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Recent results of charmonium transitions at BESIII

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We present the measurements of charmonium P-wave spin-singlet state h_c made with 106M ψ' events collected by BESIII at BEPCII. Clear signals are observed for $\psi' \rightarrow \pi^0 h_c$ with and without the subsequent radiative decay $h_c \rightarrow \gamma \eta_c$. First measurements of the absolute branching ratios $\text{Br}(\psi' \rightarrow \pi^0 h_c) = (8.4 \pm 1.3 \pm 1.0) \cdot 10^{-4}$ and $\text{Br}(h_c \rightarrow \gamma \eta_c) = (54.3 \pm 6.7 \pm 5.2)\%$ are also presented. A statistics-limited determination of the previously unmeasured h_c width leads to an upper limit $\Gamma(h_c) < 1.44 \text{ MeV}$ (90% confidence). Measurements of $M(h_c) = 3525.40 \pm 0.13 \pm 0.18 \text{ MeV}/c^2$ and the branching ratios are consistent with previous results.

Also the observation of two-photon transition of ψ' to J/ψ based on the same data sample is reported. The measurement of the branching fraction is explicitly determined as $\text{Br}(\psi' \rightarrow \gamma \gamma J/\psi) = (1.02 \pm 0.05(\text{stat.}) + 0.19 - 0.20(\text{syst.})) \cdot 10^{-3}$ with combination of the studies of two different J/ψ decay channels: $J/\psi \rightarrow e^+e^-$ and $J/\psi \rightarrow \mu^+\mu^-$.

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