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Computing and Software for the HL-LHC Era

The High-Luminosity Large Hadron Collider (HL-LHC) promises an unprecedented wealth of data and exciting opportunities for precision measurements and searches for new physics. However, exploiting this physics potential will require overcoming formidable challenges in computing and software. With increasing collision rates, more complex events, and ever-growing demands on simulation and data analysis, the computing resources required by the experiments are expected to grow far beyond what can be accommodated by simply scaling up existing infrastructure.

In this talk, I will provide an overview of the computing and software challenges facing the LHC programme as it prepares for the HL-LHC era, and discuss how the community is responding. From increasingly sophisticated theoretical simulations and more efficient event reconstruction to new computing architectures, modern software technologies, and machine learning, I will highlight some of the developments that will be essential to realising the HL-LHC's scientific potential.

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