WP1 - Description

- (Run2 13 TeV, ~150 fb-1): This project aims at measuring the Higgs boson decays to b quarks in two distinctive and among the most sensitive production modes::

  - VH

  - VBF

  - First differential cross section measurements.

WP1

- (Preparation for Run3) The project also aims at preparing the analysis for Run3:

  - detector,

  - trigger

  - reconstruction

  - luminosity measurements i

  - modelling

  - analysis optimization studies taking systematic uncertainties into account

Objetives

- A precise measurement of the production rates: (Present plan)

    - **VH** (2019/2020)

    - **VBF (with or without a photon in the final state)** (2019/2020)

- The measurement of XS as a function of the transverse momentum of the Higgs boson

    - **dσ/dpT** (?)

    - **Cross section measurements in the Higgs high-pT regime** (2019/2020)

- The simplified template cross-section

    - **measurement of the STXS** (2019/2020)

    - **Higgs Effective Field Theories (HEFT) interpretation**. (2019/2020)

- **Measurement of integrated, differential and fiducial cross sections** (?)

- **Measurement of the b-Yukawa coupling through the combination of all channels.** (2020/2021)

Methodologies and Deliverables

- Methodology:

    - Machine learning: **TMVA**, Keras, Theano and TensorFlow

    - Use of GPU (request for INFN Ge)

    - Adversarial NN for uncertainties

    - **Multivariate morphing technique**

    - **Large R jets with substructures**

- Deliverables:

- **WP-1a** (Spring-Summer 2020): Measurement of the rates in the associated VH production mode using the full Run 2 dataset

- **WP-1b** (Beginning 2021): Measurement of the Hbb produced in association to jets, targeting the VBF(+gamma) production modes

- **WP-1c** (End 2021): Publication of the combined measurement of the b-Yukawa

2021 - 2023

- Immaginiamo un prin ipotetico con la tempistica:

- Aprile 2020: Submission

- Marzo 2021: Lista vincitori

- Giugno 2021: Inizio PRIN?

- Giugno 2024: Fine PRIN?

- Fisica di Hbb nel Run3