MoEDAL – supersymmetry, MAPP detector, HECOs, and dyons

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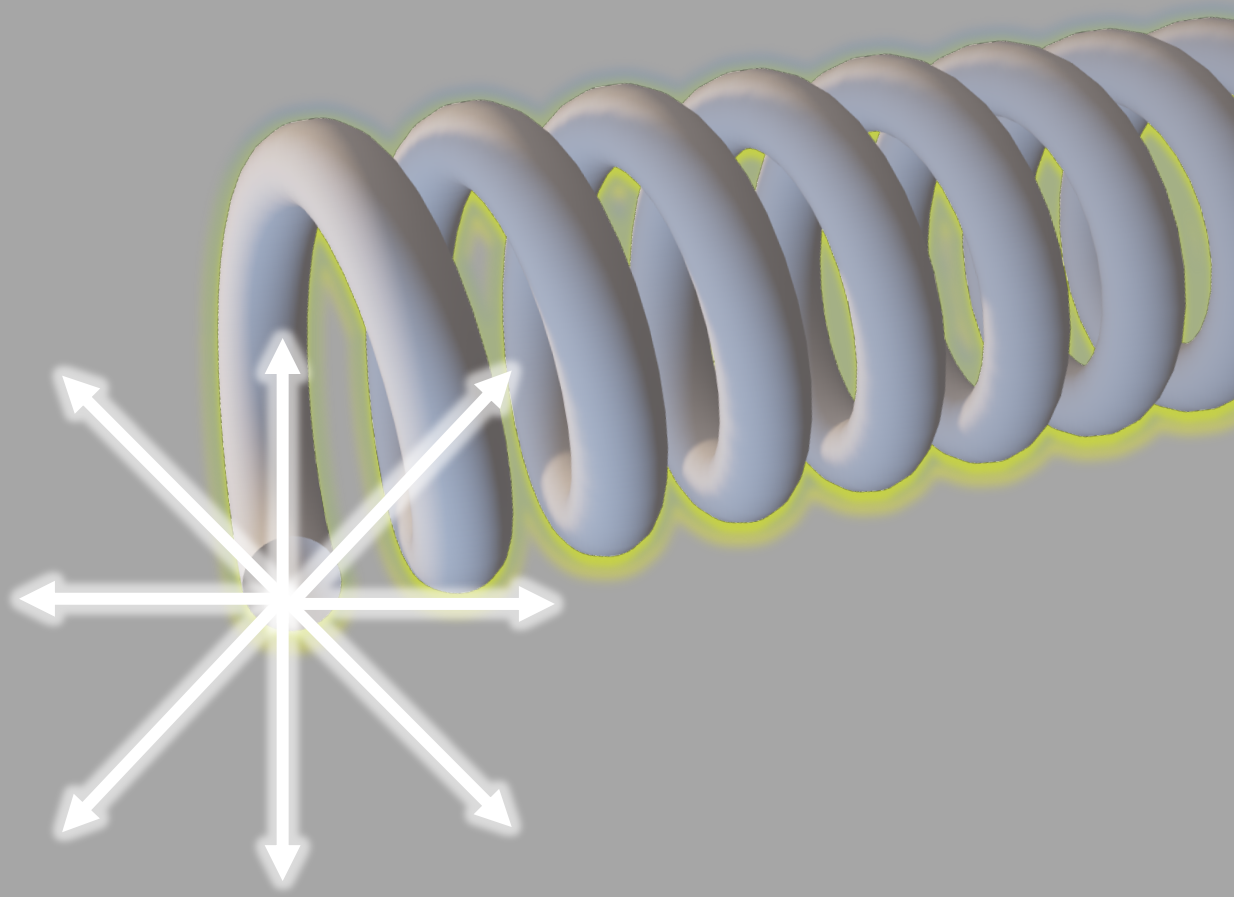
MoEDAL

