

Production of Strange Particles in Hadronic Interactions

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The NA61/SHINE collaboration has recently published high precision data on production of π^\pm and K^\pm mesons, protons, antiprotons and Λ -hyperons in pp interactions at 20, 31, 40, 80 and 158 GeV/c, and in pC interactions at 31 GeV/c. The collaboration also presented experimental data on production of particles – π^\pm , K^\pm , p^\pm , ρ^0 and K^{*0} in π^- C collisions at 158 and 350 GeV/c. The collaboration has compared these data with various Monte Carlo model calculations: UrQMD, EPOS, GiBUU, and others. All of the models have various problems. The latest version of the FTF (Fritiof) model, available in the June 2018 release of Geant4 10.5 beta, solves most of these problems. In the FTF model, we have improved the fragmentation of quark-gluon strings with small masses and introduced dependencies on string masses for probabilities of creating pairs of strange mesons and baryon-antibaryon pairs. Due to these, we describe the data of the NA61/SHINE collaboration on particle production in pp, pC, and π^- C interactions.

The improved Geant4 FTF model also well reproduces experimental data on inclusive cross sections of Λ , $\bar{\Lambda}$, K^0 production in antiproton-proton interactions at various energies. The modified FTF model allows to simulate realistic processes with two particle production: $\bar{p}p \rightarrow \Lambda\bar{\Lambda}$, $\bar{p}p \rightarrow K^+K^-$, $\bar{p}p \rightarrow \Lambda\bar{\Sigma}$, and $\bar{p}p \rightarrow \Sigma\bar{\Sigma}$, which will be studied in the future PANDA experiment at FAIR (GSI, Germany).