

Observation of a Baryonium Candidate at BES

Sunday, 25 June 2017 11:10 (5 minutes)

Baryonium (proton-antiproton bound state) was predicted by theory long ago but not confirmed in experiment. In this talk, we will give a brief review of observation of a baryonium candidate at the BESII and BESIII experiments. Using 58 million J/ψ decay events, the BESII experiment observed the proton-antiproton mass threshold enhancement $X(ppbar)$ in $J/\psi \rightarrow \gamma p \bar{p}$ and the $X(1835)$ in $J/\psi \rightarrow \gamma \eta' \pi^+ \pi^-$. Many theorists believe these two states are two different manifestations of a baryonium state. But due to the limit of statistics, no affirmative conclusion can be made. With huge J/ψ data sample collected at the BESIII experiment, the spins and parities of $X(ppbar)$ and $X(1835)$ were both determined to be 0^- . Also with this huge data sample, the BESIII experiment firstly established the direct connection between the $X(ppbar)$ and the $X(1835)$ and the new observation supports the existence of a proton-antiproton bound state or molecule like state with significance larger than 7 sigma.

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