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ATLAS physics prospects with the High-Luminosity LHC

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Run-I at the LHC was very successful with the discovery of a new boson of about 125 GeV mass with properties compatible with those of the Higgs boson predicted by Standard Model.Precise measurements of the properties of this new boson, and the search for new physics beyond the Standard Model, are primary goals of the just restarted LHC running at 13 TeV collision energy and all future running at the LHC, including its luminosity upgrade, HL-LHC, that should allow the collection of 3000 fb-1 of data per experiment.

The physics prospects with a pp centre-of-mass energy of 14 TeV are presented for 300 and 3000 fb-1.
The ultimate precision attainable on measurements of the couplings of the 125 GeV boson to elementary fermions and bosons is discussed, as well as perspectives on the searches for partners associated with it.
The electroweak sector is further studied with the analysis of the vector boson scattering, testing the SM predictions.

Supersymmetry is one of the best motivated 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 sensitivity improves at the future LHC runs. The prospects of searches for new heavy bosons and dark matter candidates at 14 TeV are explored as well as the sensitivity of searches for anomalous top decays.

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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