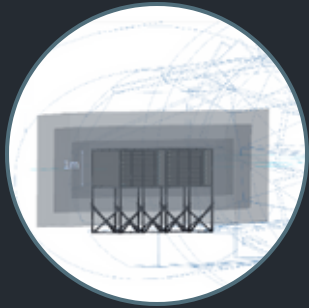


MoEDAL-MAPP Weekly Meets

Aug 31 - Sep 4 2020

Michael Staelens
staelens@ualberta.ca

Overview



MAPP Detector Construction

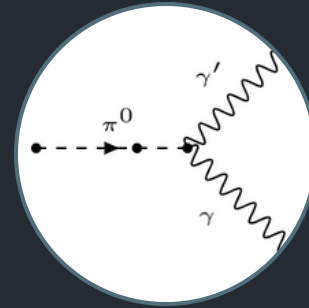
...



MAPP - Fiducial Efficiency Calculations

Large # of simulations needed suggests using an alternative approach. (for LLPs)

Possible Analytic Approach



The Physics Case of the MAPP Detector

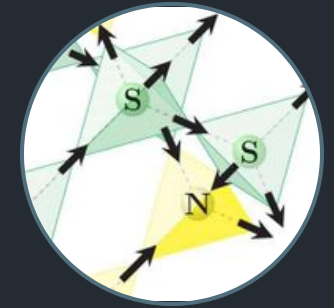
Updates on LLP Models:

Dark Photons --> 95% CL Curve rerunning.

ALPs - Model: a small fix.

2 EPJ papers in progress

GEANT4 mCP Simulations in development..



Emergent Monopoles

Modeling Emergent Monopole

Excitations in spin ice.

Calculation Part 1: 2nd Quantized Hamiltonian

Calculation Part 2: H in k-space

Calculation Part 3: EOMs

MAPP - Fiducial Efficiency Calculations

Looking at the Scalar LLP via B decays for the FCC.

MAPP2+

100 TeV

Too many simulations to run..

A new paper

Analytic approach to calculate fiducial efficiencies..

