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Study of radiative decays of the $\Upsilon(1S)$ and of three-body decays of the J/ψ

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We report on recent studies of quarkonium decays obtained with the data collected by the BaBar experiment at the PEP-II e^+e^- collider.

In particular, we use the entire BaBar dataset to study the reaction $e^+e^- \rightarrow \gamma_{ISR}J/\psi$, with $J/\psi \rightarrow \pi^+\pi^-\pi^0$, $J/\psi \rightarrow K^+K^-\pi^0$, or $J/\psi \rightarrow K_S K^\pm \pi^\mp$, and the photon γ_{ISR} produced via Initial-State-Radiation. We measure the relative J/ψ branching fractions and perform a Dalitz plot analysis of each J/ψ decay mode using an isobar model and a Veneziano model.

We also present a study of the radiative decays of the $\Upsilon(1S)$ to $\pi^+\pi^-\gamma$ and $K^+K^-\gamma$ final states, performed on the data samples collected at the peak of the $\Upsilon(2S)$ and $\Upsilon(3S)$ resonances. The $\Upsilon(1S)$ is reconstructed from the decay chains $\Upsilon(nS) \rightarrow \pi^+\pi^-\Upsilon(1S)$, with $n = 2, 3$. Branching fractions measurements and spin-parity analysis are reported for the $\Upsilon(1S)$ radiative decays to the several intermediate resonances observed in the $\pi^+\pi^-$ and K^+K^- mass spectra.

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