

Measurement of isolated-photons plus jet production in pp collisions with the ATLAS detector

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Summary. — This paper is an overview of the results of isolated prompt photon production in association with hadronic jets measurements obtained by the ATLAS Collaboration at $\sqrt{s} = 8$ TeV at the Large Hadron Collider. Measurements of a differential cross-section as a function of the main photon and jet observables are presented.

1. – Introduction

The study of the production of prompt photons in association with hadronic jets provides a test of perturbative QCD and gives information on the proton parton distribution functions. The colorless prompt photon represents a clean probe of the hard partonic interaction since the photon is produced in the hard scattering and does not undergo hadronization. The $pp \rightarrow \gamma + jet + X$ process proceeds through two different mechanisms [1]:

- direct photon (mostly quark-gluon Compton scattering, $qg \rightarrow \gamma q$, or quark-antiquark annihilation, $q\bar{q} \rightarrow \gamma g$), originated during the hard process;
- fragmentation photon, produced in the fragmentation of a quark with high p_T .

2. – Photon and jet reconstruction and identification with the ATLAS detector

Photons can be classified in two categories, converted and unconverted. For converted reconstructed photons, the presence of at least two tracks matching a cluster in the electromagnetic calorimeter is necessary, while unconverted photons do not have any matching tracks, as shown in fig. 1. After the reconstruction, not all the reconstructed candidates are a real photon. To separate the real photons from the fakes, two identification criteria are introduced (loose and tight) defined using information from the ATLAS calorimeter layers. The infrared and collinear-safe anti- k_t algorithm with radius 0.4 was

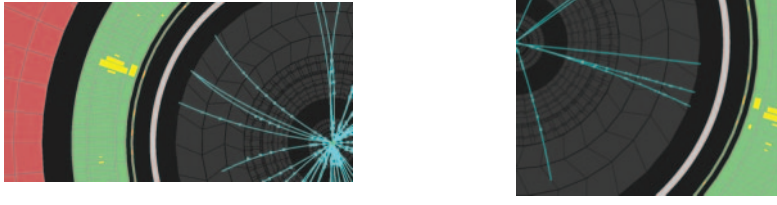


Fig. 1. – ATLAS event displays for unconverted (left) and converted (right) photon candidates.

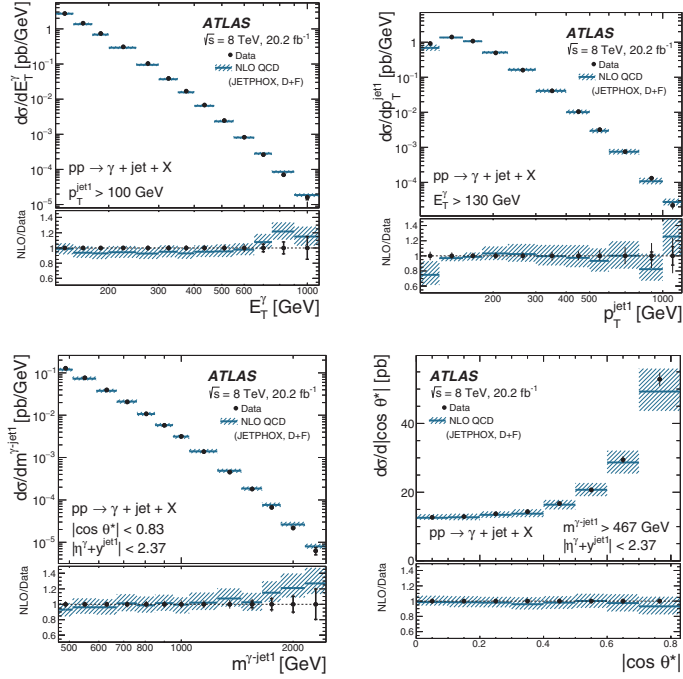


Fig. 2. – Measured cross-sections compared with the JETPHOX predictions.

used to reconstruct and identify the jets starting from the electromagnetic deposits in the ATLAS hadronic calorimeter.

3. – Cross-sections

In the following section, the differential cross-sections as a function of E_T^γ , p_T^{jet} , $m^{\gamma\text{-jet}}$ and $|\cos\theta^*|$ are shown, where $m^{\gamma\text{-jet}}$ is the invariant mass of the photon-jet system and θ^* coincides with the scattering angle in the centre-of-mass frame [2]. The measured cross-sections were compared to the NLO QCD predictions of JETPHOX (fig. 2).

REFERENCES

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