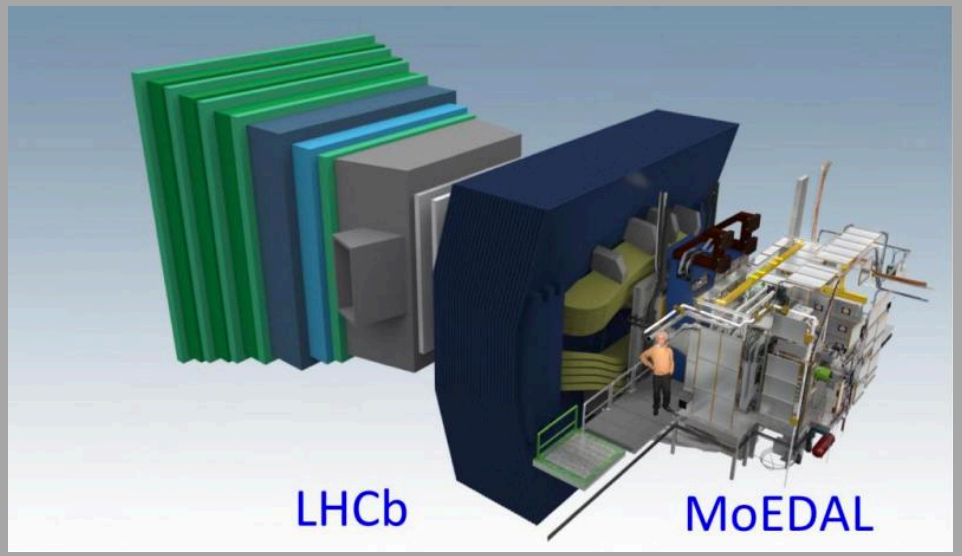
Background of magnetic monopoles

- 1931 - Dirac string
- Support for GUTs
- Justification for quantization of electric charge
- Make Maxwell's equations fully symmetric



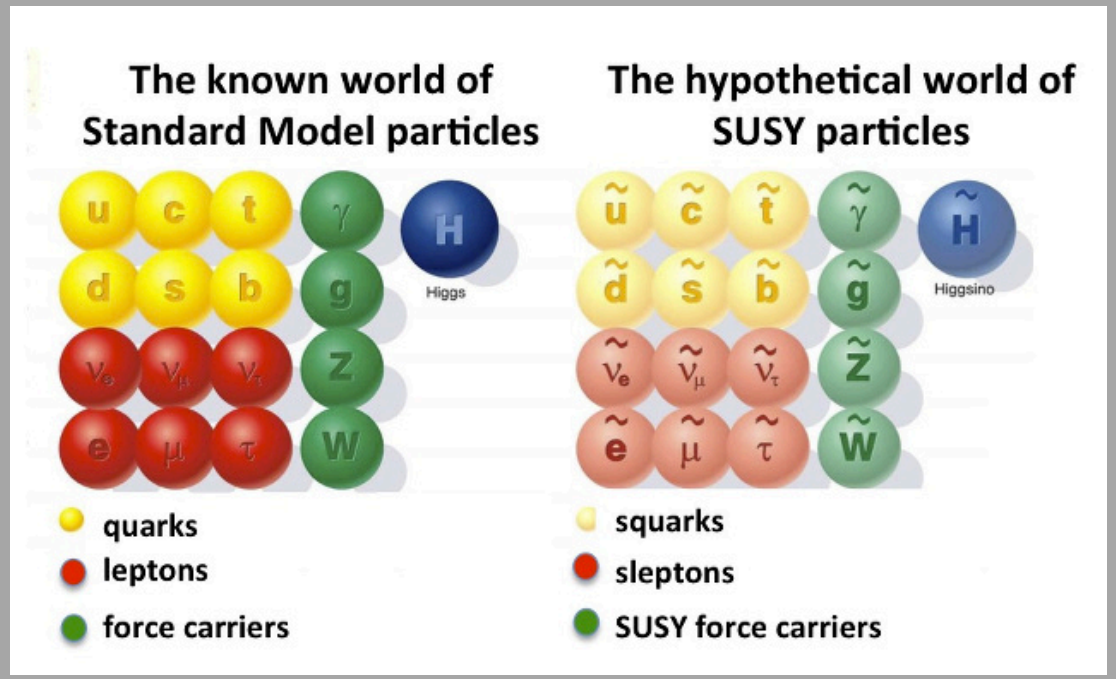
MoEDAL components

- Magnetic monopole trappers
- Nuclear track detectors
- Proposed MAPP detector
- Capable of searching for monopoles produced via two mechanisms



