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Precision measurement of the branching fraction for the decay $\psi(2S) \rightarrow \tau^+\tau^-$ at BESIII

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Using $(2259.3 \pm 11.1) \times 10^6$ $\psi(2S)$ events acquired with the BESIII detector, the branching fraction of $\psi(2S) \rightarrow \tau^+\tau^-$ is measured with improved precision to be $\mathcal{B}_{\psi(2S) \rightarrow \tau^+\tau^-} = (3.240 \pm 0.023 \pm 0.081) \times 10^{-3}$, where the first and second uncertainties are statistical and systematic, respectively, which is consistent with the world average value within one standard deviation. This value, along with those for the branching fractions of the $\psi(2S)$ decaying into e^+e^- and $\mu^+\mu^-$, is in good agreement with the relation predicted by the sequential lepton hypothesis. Combining the branching fraction values with the leptonic width of the $\psi(2S)$, the total width of the $\psi(2S)$ is determined to be (287 ± 9) keV.

Secondary track

T06 - Top and Electroweak Physics

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