Contribution ID: **65** Type: **not specified**

Mono-Higgs Detection of Dark Matter at the LHC

Tuesday, 6 May 2014 14:45 (15 minutes)

Motivated by the recent discovery of the Higgs boson, we investigate the possibility that a missing energy plus Higgs final state is the dominant signal channel for dark matter at the LHC. We consider examples of higher-dimension operators where a Higgs and dark matter pair are produced through an off-shell Z or photon, finding potential sensitivity at the LHC to cutoff scales of around a few hundred GeV. We generalize this production mechanism to a simplified model by introducing a Z' as well as a second Higgs doublet, where the pseudoscalar couples to dark matter. Resonant production of the Z' which decays to a Higgs plus invisible particles gives rise to a potential mono-Higgs signal. This may be observable at the 14 TeV LHC at low tan beta and when the Z' mass is roughly in the range 600 GeV to 1.3 TeV.

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Session Classification: Dark Matter III