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SM background estimate for supersymmetry searches: challenges and methods

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Supersymmetry features a broad range of possible signatures at the LHC. If R-parity is conserved the production of squarks and gluinos is accompanied by events with hard jets, possibly leptons or photons and missing transverse momentum. Some Standard Model processes also mimic such events, which, due to their large cross sections, represent backgrounds that can fake or hide supersymmetry. While the normalisation of these backgrounds can be obtained from data in dedicated control regions, Monte Carlo simulation is often used to extrapolate the measured event yields from control to signal regions. Next-to-leading order and multi-parton generators are employed to predict these extrapolations for the dominant processes contributing to the SM background: W/Z boson and top pair production in association with (many) jets. The proper estimate of the associated theoretical uncertainties and testing these with data represent challenges. Other important backgrounds are diboson and top pair plus boson events with additional jets that usually are estimated directly using Monte Carlo simulation. The talk presents the challenges and methods employed by ATLAS to determine backgrounds and uncertainties in supersymmetry searches.

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