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Precise measurements of the mass differences between the $D^*(2010)^+$, and the D^+ and D^0 mesons with the BABAR detector

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We present a high precision measurement of the mass difference between the $D(2010)^+$ and D^+ mesons using the decay chain $D(2010)^+ \rightarrow D^+ \pi^0$, with $D^+ \rightarrow K^- \pi^+ \pi^+$. The analysis has been performed on a data sample corresponding to an integrated luminosity of about 477 fb^{-1} , collected with the BABAR detector at the PEP-II e^+e^- collider. We additionally combine this result with a previous BABAR measurement of $m(D^*(2010)^+) - m(D^0)$ to extract the mass difference between the charged and neutral D mesons. We obtain results that are approximately seven times more precise than the present world averages.

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