Particle Physics Seminar

Tuesday

November 7

4:00 P.M.

Rm 415 NSH

Search for a boosted Higgs boson produced via gluon fusion and decaying to b quarks

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Searches for the Higgs boson decaying to a bottom quark-antiquark pair in the gluon fusion production mode was long considered impossible due to the overwhelming background from QCD multijet production of bottom quarks. However, we can access this process in the boosted topology, in which the Higgs to bb system is reconstructed as a single, large-radius jet. Jet substructure and dedicated b-tagging techniques are used in the first search for boosted Higgs to bb at the LHC. The resulting experimental signature is a peak over a falling background in the distribution of the invariant mass of the jet. The data-driven background estimation strategy and signal extraction is validated with Z to bb decays. The Z to bb process is observed with a local significance of 5.1 standard deviations for the first time in the single-jet topology. An excess of Higgs to bb events above the expected background is observed with a local significance of 1.5 standard deviations.

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