

Evidence for the Decay $\Sigma^+ \rightarrow p\mu^+\mu^-$

HyperCP Collaboration

The HyperCP (E871) experiment collected $\sim 10^{10}$ hyperon decays in the 1997 and 1999 Fermilab fixed-target running periods. Using the data from the 1999 run, we report on the observation of three isolated events with reconstructed masses consistent with the hypothesis $\Sigma^+ \rightarrow p\mu^+\mu^-$. This is the rarest decay ever observed in the baryon sector. The dimuon mass distribution is unexpectedly narrow, suggesting that the decay may proceed via an intermediate state of mass $214.3\pm 0.5\text{ MeV}/c^2$. Possible interpretations of the observed events will be discussed including the decay of an sgoldstino-like particle.