Contribution ID : **124** Type : **not specified**

Charmonium properties from lattice QCD+QED: hyperfine splitting, J/psi leptonic width and a_muˆc

Content

I will present results from the first lattice QCD+QED computations of the properties of ground-state charmonium mesons. These calculations include the effect of up, down, strange and charm quarks in the sea and cover a wide range of values of the lattice spacing enabling very accurate results in the continuum limit (with physical quark masses). We tune the charm quark's mass so that the mass of the J/psi meson is equal to experiment, including the effect of the charm quark's electric charge. We obtain a value of 120.3(1.1) MeV for the hyperfine splitting (mass difference between J/psi and eta-c) from connected c-cbar correlation functions. The difference from experiment is interpreted as the effect of the eta-c annihilation to gluons which is missing from the lattice calculation. This is the first time it has been possible to pin down this effect. We determine the J/psi and eta-c decay constants with 0.5% uncertainty. Our results give the leptonic width of the J/psi in the Standard Model as Gamma(J/psi -> e+e-) = 5.637(49) keV, in good agreement with, but now more accurate than, experiment. From the time-moments of the correlation functions we obtain the most accurate result to date for the charm quark hadronic vacuum polarisation contribution to the anomalous magnetic moment of the muon; a_muˆc = 14.638(47) x 10ˆ{-10} . These results are written up in arXiv:2005.01845, Phys. Rev. D102:054511 (2020).

Summary

Primary author(s) : Prof. DAVIES, Christine (University of Glasgow)

Co-author(s) : Dr. HATTON, Daniel (University of Glasgow); Dr. KOPONEN, Jonna (University of Mainz); Dr. LYTLE, Andrew (University of Illinois); Prof. LEPAGE, Peter (Cornell University)

Presenter(s) : Prof. DAVIES, Christine (University of Glasgow)