Contribution ID: **1172** Type: **Parallel session talk**

Precise decay rates for $\eta_c \to \gamma\gamma$ and $\eta_b \to \gamma\gamma$ from lattice QCD

Saturday, July 20, 2024 3:15 PM (15 minutes)

The measurement of the decay rates $\eta_c \to \gamma\gamma$ and $\eta_b \to \gamma\gamma$ are part of the BES3 and Belle II programmes respectively as tests of the Standard Model. Here we provide, for the first time, precise SM values for these decay rates using lattice QCD. For $\Gamma(\eta_c \to \gamma\gamma)$ we obtain 6.788(61) keV in good agreement with, but much more accurate than, experimental results using $\gamma\gamma \to \eta_c \to K\overline{K}\pi$. Our value is in 4 sigma tension with the PDG global fit result, however. Building on this study, we have been able to predict $\Gamma(\eta_b \to \gamma\gamma)$ with an uncertainty of 2\%. We also compare the ratio of the form factors to the meson decay constants with expectations from NRQCD to assess how well nonrelativistic effective theories work in these two cases.

Alternate track

I read the instructions above

Yes

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