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Recent Charmonium Results from BES

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Recent results obtained using the BES $\psi(2S)$ data set, which with 3.8×10^6 events is the world's largest, are summarized. Following is a partial list of topics.

The process $\psi(2S) \to \pi^+\pi^- J/\psi$, which is the biggest decay mode of the $\psi(2S)$, is studied. Angular distributions indicate that the $\pi^+\pi^-$ system contains a D-wave contribution, consistent with some heavy quark models. Using the same process, the J/ψ events which decay leptonically are used to measure the precise branching ratios: $B(J/\psi \to e^+e^-) = 5.90 \pm 0.05 \pm 0.10$ and $B(J/\psi \to \mu^+\mu^-) = 5.84 \pm 0.06 \pm 0.10$.

Many hadronic decays of the $\psi(2S)$ are measured, many for the first time. The branching ratios obtained provide information on the $\rho\pi$ puzzle.

The large number of χ_c decays ($\sim$ 1 M) allow studies with unprecedented precision. Many χ_c branching ratios are measured. Many, like $B(\chi_{c0} \to p\bar{p})$, are measured for the first time. Using $\chi_{c0} \to \pi^+\pi^-$, we find $\Gamma_{\chi_0} = 14.3 \pm 3.6$ MeV, which is an improvement on the PDG value (14 ± 5 MeV),which was based on two discrepant measurements.

Using many decay modes of the χ_{c0}, we have determined $M_{\chi_{c0}} = 3414.1 \pm 0.6 \pm 0.8$ MeV; this improves on the PDG value, which has an error of 2.8 MeV. We have also measured the η_c mass and find $M_{\eta_c} = 2975.8 \pm 3.9 \pm 1.2$ MeV.