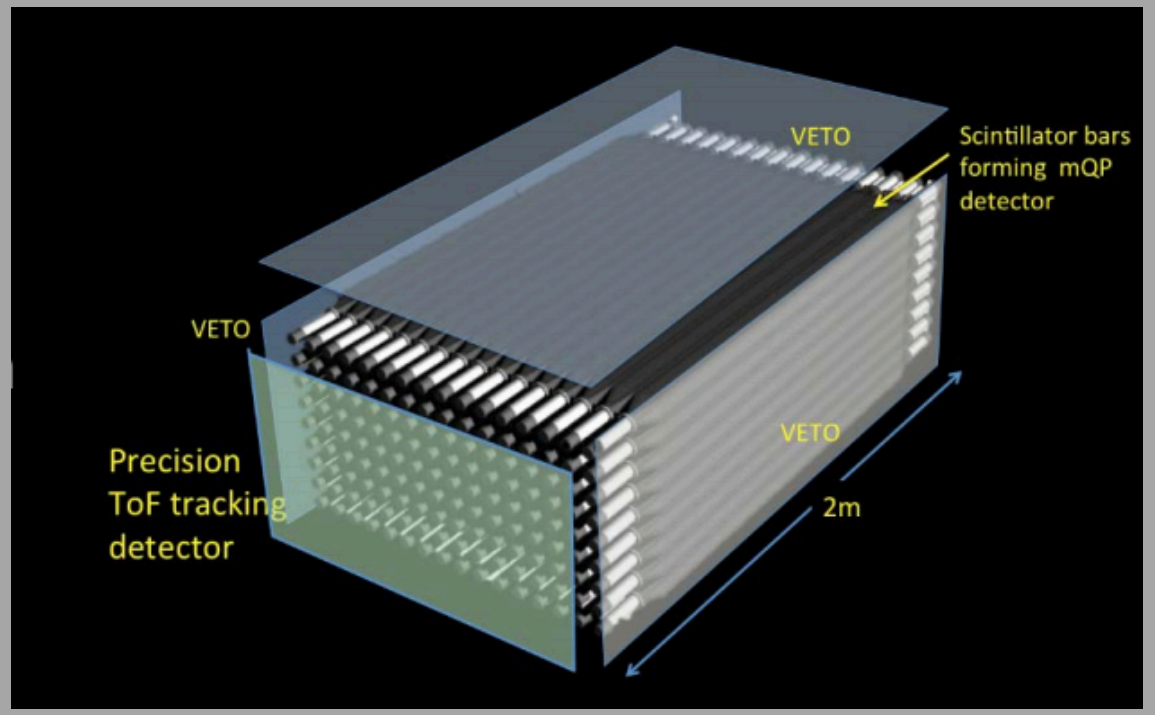
Supersymmetry background

- Each SM particle has a corresponding sparticle
- Monte Carlo simulations
- Beginning with very general model
- Looking for stau, gluino, Higgsino currently
- Special interest in doubly charged Higgsino



