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Searches for new phenomena with the ATLAS detector

Many theories beyond the Standard Model (BSM) predict new phenomena accessible by the LHC. The presence of a non-baryonic dark matter (DM) component in the Universe is inferred from the observation of its gravitational interaction. If dark matter interacts weakly with the Standard Model (SM) it could be produced at the LHC, escaping the detector and leaving a large missing transverse momentum as their signature. The ATLAS experiment has developed a broad and systematic search program for DM candidates.

Multiple theories beyond the Standard Model predict the existence of heavy neutrinos, such as the Type I or Type III seesaw mechanisms which can explain the light neutrino masses, or left-right symmetric models which restore parity symmetry in weak interactions at higher energy scale and predict right-handed counterparts to the weak gauge bosons. Searches for such heavy Majorana or Dirac neutrinos with the ATLAS detector will be presented.

In addition, highlights in the broader search program for BSM will be discussed, including searches for leptoquarks, vector like quarks, lepton-flavour violation and long-lived particles using the full Run 2 dataset.

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