Title: A simple charged particle spectrometer for a pion production experiment.


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A simple charged particle spectrometer for a pion production experiment


Measurement of a charged-particle energy is not a new task, but inexpensive ways of such measurement are of interest, in particular as they open new opportunities for advanced charged-particle radiography. We describe a magnetic spectrometer built for pion-production-measurement experiments at LANSCE. The spectrometer consists of four modules of drift tubes and a bending magnet. Drift tubes of 2 inches in diameter were made of thin carbon fiber to minimize multiple scattering in their walls. The spectrometer was used in the experiment with primary beam of 800-MeV protons and a C or Al target. We present measurements of secondary protons, pions and muons produced in the reverse direction. Energy deposited in a 1-cm thick plastic scintillator and 4" CsI was compared to the energy measured from the particle bending in the magnetic field. Experimental data are compared to GEANT4 modeling. We discuss, how this technology may be applied to particle identification and to energy-loss measurements. (Work supported by Defense Threat Reduction Agency)