Background study for Korea Experiments on Magnetic Monopole

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- Magnetic monopoles are accelerated under a 1 T magnetic field and measured in the end-cap calorimeters.
- To increase the sensitivity of magnetic monopole, we build a magnetic mirror.
- The 1274 keV Y from ²²Na decay is the trigger signal in the trigger veto detector.
- LYSO, Csl, and Csl(Tl) crystals are candidates for trigger veto detector and end-cap calorimeter.







$Lu_{2(1-x)}Y_{2x}SiO_5$	Value
Density, ρ (g/cm ³)	7.25
Yield (Photons/MeV)	33200
Decay Time, τ (ns)	42
Refractive Index, n	1.82
Radiation length, X_0 (cm)	1.14

Calibration and validation

- Calibrated using 662 keV Vs into two different sizes of single LYSO crystal.
- Validate the calibration constant in each ECAL and Trigger veto detector with 662 keV and 1 MeV Vs.



Result of background simulation

²²Na

Pattern Recognition



Conclusion and Plan

- The study of Korea Experiments on Magnetic Monopole backgrounds simulation with GEANT4 shows that backgrounds leave how much energy in trigger veto detector and end-cap calorimeters. Those provide to design rejecting background events from magnetic monopoles.
- The trigger signal 1274 keV gamma is dominant in that energy region and improved with pattern recognition. There are no significant background events in the magnetic monopole search region except cosmic-ray muon. We update the design to reject muon and set up the muon veto detectors that surround end-cap calorimeters.
- Finalize to validate magnetic monopole signals using GEANT4 and improve the sensitivity of magnetic monopole.