



# Anomaly Detection for ATLAS trigger processing

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# Objetivo

- Supervised classifier to compare the performance of anomaly detection methods
- Separate background events from signal

# Data

- Signal: HH-bbbb (50000 events)
- Background: TLA (10000 events): events selected by L1 trigger

# Features

- Number of jets, electrons and electrons
- Transverse momentum (pt), pseudorapidity ( $\eta$ ),  $\phi$  of the 4 jets with higher pt, with  $pt > 20$  and  $|\eta| < 4$
- Transverse momentum (pt), pseudorapidity ( $\eta$ ),  $\phi$  of the 2 electrons with higher pt
- Transverse momentum (pt), pseudorapidity ( $\eta$ ),  $\phi$  of the 2 muons with higher pt

# Data

- Dataset was divided into train, test and validation datasets
- Sample weights were normalised, because the sum of the weights of background is much higher than the sum of the weights of signal

# Neural Network

- Input layer with 27 neurons
- 2 Hidden layers with 50 neurons
- Output layer with 1 neuron
- Optimizer: adam
- Loss: binary crossentropy

# Results

- Learning rate and activation function optimization:  
learning rate: 0.03  
activation function: ReLU
- Accuracy: 83 %
- Area under ROC: 0.801

