Abstract Submitted
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Precise Measurement of the Mass of the τ Lepton TAO LUO, University of Hawaii, BESIII COLLABORATION — An optimized energy scan near the τ pair production threshold has been performed using the BESIII detector. About 24 pb^{-1} of data, distributed over four scan points, was collected. The τ mass is determined directly from the threshold behavior of the τ pair production cross section in the e^+e^- collisions. The key question in the measurement is how to determine the beam energy precisely. Here the beam energy measurement system (BEMS) for BEPC-II is used to determine the beam energy. The relative systematic uncertainty of the electron and positron beam energy determination in our experiment is estimated as 2×10^{-5}; the relative uncertainty of the beam's energy spread is about 6%. This analysis is based on the combined data from the ee, $e\mu$, eh, $\mu\mu$, μh, hh, $e\rho$, $\mu\rho$ and $\pi\rho$ final states, where h denotes a charged π or K. The mass of the τ lepton is measured as

$$m_\tau = 1776.91 \pm 0.12 \, ^{+0.09}_{-0.12} \text{ MeV/c}^2 \quad (1)$$

which is consistent with results from any other groups included by the Particle Data Group, but has the smallest uncertainty.

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