Recent Charmonium Physics at BES

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With 3.8×10^6 $\Psi(2S)$'s and $\sim 1 \times 10^6$ χ_c's , the world's largest $\Psi(2S)$ and χ_c data sets, recent $\Psi(2S)$ and χ_c results from BES are summarized. The talk mainly covers the following topics:

- Test of lepton universality in $\Psi(2S)$ and J/ψ decays into lepton pairs with $\Psi(2S)$ into $\pi^+\pi^- J/\psi$ and detailed study on $\Psi(2S) \to \pi^+\pi^- J/\psi$ have been performed.

- Many hadronic decays of $\Psi(2S)$ are measured, most of them for the first time. The measurements of the branching ratios provide important information of understanding the $\rho\pi$ puzzle. Emphasis will be paid on the vector-tensor and axial vector-pseudoscalar modes.

- The largest number of χ_c ($\sim 1 \times 10^6 \chi_c$'s) provide studies on χ_c decays with unprecedented precision. Many χ_c decay modes are measured, many of them are measured for the first time. Using χ_{c0} decays into $\pi^+\pi^-$, we obtain $\Gamma_{\chi_{c0}} = (14.3 \pm 3.6)$ MeV, improving the PDG value (14 ± 5) MeV which was based on the two discrepant measurements. Meanwhile, using many χ_{c0} decay modes, the χ_{c0} mass has been determined to be $M_{\chi_{c0}} = (3414.1 \pm 0.6 \pm 0.8)$ MeV, it improves the PDG value with an error of 2.8 MeV.

- We have also measured the η_c mass and get $M_{\eta_c} = (2975.8 \pm 3.9 \pm 1.2)$ MeV using $\Psi(2S)$ data, together with $M_{\eta_c} = (2976.6 \pm 2.9 \pm 1.0)$ MeV and $\Gamma_{\eta_c} = (11.0 \pm 8.1 \pm 3.5)$ MeV from J/ψ decays, we have $M_{\eta_c} = (2976.3 \pm 2.3 \pm 0.8)$ MeV.