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Physics prospects with the upgraded ATLAS detector

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Run-I at the LHC has been very successful, including the discovery of a new particle with a mass of about 125 GeV and with properties compatible with those of the Standard Model Higgs boson within uncertainties. Precise measurements of the properties of this boson, and the discovery of new physics beyond the Standard Model, are primary goals of future running at the LHC. The physics prospects based on 300/fb and 3000/fb protonproton collision data to be collected at 14 TeV are presented. The ultimate precision attainable on measurements of the couplings of the 125 GeV particle to elementary fermions and bosons is discussed, as well as perspectives on the searches for partners associated with this new object, predicted by several extensions of the standard theory. Supersymmetry is one of the best motivated and well-studied extensions of the Standard Model. The current searches at the LHC have yielded sensitivity to TeV scale gluinos and 1st and 2nd generation squarks, as well as to 3rd generation squarks and electro-weakinos in the hundreds of GeV mass range. Benchmark studies are presented to show how the discovery potential can be extended for inclusive strong production of squarks and gluinos, direct production of 3rd generation squarks and weak production of electro-weakinos A considerable fraction of the parameter space for a wide variety of other models has been probed with the 8 TeV data. The prospects of searches for new heavy bosons and dark matter candidates at 14 TeV are explored here. For all these studies, a parameterised simulation of the Upgraded ATLAS detector is used, taking into account the expected pileup conditions.

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