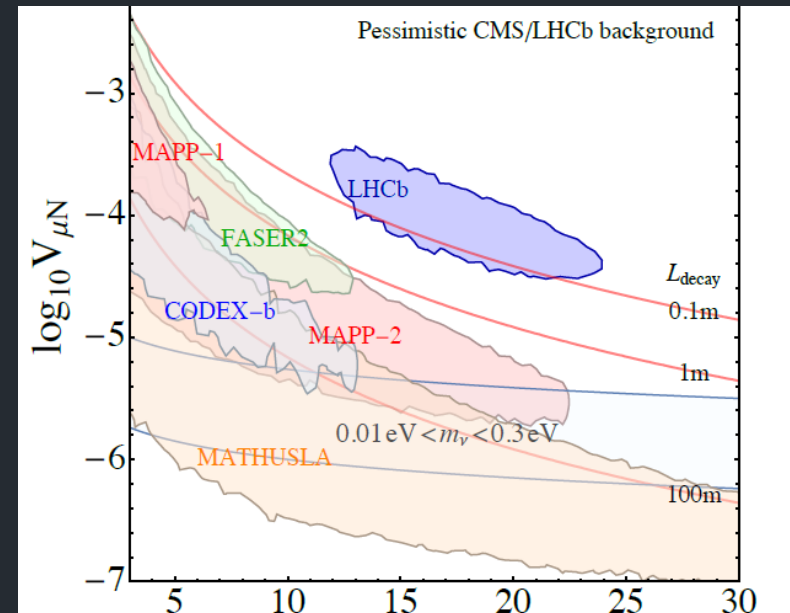
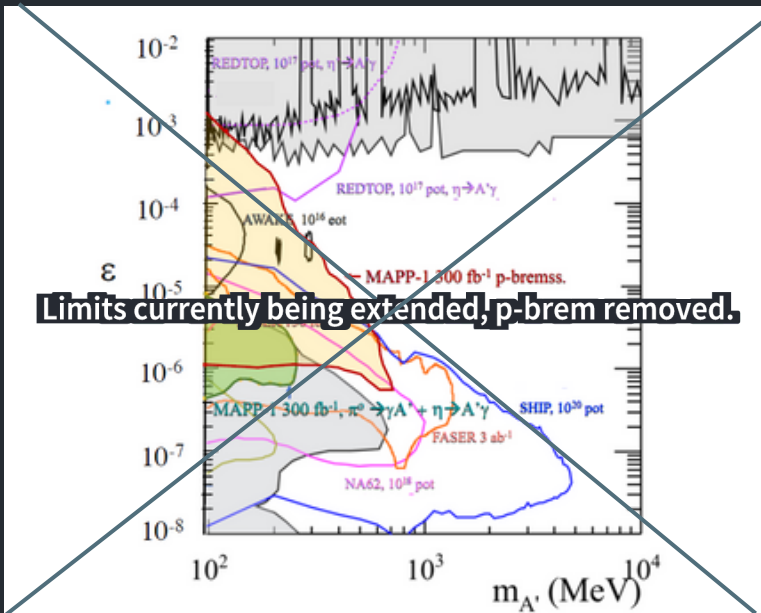
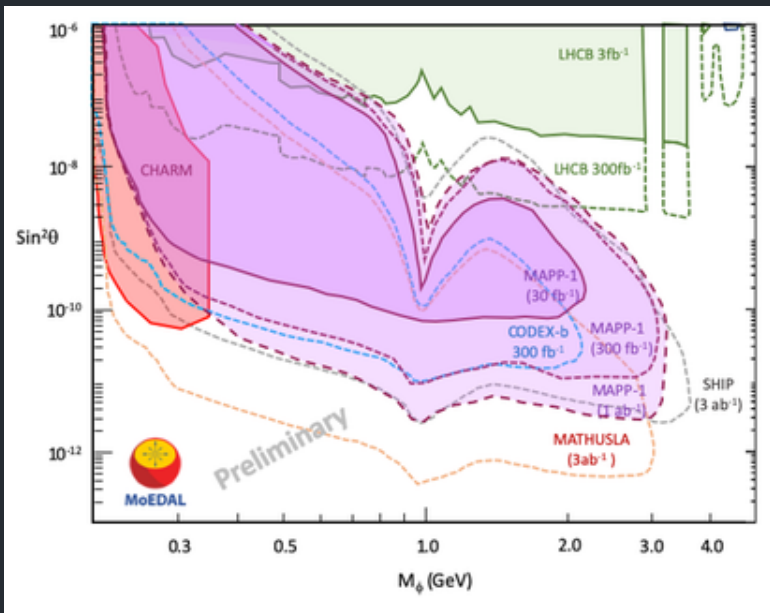
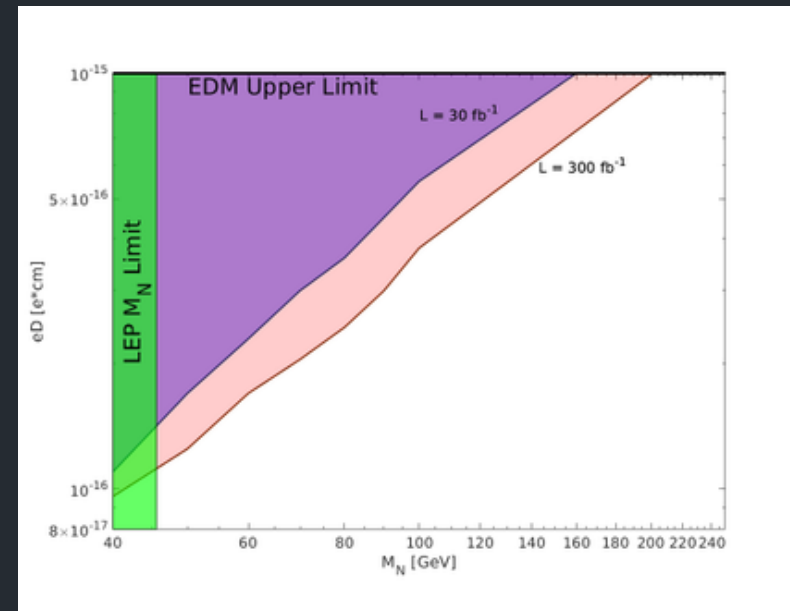
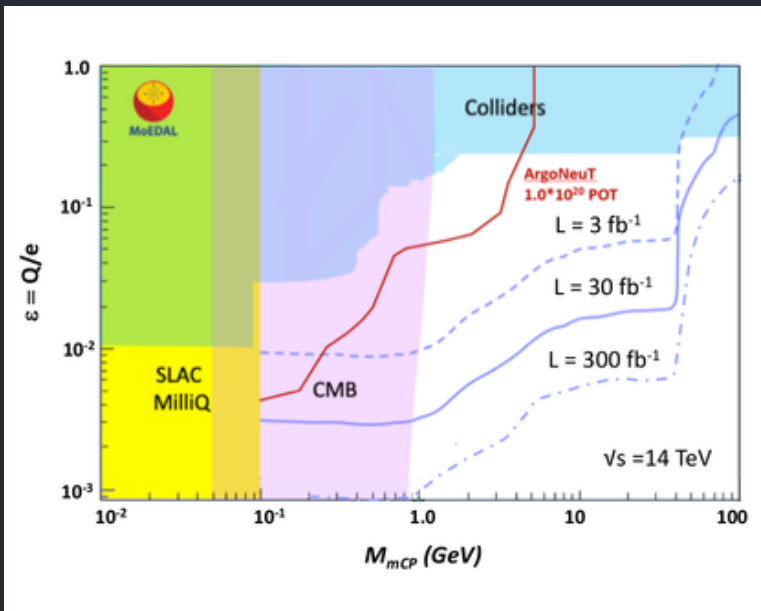
They looked @ SHiP and MATHUSLA and found similar results+

