# Harvard node of Invisibles

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# Large Range of Questions

- LHC Models
- LHC Phenomenology
- Flavor Models and Phenomenology
- Neutrino Models and Phenomenology
- Dark Matter
  - Astrophysics
  - Models
  - Methods
- Baryogenesis: connection to dark matter?

# Strategy

- Look for consistency among models
- Look for implications for searches
- Use even unexpected astrophysical data that can have implications for dark matter
- Find connections to high energy theories such as string theory

# Activities in the Last Years

- Flavor Physics
- In particular in relation to Randall Sundrum warped geometry Models
- Flavor in Neutrino Sector related to that in Quark Sector
  - Very good feature
  - And very rare
- Actually predicted Daya Bay result!

# Dark Matter Phenomenology

- Investigated potential of dark matter searches with antideuterons
- Showed unique strength to look for annihilations into strongly interacting particles
- Investigated range of models

# Dark Matter and Astrophysics

- Implications of PAMELA, FERMI
- Recently attention to 130 GeV gamma line
- Model building related to that

# Connections Dark Matter and Baryogenesis

- Asymmetric Dark Matter paradigm
- Dark Matter like ordinary matter in that matter/antimatter asymmetry
- We show weak scale possible
- We show can happen naturally
  - Through mass mixing violating b-number and dark matter number
  - Through Planck suppressed operators

# Weak Scale Baryogenesis through Dark Matter Annihilation

- We show out of equilibrium can be established by dark matter annihilation
- Everything happens at weak scale

# Supersymmetry and RS

- Consider viable models of supersymmetry consistent with existing constraints
- Implications for dark matter candidates

- Also consider singlet candidate in RS Models
- Importance of photon signature from dark matter annihilatoin

# Summary

- Lots of work to be done
- Weak Scale
- But also flavor, neutrinos, dark matter
- All ultimately connected
- Combination of theory and experiment to move forward