Machine Learning for the ATLAS experiment

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AI@IFIC

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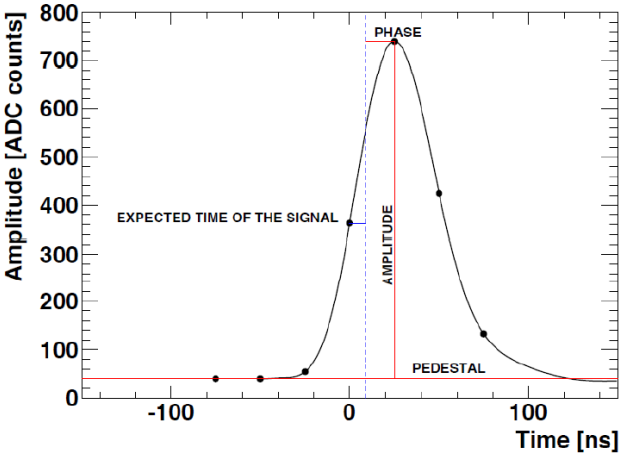
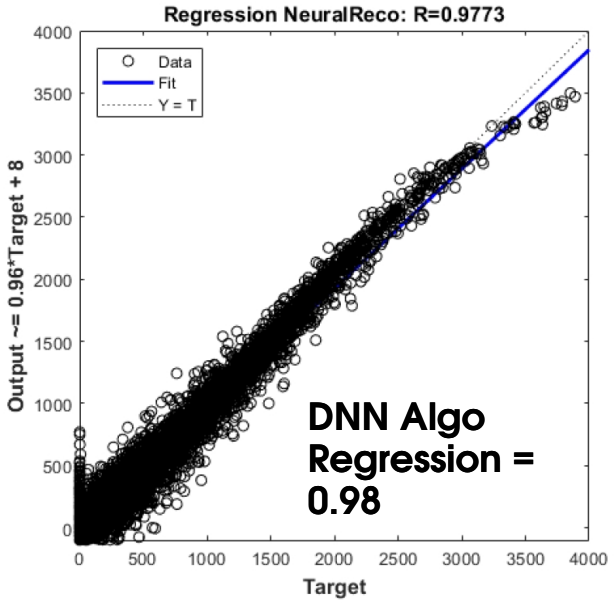
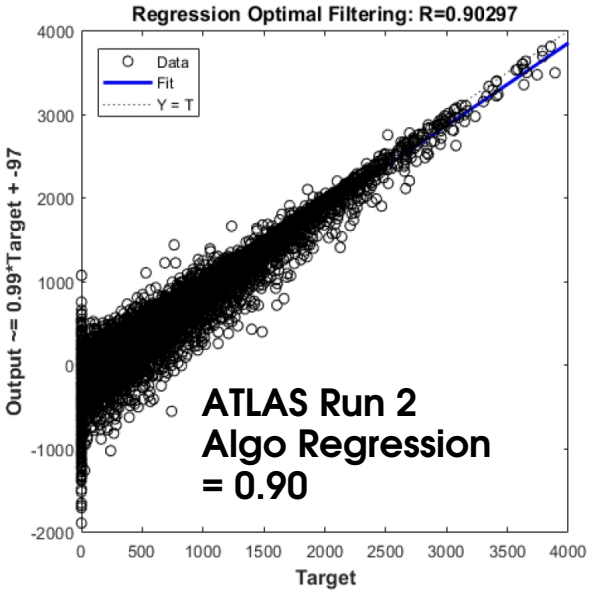
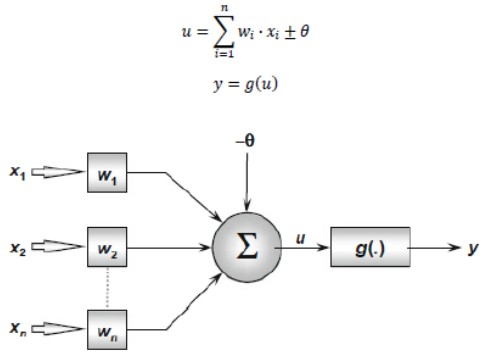
Activity 1: DNN Signal Reco @HL-LHC

