Supplemental figures: “Dielectron and heavy-quark production in inelastic and high-multiplicity proton–proton collisions at $\sqrt{s} = 13$ TeV”

ALICE Collaboration

Abstract

This note provides supplemental figures for the paper “Dielectron and heavy-quark production in inelastic and high-multiplicity proton–proton collisions at $\sqrt{s} = 13$ TeV” [1].

*See [1] for the list of collaboration members
Dielectron cross section in inelastic pp collisions at \( \sqrt{s} = 13 \) TeV are shown.

Fig. 1: Signal over background ratio in minimum-bias (left) and high-multiplicity (right) events. Only statistical uncertainties are shown.

Fig. 2: Dielectron cross section in inelastic pp collisions at \( \sqrt{s} = 13 \) TeV as a function of invariant mass in different \( p_T^{ee} \) intervals using PYTHIA simulations of open heavy-flavour decays normalised to the cross sections of \( d\sigma_{ee}/dy|_{y=0} = 1296 \pm 172 \) mb and \( d\sigma_{ee}/dy|_{y=0} = 68^{+15}_{-16} \) mb extrapolated from \( \sqrt{s} = 7 \) TeV [2,3]. The global scale uncertainty on the pp luminosity (5%) is not shown. The statistical and systematic uncertainties of the data are shown as vertical bars and boxes. The expectation from the hadronic decay cocktail is shown as a band and the ratio data to cocktail is presented below together with the cocktail uncertainty.
Dielectron production in pp collisions at $\sqrt{s} = 13$ TeV

Figure 3: Dielectron cross section in inelastic pp collisions at $\sqrt{s} = 13$ TeV as a function of invariant mass using POWHEG simulations of open heavy-flavour decays normalised to the cross sections of $d\sigma_{cc}/dy|_{y=0} = 1296^{+172}_{-162}$ mb and $d\sigma_{bb}/dy|_{y=0} = 68^{+15}_{-16}$ mb extrapolated from $\sqrt{s} = 7$ TeV [2–4]. The global scale uncertainty on the pp luminosity (5%) is not shown. The statistical and systematic uncertainties of the data are shown as vertical bars and boxes. The expectation from the hadronic decay cocktail is shown as a band and the ratio data to cocktail is presented below together with the cocktail uncertainty.
Fig. 4: Dielectron cross section in inelastic pp collisions at $\sqrt{s} = 13$ TeV as a function of invariant mass in different $p_{T,ee}$ intervals using POWHEG simulations of open heavy-flavour decays normalised to the cross sections of $d\sigma_{\gamma}\!/dy|_{y=0} = 1296^{+172}_{-162}$ fb and $d\sigma_{\gamma}\!/dy|_{y=0} = 68^{+15}_{-16}$ fb extrapolated from $\sqrt{s} = 7$ TeV [2-4]. The global scale uncertainty on the pp luminosity (5%) is not shown. The statistical and systematic uncertainties of the data are shown as vertical bars and boxes. The expectation from the hadronic decay cocktail is shown as a band and the ratio data to cocktail is presented below together with the cocktail uncertainty.
Supplemental figures: “Dielectron production in pp collisions at $\sqrt{s} = 13$ TeV”

Fig. 5: Fit of the minimum-bias data sample in different $p_{T,ee}$ intervals with a three-component fit function described in [1] to extract the fraction of direct photons to inclusive photons.

Fig. 6: Fit of the high-multiplicity data sample in different $p_{T,ee}$ intervals with a three-component fit function described in [1] to extract the fraction of direct photons to inclusive photons.
Fig. 7: Ratio of direct to inclusive photon cross sections extracted from the dielectron spectra in inelastic (top) and high-multiplicity (bottom) pp collisions at $\sqrt{s} = 13$ TeV. The result in inelastic pp collisions is compared with a NLO pQCD calculation $[5]$. The width of the theory band is given by the variations of the factorisation and renormalisation scales from $\mu = p_T$ to $\mu = 0.5p_T$ and $\mu = 2p_T$ (for $\mu = 0.5p_T$ the calculation is limited to $p_T > 2$ GeV/c). Statistical and systematic uncertainties are shown as vertical bars and boxes.
References