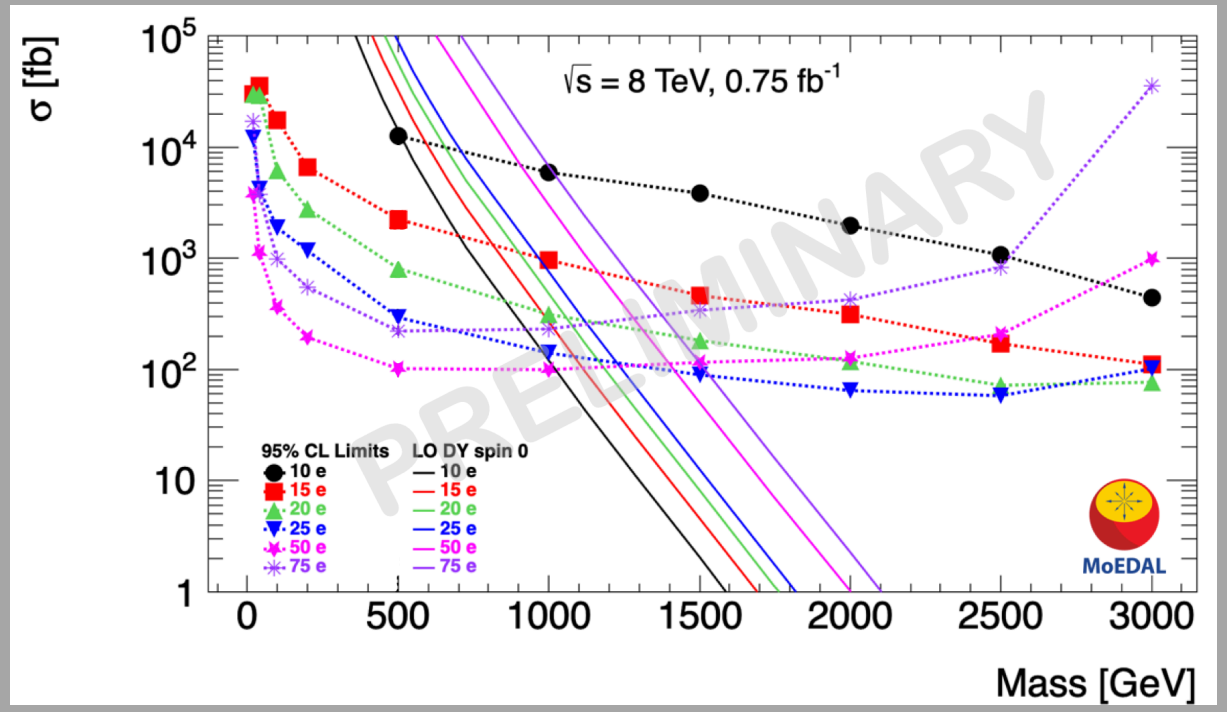
MoEDAL Apparatus for Penetrating Particles

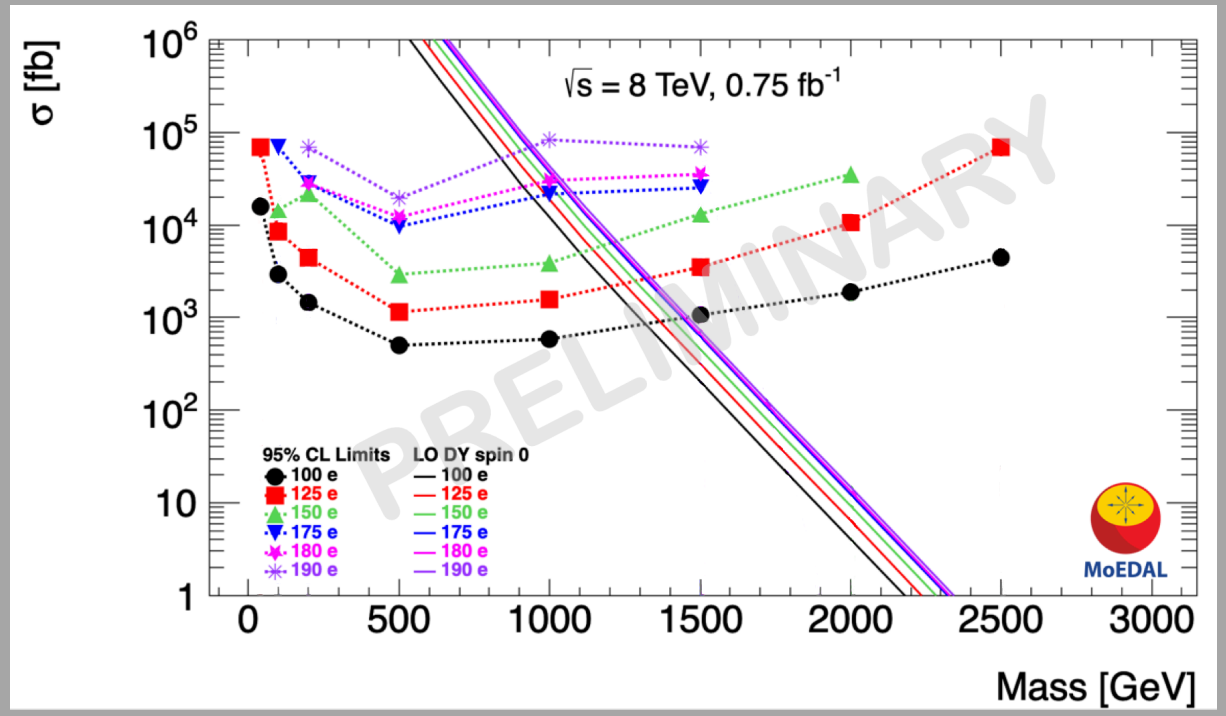
- Search for millicharged particles and long lived neutral particles
- Shielded by 50 m of rock
- 5 degree offset from IP8
- Generating events via Pythia, implementing geometry in C++