They looked at both HNLs and Scalar Portals via B/D Mesons

arXiv:1902.06240v2

Physics Performance of the MoEDAL-MAPP Detector

MAPP-1.. Results So Far



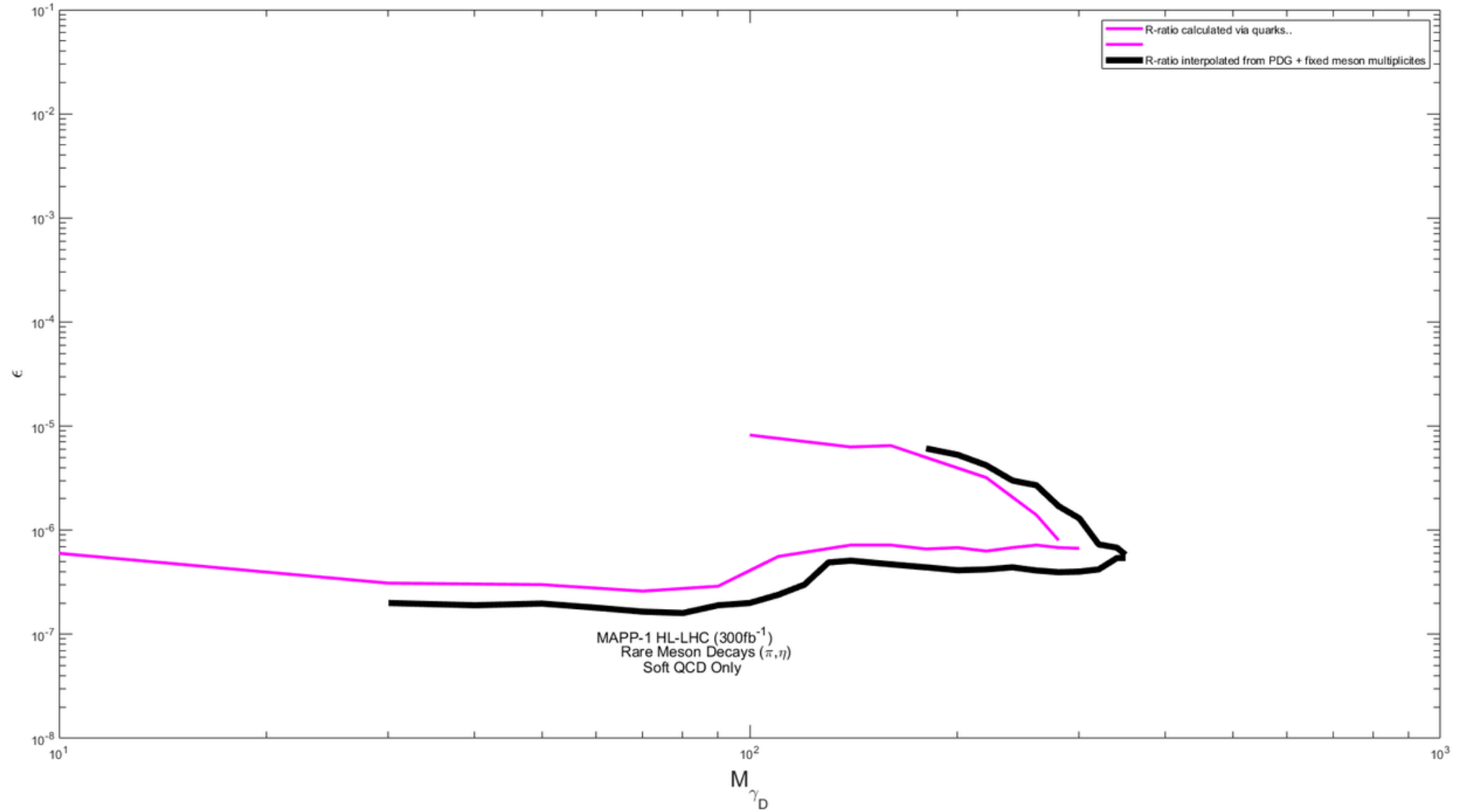
MAPP-2 Dark Higgs Limits for HL-LHC also done & FCC (Coming)

External Study1

Meson Results Updating:

$\eta \rightarrow \gamma \gamma'$ region nearly done. (135-350MeV)

π & $\eta \rightarrow \gamma \gamma'$ bottom region done. (10-135 MeV)



Axion-like Particles

Overall Plan Ahead

- **Thesis Writing**

Outstanding research items (MAPP) --> Dark Photon Limit Curve, ALP limit curve (MAPP-mCP & MAPP-LLP as the fiducial volume), and hopefully, a working method for calculating the fiducial efficiencies.

Outstanding research items (Emergent-MM) --> Solution(s) to simplified and collapsed EOMs + Discussion (dynamics, nature of soln, etc.)

- **Additional Items**

ALPs via the Primakoff Process v1 - MAPP + TAXN-like scenario as a first look

ALPs via the Primakoff Process v2 - Proper Simulation w/ Pythia (+GEANT?)

mCP vs. Heavy nu Ionizations in 3m of plastic Scintillator, a first look w/ GEANT4.

Questions?