
Contribution ID: **54** Type: **Oral Presentation**

# Search for heavy resonances in the $\ell^+\ell^-\ell^+\ell^-$ final state in association with missing transverse energy using $pp$ collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector

*Tuesday, 27 July 2021 12:00 (15 minutes)*

Search for the presence of a new heavy resonance, produced via gluon-gluon fusion and decaying to the four-lepton ($4\ell$) final state, in association with missing transverse energy ($E_{\mathrm{T}}^{\mathrm{miss}}$), with $\ell$ = $e$, $\mu$. The search uses 2015–2018 proton–proton collision data at $\sqrt{s}$ = 13 TeV, corresponding to an integrated luminosity of 139 fb$^{-1}$, collected by the ATLAS detector at the Large Hadron Collider at CERN. The data is interpreted in terms of two models, firstly the $R \to SH \to 4\ell + E_{\mathrm{T}}^{\mathrm{miss}}$, where $R$ is a scalar boson, which decays to two lighter scalar bosons ($S$ and $H$). The $S$ decays to a pair of neutrinos ($E_{\mathrm{T}}^{\mathrm{miss}}$) and the $H$ decays into $4\ell$, through $ZZ$ bosons. The second model is the $A \to ZH \to 4\ell + E_{\mathrm{T}}^{\mathrm{miss}}$, where $A$ is considered to be a CP-odd scalar which decays to a CP-even scalar $H$, and the $Z$ boson. The $Z$ boson decays to a pair of neutrinos, and the $H$ decays to the $4\ell$ final state.

## 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