- Problem: "Reconstruct signals **in real-time** @HL-LHC" (meaning 40 MHz rate, ms latency, high noise level).
- Techniques: (D)NN in FPGAs
- Results: JINST 14 (2019) 09, P09002





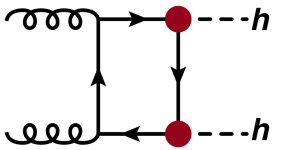




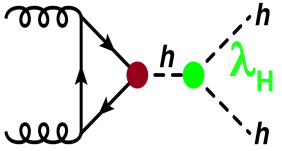
- Support: Expert level training of ML in FPGAs

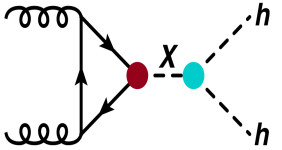
Activity 2: Higgs physics@LHC

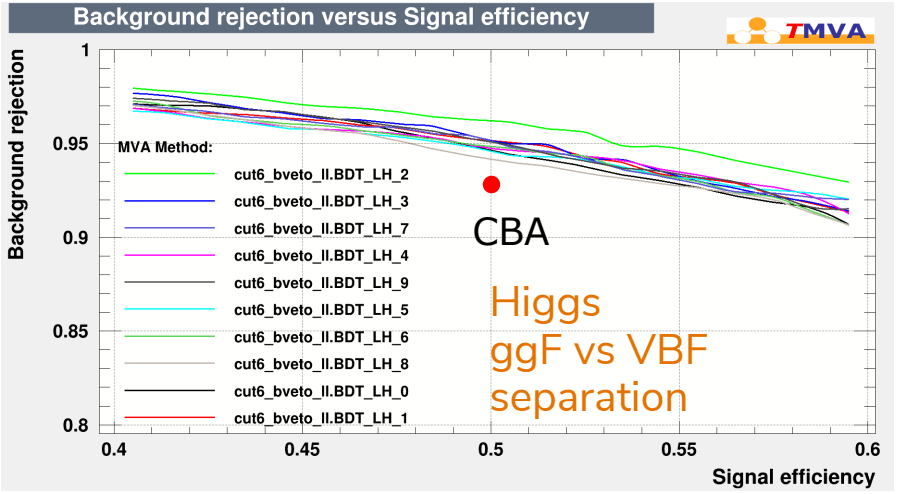
- Problem: “Higgs measurements and searches at LHC”



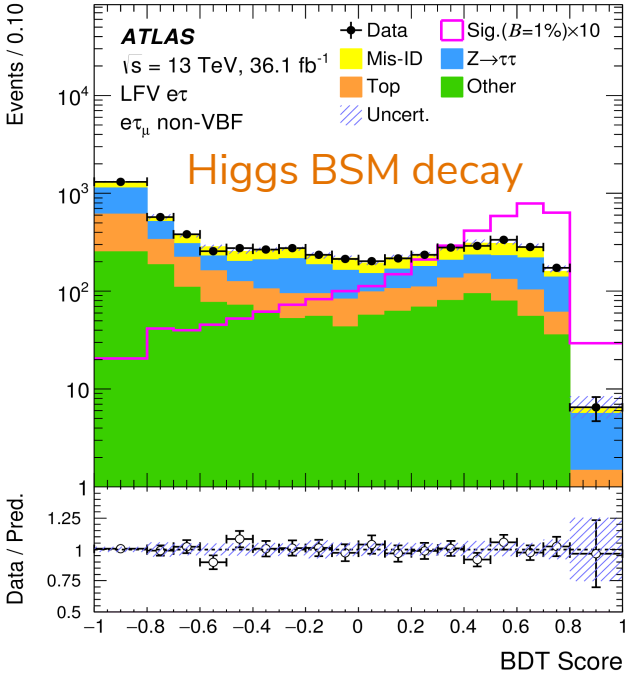
- Techniques:
  - BDT (XGBoost, TMVA)
  - PNN, RNN, DNN – Keras (Tensor Flow)
- Results:
  - Phys. Lett. B 800 (2020) 135069
  - JHEP04 (2015) 117







ML improves separation by a factor ~2



- Support: Artemisa tutorial