRN (International Institute of Physics – UFRN)): *Unruh Effect under the Quantum Trajectories Formalism*
- **Valéria Vale** (Instituto Tecnológico de Aeronáutica): *Characteristics of the LArQL model and its prospects*

NOvA Constraints on CP-violating Non-Standard Interactions

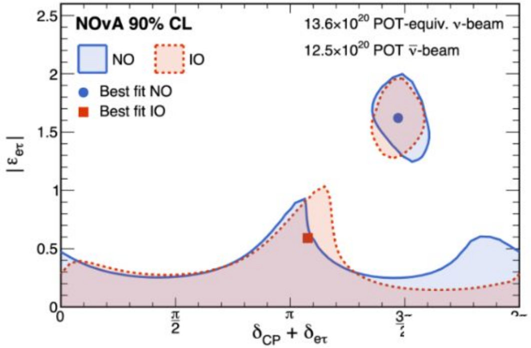
NOvA Experiment

- ➢ Neutrino oscillation
- ➢ Charge parity (CP) violation
- ➢ Neutrino mass ordering
- ➢ Physics beyond the Standard Model
    - Non-Standard Interactions (NSI)



Analysis of NSI

Hamiltonian's modification due the NSI → NOvA spectra with NSI → Effect of NSI on standard oscillation parameters

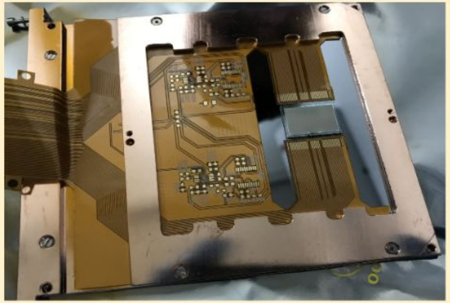


BSM Physics in Nuclear Power Reactor

Eliana Depaoli[1,2] on behalf of the CONNIE and Atucha II collaborations

[1]*Centro Atómico Constituyentes, Comisión Nacional de Energía Atómica, San Martín, Argentina*

[2]*Departamento de Física, FCEN, Universidad de Buenos Aires, Buenos Aires, Argentina*

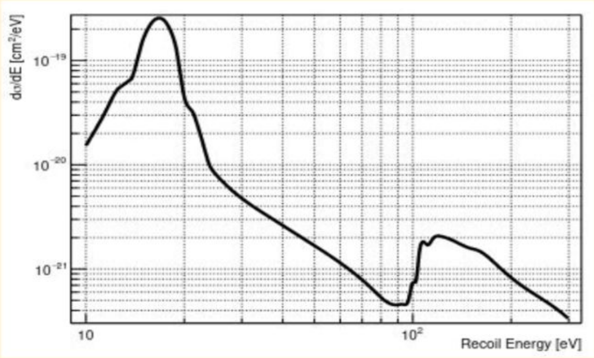


Connie Collaboration & Atucha-II Experiment

1st in using CCDs at NR

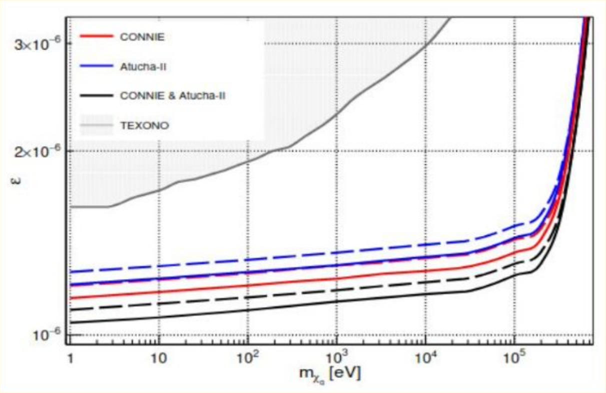
Skipper-CCD deployed 12 m NR

- ➔ Looking for CEvNS
- ➔ Limits on neutral vector boson Z′, scalar mediator φ, NMN, mcP charge



