Assortment of Di-Lepton Signatures and Physics Beyond the Standard Model

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Dileptons are among the cleanest probes of new physics waiting to be discovered at the LHC. In this review, I discuss an assortment of signatures involving dileptons and the exciting new physics they may help uncover. High invariant mass dileptons with opposite sign may reveal a new resonance, a possible remnant of some unified gauge theory. On the other hand, same-sign dileptons alongside color production are expected when supersymmetric particles such as squarks and gluinos are produced. Finally, I discuss some recent exotic signatures associated with multiple, collimated di-lepton, the so called "Lepton-Jets". The high cross-section and relatively low Standard Model background allow for an early discovery and exploration in both CMS and ATLAS, using the excellent lepton ID of the two machines.

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