

# The mixing of $\eta_c$ and the Pseudoscalar Glueball

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The first lattice QCD study of the mixing of  $\eta_c$  and pseudoscalar glueball was performed. We generated two large ensembles of gauge configuration with  $N_f = 2$  degenerate charm quarks on anisotropic lattices, with spatial lattice spacing  $a_s = 0.1026$  fm and anisotropy  $\xi = 5$ , where the charm sea quark mass was tuned to give vector charmonium  $J/\psi$  mass  $m_{J/\psi} = 2743$  and  $3068$  MeV. The correlation functions of the charm quark bilinear operator and the glueball operator were calculated on these ensembles with the charm quark loops computed through the distillation method. Subsequently the mixing angle between  $\eta_c$  and the pseudoscalar glueball was extracted to be  $7.1(9)^\circ$  and  $4.3(4)^\circ$  on these two ensembles, respectively, which provides an important theoretical input in order to understand the properties of  $\eta_c$ .

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