Interaction cross-section with Si using PAI

Exclusion limits at 90% C.L.
Charge of mcP

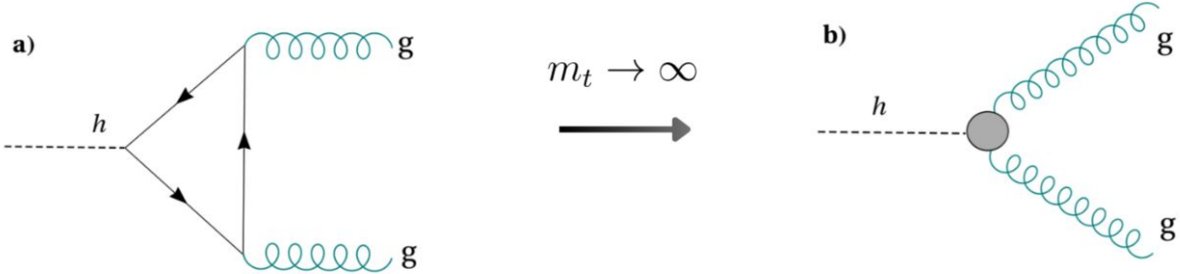


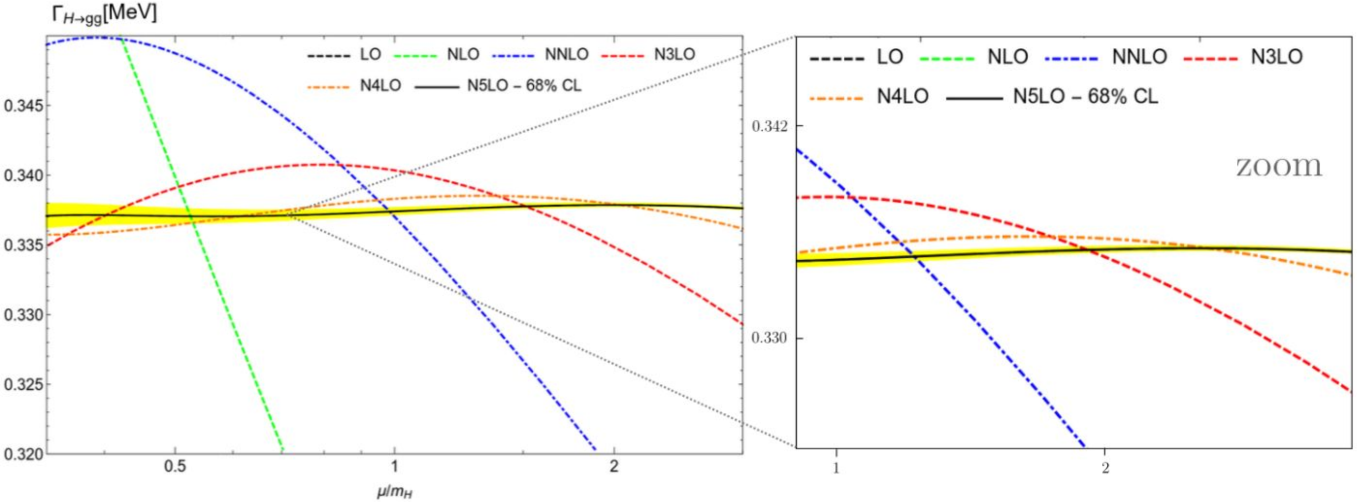
Combined analysis of both experiments

Higgs decay into two gluons

Guilherme de Araújo Nogueira

- We work at the heavy-top limit,where the quark-top is integrate out





$1/\xi < \mu/m_h < \xi$

$$\Gamma_{h\to gg} = \Gamma_0[1+5.7931\alpha_s+15.512\alpha_s^2+12.666\alpha_s^3-69.329\alpha_s^4+(-293\pm 78)\alpha_s^5+\cdots]$$

Model for Direct Detection of Dark Matter with SU(2) Custodial Symmetry

Universidad Nacional Autónoma de México

Juan Felipe Jiménez Román

$$\mathcal{L} = \mathcal{L}_{SM} - \frac{1}{4}F_{\mu\nu}F^{\mu\nu} + (D_\mu\phi)^\dagger(D^\mu\phi) - \lambda_m\phi^\dagger\phi H^\dagger H - \mu_\phi^2(\phi^\dagger\phi) - \lambda_\phi(\phi^\dagger\phi)^2 \quad (1)$$

- The local symmetry $SU(2)_{HS}$ is introduced, and it is assumed to be broken by the doublet ϕ, providing mass to the gauge boson A^i_μ. The scalar η' appears and mixes with the Higgs boson h'.
- There is a $SO(4)$ symmetry which is broken to $SO(3)$, and this is isomorphic to $SU(2)_{CS}$ (Custodial Symmetry), which stabilizes the gauge bosons A^i_μ and prevents their interaction with SM fermions.

