# Measurement of the associated production of a single top quark and a Z boson in pp collisions at 13TeV

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### Motivation
- Rare process: sensitive to new physics (irreducible background for FCNC-tZ searches).
- Important background in SM studies (ttH, tHq...).
- Previous CMS studies at 8TeV (CERN-EP-2016-324).
- Analysis performed on the trilepton decay mode with 2016 data (35.9 fb⁻¹).
- Trilepton channel: low statistics but cleaner signal than dilepton.

### The analysis

#### Strategy
- **Two MVA discriminators** to enhance signal/background separation.
- **Background control:** trilepton sample splitting

#### Results
- **Post-fit templates**
- **Signal extraction**
  - Fit maximizes $\mathcal{L}(\text{data}|\mu,\theta) \Rightarrow$ extract signal strength, $\theta$ for each systematic and NPL normalization. The resulting cross section
  
  $$\sigma(t\ell^+\ell^- q) = 123^{+33}_{-31}(\text{stat}) \pm 29^{+29}_{-23} \text{ (syst) fb}$$

  Good agreement with SM prediction.

- **Significances**
  - From Profile Likelihood fit
    - Observed: 3.7
    - Expected: 3.1

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**Reference**

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