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# Searches for high-mass resonances in the $Z\gamma$ decay mode in Run-2 proton-proton collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector with the integrated luminosity of $139 \text{ fb}^{-1}$

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Searches for new resonances predicted by theories beyond the Standard Model are one of the interesting projects in the physics program of the Large Hadron Collider. This study searches for high-mass spin-0 and spin-2 resonances in the  $Z(\ell\ell)\gamma$  final state where the  $Z$  boson decays into a pair of oppositely charged muons or electrons. The full Run-2 dataset recorded with the ATLAS detector in the years 2015-2018 with the integrated luminosity of  $139 \text{ fb}^{-1}$  is used. Upper limits are to be set on the production cross-section times the branching ratio in the mass range of narrow resonances from 200 GeV to 3.5 TeV, assuming spin-0 resonances produced via gluon-gluon fusion mechanism and spin-2 resonances produced via gluon-gluon or quart-antiquark initial states. The expected limits as a function of the resonant mass for the spin-0 and spin-2 resonances are discussed in this study.

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

Yes

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

PhD

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