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# Bounding the Higgs Boson Width Through Interferometry

*Friday, 16 August 2013 11:00 (20 minutes)*

We study the change in the di-photon invariant mass distribution for Higgs boson decays to two photons, due to interference between the Higgs resonance in gluon fusion and the continuum background amplitude for gluon pair to photon pair. Previously, the apparent Higgs mass was found to shift by around 100 MeV in the Standard Model in the leading order approximation, which may potentially be experimentally observable. We compute the next-to-leading order QCD corrections to the apparent mass shift, which reduce it by about 40%. The apparent mass shift may provide a way to measure, or at least bound, the Higgs boson width at the Large Hadron Collider through "interferometry". We investigate how the shift depends on the Higgs width, in a model that maintains constant Higgs boson signal yields. At Higgs widths above 30 MeV the mass shift is over 200 MeV and increases almost linearly with the width. The apparent mass shift could be measured by comparing with the ZZ* channel, where the shift should be much smaller. It might be possible to measure the shift more accurately by exploiting its strong dependence on the Higgs transverse momentum.

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