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Analysis of the Farmville Meteorite MEGAN FERM, Keene State College — Meteoroids are objects that are constantly bombarded by cosmic rays in outer space. Through spallation reactions between cosmic rays and meteoroid matter, radioactive nuclides, such as ²⁶Al, are produced. ²⁶Al is a positron emitter, meaning that the positron annihilates within a cubic millimeter of the sample. This results in the release of two 511 keV photons, in addition to an 1809 keV gamma ray from the decay to the ²⁶Mg ground state. This study focuses on the detection of ²⁶Al in the Farmville meteorite, which fell in North Carolina in 1934. The meteorite has been centered in our sensitive apparatus, and the conditions for detection require a triple gamma coincidence which greatly reduced background. With the radioisotopes measured within the sample, Monte Carlo transport simulations (using the package Geant4) will be performed to determine the amount of 26 Al in the meteorite. With this information, it may be possible to determine the time the meteorite entered Earth's atmosphere (which should be consistent with the reported find time), the time period that the meteoroid was exposed to the cosmic rays, the pre-atmospheric size of the meteoroid and the intensity of cosmic rays in the inner solar system.

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