Muon Flux through Various Substances and Conditions

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This experiment tested whether the muon count is altered by changing the conditions between counter scintillators, with the purpose of determining if applied fields could cause any deflection in the flow of muons. We hypothesized that if fields were applied between scintillators then the muon count would be altered. Three counters, each consisting of a scintillator, light guide, and photomultiplier tube, were set in a column, positioned horizontally, and parallel to one another with equal distance between each. Each counter was connected to a mediating DAQ board, which transmitted data of muon counts to a computer. An initial test was run for normal fluctuations to serve as a standard of measurement for the other tests, and the first counter was reserved as the control. The experimental fields were set up above the second counter. The conditions tested were—the north and south poles of a magnetic field produced by an electromagnetic, electric fields of varying strengths created by a basic variable capacitor, and a medium of free-flowing positive and negative ions produced by an electrolytic cell. The data revealed that while the average counts in the control and third counter rose form the normal average of 1022.4 and 1689.2, respectively, to 1244.52 in the control and 1996.54 in the third when exposed to the free-flowing Cu(II)SO4 ions, the second counter displayed a drop from 1041.14 to 987.88. A similar phenomenon occurred with the negative electromagnet as well as the ZnSO4 ions. This indicates that muons may have been deflected by the applied fields, supporting our hypothesis.

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