High Energy Physics - Experiment

The energy dependence of the pp->K+ n Sigma+ reaction close to threshold

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The production of the Sigma+ hyperon through the pp->K+nSigma+ reaction has been investigated at four energies close to threshold, 1.826, 1.920, 1.958, and 2.020 GeV. At low energies, correlated K+pi+ pairs can only originate from Sigma+ production so that their measurement allows the total cross section for the reaction to be determined. The results obtained are completely consistent with the values extracted from the study of the K+-proton correlation spectra obtained in the same experiment. These spectra, as well as the inclusive K+ momentum distributions, also provide conservative upper limits on the Sigma+ production rates. The measurements show a Sigma+ production cross section that varies roughly like phase space and, in particular, none of the three experimental approaches used supports the anomalously high near-threshold pp->K+ nSigma+ total cross section previously reported [T. Rozek et al., Phys. Lett. B 643, 251 (2006)].

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