

High Energy Physics - Experiment

A Novel Scheme to Search for Fractional Charge Particles in Low Energy Accelerator Experiments

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In the Standard Model of particle physics, the quarks have fractional charge equal to $\pm 1/3$ or $\pm 2/3$ of the electron's charge. There have been a large number of experiments in searching for fractional charge, isolatable, elementary particles using a variety of methods, including e^+e^- collisions using dE/dx ionization energy loss measurements, but no evidence is found to confirm existence of the free fractional charge particles, which leads to the quark confinement theory. In this paper, The design of a novel scheme to search for this kind particles is presented, which is based on the conservation law of four-momentum. Thanks to CLEOc and BESIII detectors' large coverage, precision measurement and their collected large data samples, these features make the scheme feasible in practice. The advantage of the scheme is independence of any theoretical models and high sensitivity even if there are a small fraction of quarks transitting to unconfinement phase.

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