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Upcgen: an event generator for two-photon and photoproduction processes in ultraperipheral collisions

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Upcgen is a dedicated Monte Carlo event generator for simulation of dilepton production and vector meson photoproduction processes in ultraperipheral collisions (UPCs).

The dilepton production cross section in UPCs is calculated by folding the elementary $\gamma\gamma \rightarrow \ell\ell$ cross section with the photon fluxes produced by the colliding nuclei. These photon fluxes are modeled using nuclear form factors, which account for possible emission of photons from inside the nucleus. This approach results in an increase of predicted cross sections and is expected to improve description of the experimental data. Furthermore, the lepton anomalous magnetic moment can be freely adjusted, making it particularly valuable for investigating the tau g-2 via ditau production measurements in UPCs.

In addition, the latest version of Upcgen provides a possibility to model photoproduction of heavy vector mesons that is used to probe poorly known gluon shadowing effects at low Bjorken-*x* values. Upcgen calculations rely on the leading order pQCD framework, where photoproduction cross sections are proportional to the square of the gluon density in the target nuclei. The gluon PDF in nuclei is modeled using either EPS09 parameterisation or the leading twist theory of nuclear shadowing. In a view of new experimental data expected in Run 3 and 4 of the LHC, one can strongly benefit from a powerful tool for detailed studies of the kinematic properties of photoproduction processes.

In this report, we will present the Upcgen generator and discuss its capabilities in more detail.

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