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## Signal-background interference for digluon resonances at the Large Hadron Collider

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We study the interference between the amplitudes for  $gg \rightarrow X \rightarrow gg$ , where  $X$  is a new heavy digluon resonance, and the QCD background  $gg \rightarrow gg$ , at the Large Hadron Collider. The interference produces a large low-mass tail and a deficit of events above the resonance mass, compared to the naive pure resonance peak. For a variety of different resonance quantum numbers and masses, we evaluate the signal-background interference contribution at leading order, including showering, hadronization, and detector effects. The resulting new physics dijet mass distribution may have a shape that appears, after QCD background fitting and subtraction, to resemble an enhanced peak, a shelf, a peak/dip, or even a pure dip. We argue that the true limits on new digluon resonances are likely to differ significantly from the limits obtained when interference is neglected, especially if the branching ratio to  $gg$  is less than 1.

### Summary

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