

Observation of isoscalar $1^{(-+)}$ spin-exotic state, η_1 (1855)

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Based on a sample of 10 billion J/ψ events collected with the BESIII detector, a partial wave analysis of the decay $J/\psi \rightarrow \gamma \eta \eta'$ is performed. An isoscalar state with exotic $J^{PC}=1^{(-+)}$ quantum numbers, denoted as η_1 (1855), has been observed for the first time with statistical significance larger than 19σ . Its mass is consistent with the predicted mass of $1^{(-+)}$ hybrid from Lattice QCD. This is an observation of a new category of hadronic matter, which opens a new direction to complete the picture of spin-exotics.

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