



Contribution ID: 45

Type: Oral Presentation

## Background decomposition in $Z\gamma$ events used in the search for high-mass resonances.

Tuesday, 27 July 2021 11:30 (15 minutes)

The study present the measurement of the contribution, purity, of  $Z + \gamma$  and  $Z + \text{jet}$  background events in the search for high-mass  $Z\gamma$  resonances. The study uses events were the  $Z$  boson decays into a pairs of oppositely charged electrons or muons. The events used consist of  $139 \text{ fb}^{-1}$  of proton-proton,  $pp$ , collisions data at  $\sqrt{s} = 13 \text{ TeV}$ , recorded by the ATLAS detector at the CERN Large Hadron Collider.

The measured purity of  $Z + \gamma$  background events depends on the parameter  $R$  that gives the correlation between the isolation and identification criteria for jets faking photons in  $Z + \text{jet}$  events. A data-driven method that uses  $\gamma\gamma$  events collected in the same detector conditions as the  $Z\gamma$  events is used to determine  $R$  in various bins of the photon transverse momentum or the invariant mass bins. The results are compared against results that are obtained using the  $R$  computed using a  $Z + \text{jet}$  Monte Carlo sample and a data-driven method that uses  $Z + \gamma$  events to estimate  $R$ .

### Apply to be considered for a student ; award (Yes / No)?

Yes

### Level for award;(Hons, MSc, PhD, N/A)?

PhD

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**Session Classification:** Nuclear, Particle and Radiation Physics

**Track Classification:** Track B - Nuclear, Particle and Radiation Physics