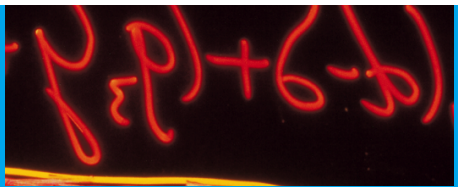
DESY
Particle and Astroparticle Physics Colloquium



Discovery of a Glueball-like particle X(2370) at BESIII.

Tuesday, 17 September, 2024
Auditorium & Webcast 16:00 h

ZOOM ID: 996 1652 8733
Meeting Password: 733220

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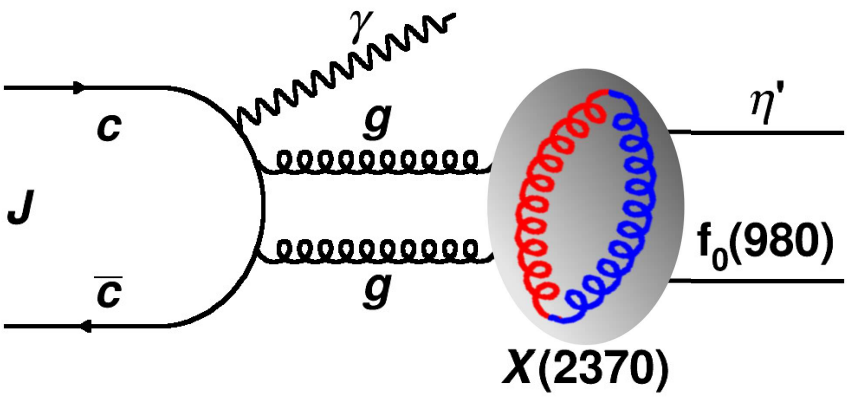
In the Standard Model (SM) of particle physics, gluons are the fundamental particles mediating the strong interaction, as photons do in electromagnetic interactions. Gluons can attract each other to form new bound states called glueballs, which are the only particles in nature entirely composed of force mediators. Finding these gluon bound states is crucial and serves as a fundamental test of the SM. No candidate has yet been unambiguously identified until the new BESIII result to be reported in this presentation.



The Beijing Electron Positron Collider (BEPCII) is a double ring e^+e^- collider in the 2-5 GeV energy region and the Beijing Spectrometer (BESIII) is a general purpose detector operating at the BEPCII. Decays of J/ψ particle produce a gluon-rich environment and are an ideal place to search for glueball. Discovery of the glueball has been one of the most important scientific goals of the BEPC and BEPCII for decades.

The X(2370) particle was first discovered at the BESIII experiments in 2011. To confirm its pseudoscalar glueball state nature experimentally, the most crucial step is to determine whether the spin parity quantum number of the X(2370) are indeed zero spin and negative parity. Recently, based on about 10 billion J/ψ decays collected with BESIII, the spin-parity quantum numbers of the X(2370) were first measured with a complex partial wave analysis. The experimental results, including quantum numbers, mass, production and decay properties, are consistent with the features of the lightest pseudoscalar glueball. This recent study provides direct and strong experimental evidence for X(2370) being a glueball.

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