HECOs

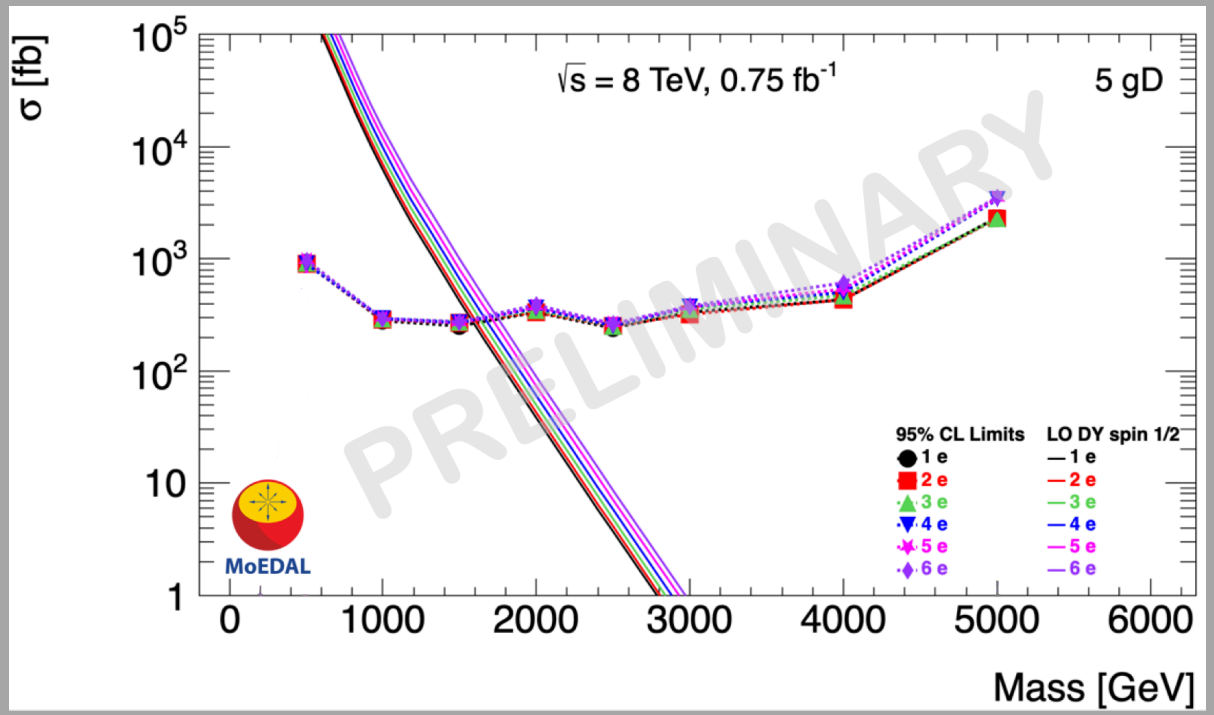
- Could potentially be found in the NTDs
- Some examples are strangelets, Q-balls and micro black hole remnants

