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Measurement of $\eta_c(1S)$, $\eta_c(2S)$ and non-resonant η' $\pi^+ \pi^-$ production in two-photon collisions at Belle

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We report the measurements of $\gamma\gamma \rightarrow \eta_c(1S)$, $\eta_c(2S) \rightarrow \eta' \pi^+ \pi^-$ with η' decay to $\gamma\rho$ and $\eta \pi^+ \pi^-$ using 941 fb⁻¹ of data collected with the Belle detector at the KEKB asymmetric-energy $e^+ e^-$ collider. First observation of $\eta_c(2S) \rightarrow \eta' \pi^+ \pi^-$ with a significance 5.5 σ including systematic error is obtained. The products of the two-photon decay width and branching fraction of decays to $\eta' \pi^+ \pi^-$ are determined for the $\eta_c(1S)$ and $\eta_c(2S)$, respectively. A new decay mode for the $\eta_c(1S) \rightarrow \eta' f_0(2080)$ with $f_0(2080) \rightarrow \pi^+ \pi^-$ is observed with a statistical significance of 20 σ . The cross section for $\gamma\gamma \rightarrow \eta' \pi^+ \pi^-$ and $\eta' f_2(1270)$ are measured for the first time.

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