

Precise Measurement of the $D^*(2010)^+ - D^+$ Mass Difference

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We measure the mass difference, Δm_+ , between the $D^*(2010)^+$ and the D^+ , using the decay chain $D^*(2010)^+ \rightarrow D^+\pi^0$ with $D^+ \rightarrow K^-\pi^+\pi^+$. The data were recorded with the BaBar detector at center-of-mass energies at and near the $\Upsilon(4S)$ resonance, and correspond to an integrated luminosity of approximately 468 fb^{-1} . We measure $\Delta m_+ = (140,601.0 \pm 6.8 [\text{stat}] \pm 12.9 [\text{syst}]) \text{ keV}$. We combine this result with a previous BaBar measurement of $\Delta m_0 \equiv m(D^*(2010)^+) - m(D^0)$ to obtain $\Delta m_D = m(D^+) - m(D^0) = (4,824.9 \pm 6.8 [\text{stat}] \pm 12.9 [\text{syst}]) \text{ keV}$. These results are compatible with, and approximately five times more precise than, previous world averages.

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