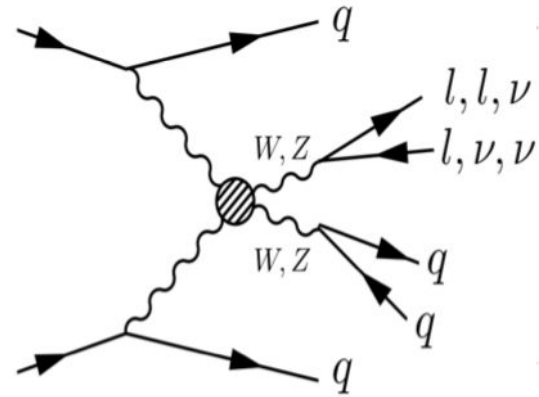


# ML in VBS semileptonic channels

David Rousseau, Dimitris Varouchas  
(LAL)

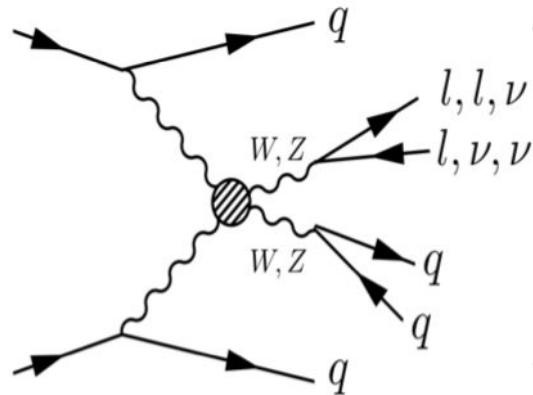
# VBS semileptonic channel

- Relatively high BR
  - Jet performance (in particular forward) is critical: 4 jets in the final state
  - Jet substructure (1 large-R jet) in case of boosted W/Z
- 
- Use jet (Dimitris) and ML (David) expertise in house



# Jet and V boson tagging performance

- Develop efficient V boson tagger with mass decorrelation using DNN and adversarial networks using low level variables. Effort in the group has started in another context
- Develop quark/gluon tagger for the forward region
  - Currently supported only at the tracker coverage
  - Moving to forward will help us a lot in reducing background
  - DNN to combine information from the calorimeter using topological clusters at first stage, then look directly the calorimeter cells



# Advanced ML at the analysis level

- A DL multi-classifier will be developed to separate the signal from the  $W$ +jets and  $t\bar{t}$  background
- An undesired consequence of this approach is the increased dependence on the choice of the factorisation scales in the signal MC samples, which result into augmented systematic uncertainties.
- To cope with this, robust adversarial trainings will be used. Preliminary studies (in a different context) show that these techniques need very large training sample

