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Investigation of the Mass Spectra of Singly Charmed Pentaquarks

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In this study, we calculate the mass spectra of singly charmed pentaquark states using the hypercentral constituent quark model (HCQM). The pentaquark is treated as a bound system consisting of two diquarks and an antiquark, with their interactions described by a potential that includes both a linear confining term and a Coulomb term. To account for the fine structure of the mass spectra, spin-dependent interactions specifically spin–spin, spin–orbit, and tensor terms are incorporated. We systematically analyze the spin-parity quantum numbers of the predicted states and compare our results with available experimental data and other theoretical approaches. This work provides valuable insight into the internal structure of exotic hadrons and supports ongoing efforts to better understand singly charmed pentaquark systems.

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