Particle Physics Seminar

Identifying Dijet Resonances at the LHC

TUESDAY

MARCH 15

4:00 P.M.

RM 415 NSH

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An exciting possibility for the 13 TeV run of the LHC is that a new strongly-coupled resonance decaying to dijets could be discovered. Once the resonance is detected, the immediate questions will be about the nature of the particle: is it colored? is it a vector, fermion, or scalar? does it couple to quarks in a flavor-universal way?

This talk explores the LHC discovery reach for a variety of dijet resonances and discusses two strategies for measuring the newly discovered state's properties. The first method relies on the study of the jet energy profiles of the two leading jets in the di-jet channel. The second method relies on the color discriminant variable, which can be readily obtained at the LHC from the measurements of the di-jet signal cross section, the resonance mass and the resonance width. We discuss the ability of these methods to distinguish between a qg excited quark resonance, a qqbar coloron, a qqbar Z', a gg color-octet scalar, and a variety of colored diquark scalars. We also show how including information about the new resonance's decays to heavy flavor can probe questions related to flavor universality in the underlying theory.