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Multibody decays of heavy hadrons

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The decay of the D meson into multibody final states is a complex process that provides valuable insights into the fundamental interactions within the Standard Model of particle physics. This study focuses on the decay cascade $D^+ \to K_J^* \ell^+ \nu \to K^\pm \pi^\mp \ell^+ \nu$ where the K_J^* resonance encompasses the $K^*(892), K^*(1410), K_0^*(1430)$ states. We employ the helicity amplitude technique to derive the angular distributions for the decay chain, enabling the extraction of one-dimensional and two-dimensional distributions. Utilizing form factors for the $D \to K^*$ transition derived from the quark model, we calculate the differential and integrated partial decay widths, explicitly considering the electron and muon masses.

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