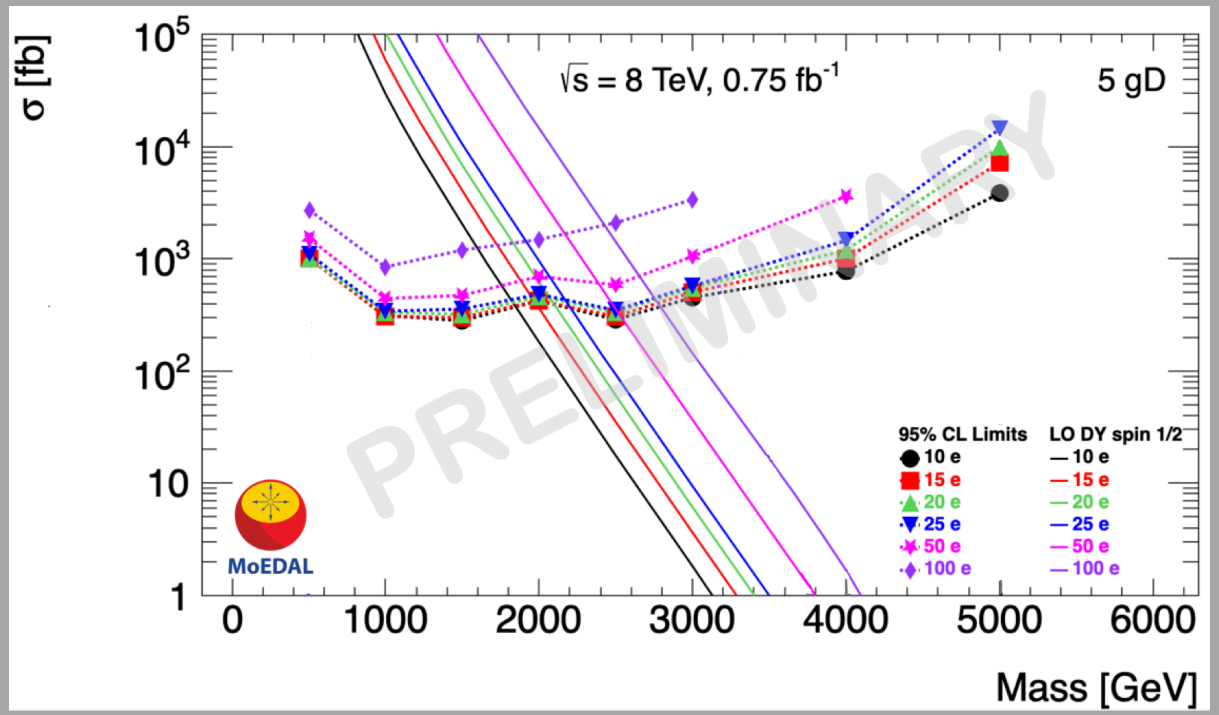




Dyons

- Have both magnetic and electric charge
- Magnetic charge is considered in integer multiples of the Dirac charge (1 $g_D \approx 68.5\ e = 137e/2$)





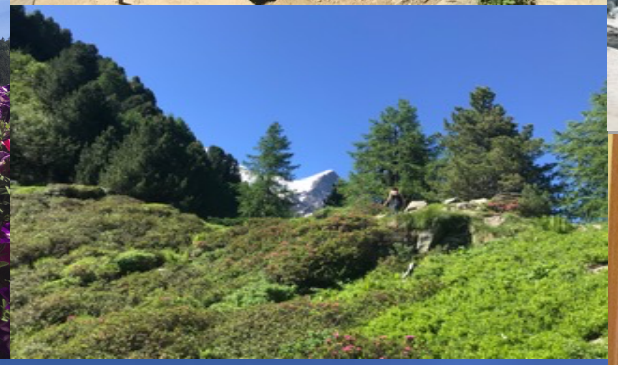
Completed work

- HECO limit plots for upcoming paper done
- Dyon limit plots script written
- First round of stau(50-500GeV), gluino(500GeV-3TeV), Higgsino like particles(50-600GeV as lightest neutralinos/charginos) simulations
- Pythia simulations of generic particle and tentative implementation of MAPP geometry

Next steps

- Finish dyon limit plots, get limits, and compare results
- Check implementation of MAPP geometry, determine if MAPP detector would be a useful addition
- More SUSY simulations


Accelerating Science

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