



My Intel ISEF Project

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Pupil at The Mary Erskine School, Edinburgh, 1994-2007

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Winner of First in Category in Physics and Astronomy at the Intel ISEF 2007

### "Cosmic Rain: Investigating Particles from Space"

- Investigated different aspects of cosmic rays at sea level
- Built a cosmic ray hodoscope to investigate the angular distribution of cosmic rays
- Examined the energy spectrum of muons (the most common cosmic ray at sea level)
- Designed and manufactured a cloud chamber to view particle tracks left by cosmic rays (to be reliable, cheap and easy for schools to emulate)
- Gained insight to both the satisfactions and frustrations of experimental physics
- Allowed me to present project to physicists and higher educationalists worldwide
- Inspired me to continue studying physics and consider pursuing a career in science

# Cosmic Rain: Investigating Particles from Space

The energy spectrum of muons was investigated using the Teach Spin muon lifetime apparatus to count muon decays. Muons with different energies were selected using varying layers of moderating steel. For a muon to make it through the steel and decay within the detector, it must have had a minimum energy which was calculated.



To investigate the angular distribution of cosmic rays, a cosmic ray hodoscope was constructed. This consisted of two scintillator paddles, each coupled to a photomultiplier tube; the pulses from which were then sent to a circuit board that counted cosmic ray flux. These paddles were positioned a metre apart, counting only a small angular range of cosmic rays. This apparatus was then angled at varying degrees from the zenith.

A diffusion cloud chamber allows you to view particle tracks left by cosmic rays. The aim was to design and make a cheap, reliable chamber from readily available components. This design could then be easily copied by schools/teachers, making particle physics accessible to school pupils.

