Contribution ID: **35**   Type: **not specified**

Investigation of $T_{cs0}^*(2870)^0$ in pp collisions at 7 TeV with the PACIAE model

Sunday 3 August 2025 11:55 (25 minutes)

We have used the parton and hadron cascade model PACIAE together with the Dynamically Constrained Phase-space Coalescence model (DCPC) to study the $T_{cs0}^*(2870)^0$ production in *pp* collision at $\sqrt{s}$ = 7 TeV, in line with the LHCb observation of $T_{cs0}^*(2870)^0$ in the $B^- \to D^- D^0 K_S^0$ decays in *pp* collisions at $\sqrt{s}$ = 7, 8, and 13 TeV [PRL 134(2025)101901]. The final hadronic states of the *pp* collisions at $\sqrt{s}$ = 7 TeV are first simulated by the PACIAE model. Three
sets of $T_{cs0}^*(2870)^0$ candidates are then recombined by the DCPC model using the constituent meson pair of $D^0 K_S^0$, $D^+ K^-$, and $D^- K^+$ based on the above simulated final hadronic states, respectively. We calculate their rapidity distributions, transverse momentum spectra, and angular distribution between the two component mesons, as well as angular distribution between D component meson and $T_{cs0}^*(2870)^0$. Our results show that the yields of three $T_{cs0}^*(2870)^0$ candidates follow the magnitude order of $D^+ K^- > D^- K^+ \sim D^0 K_S^0$ (the latter two are nearly equal indeed). Similar ordering behavior is also observed in the aforementioned distributions.

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