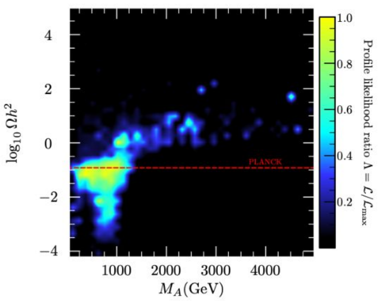


Figura: Relic Density Parameter Space

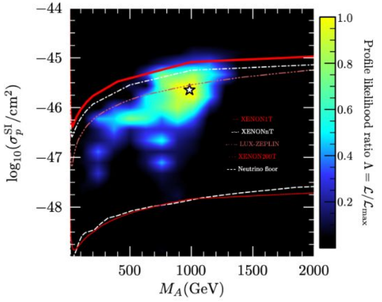


Figura: Cross Section Parameter Space

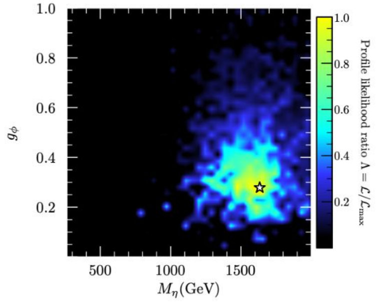


Figura: Parameter Space Between g_ϕ and m_η

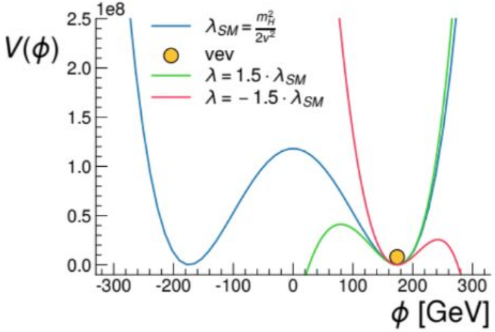
New approach to measure the Higgs boson self-coupling in the LHC

Manuel Mollerach, Universidad de Buenos Aires in collaboration with BNL

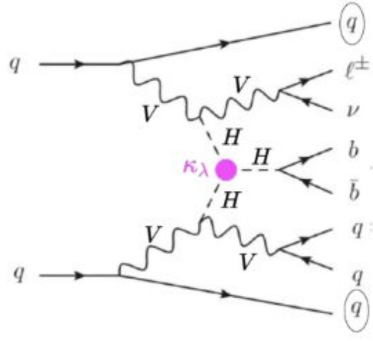
When we add the Higgs potential we get self-interacting terms:

$$V(h) = \frac{1}{2}m_H^2 h(x)^2 + \boxed{v\lambda h(x)^3} + \frac{1}{4}\lambda h(x)^4$$

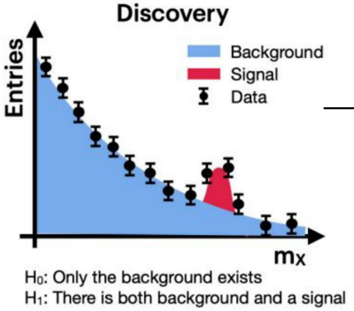
→ But λ has not yet been measured with precision. (tri-higgs has low cross-section)



Proposition:
Study VBS processes (topology may present discrimination with background)



MC simulation → **<u>Cuts in kinematic variables</u>** to improve signal/bkg relation and **<u>likelihood fit</u>**:



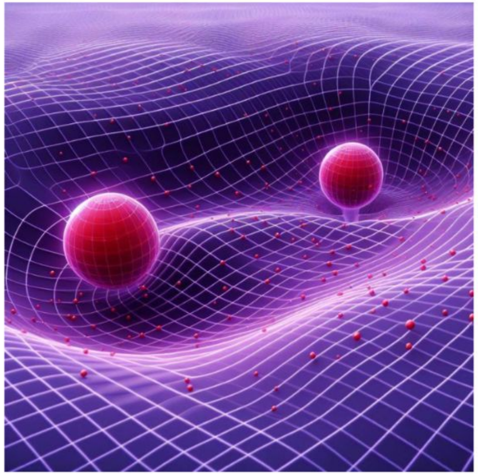
→ $\boxed{Z = 0.41}$

Promising results for more studies. (Larger sample, more channels, etc,)

Unruh effect under the quantum trajectories formalism

https://doi.org/10.1103/PhysRevD.108.083514

Matheus M. A. Paixão, O. Galkina, and Nelson Pinto-Neto



1. Compute the wave functional associated to the Klein-Gordon field
2. Decompose the energy into classical and quantum components
3. Obtain the field trajectories
4. Consider the non-local connections between the right and left wedges of Rindler space

Characteristics of the LArQL model and its prospects

Vale, V. , Marinho, F.
Instituto Tecnológico de Aeronáutica

Liquid argon is used as a scintillator in LArTPCs, when relativistic particles pass through it, argon excimers are produced **UV photon light is emitted.**

Two processes are more likely to happen: **Ionization** and **excitation** of the argon atoms in the cryogenic volume.

From these reactions, it will be produced photons and free charges, which offers a **light yield** and a **charge yield.**

LArQL is a phenomenological model that provides an anticorrelation betweeen ***charge yield (L)*** and ***light yield (Q)*** both depending on the eletric field (ε) applied to LAr and the deposited energy (dE/dx)

This poster presentation will explain the perspectives of LArQL, new hypotheses, some results from the inclusion of recent Q and L data and the process of implementing a global fit to the available data.