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Formation of strange dibaryon X(2265) in $p + p \to K^+ + X$ reaction at T_p = 2.5 and 2.85 GeV

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The so-called $X(2265)$ resonance state has been observed [1] in an exclusive data set of $pp \to p\Lambda K^+$ at $T_p = 2.85$ GeV of DISTO data with a mass of 2267 MeV/c^2 and a width 118 MeV. The $X(2265)$ state has a baryon number 2 and a strangeness -1 and it is possibly a candidate of the $(\bar{K}NN)_{S=0,I=1/2}$ kaonic nuclear system, often called K^-pp. We studied [2] the energy dependence of the production rate of the $X(2265)$ in the DISTO $pp \to p\Lambda K^+$ data at $T_p = 2.5$ and 2.85 GeV. If the $X(2265)$ is produced in a similar mechanism as a hyperon production in the $pp \to p\Lambda K^+$ then the $X(2265)$ at $T_p = 2.5$ GeV would be produced as much as 33% of the $T_p = 2.85$ GeV case. However, if the $\Lambda(1405)$ plays an important role as a door way to the high density kaonic nuclear systems [3], then the production of the $X(2265)$ would be strongly suppressed at 2.5 GeV as the beam energy is too close to the production threshold of the $\Lambda(1405)$ and therefore $\Lambda(1405)$ is merely produced at that energy. We found in the 2.5 GeV data no clear sign of a formation of the $X(2265)$. This fits to the latter scenario, supporting that the $X(2265)$ resonance is the long-searched K^-pp system.

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