Measurements of the CKM matrix elements $|V_{tb}|$, $|V_{ts}|$ and $|V_{td}|$ in single top events

TOP-17-012: Update on Vtd/Vts

CMS Naples Meeting

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27 July 2018

Categories and Multivariate analyses

2j1t & 3j1t

Central region: $m_{\mathrm{T}}^{\mathrm{W}} > 50\ \mathrm{GeV}$ & $|\eta_{j'}| < 2.5$

- single top t-channel vs $\mathrm{t\bar{t}}$
- single top t-channel vs $\mathrm{W} + \mathrm{jets}$

Signal region: $m_{\mathrm{T}}^{\mathrm{W}} > 50\ \mathrm{GeV}$ & $|\eta_{j'}| > 2.5$

- single top t-channel or $\mathrm{t\bar{t}}$ with $|\mathrm{V_{tq}}|^2$ vertex vs standard single top t-channel
- single top t-channel or $\mathrm{t\bar{t}}$ with $|\mathrm{V_{tq}}|^2$ vertex vs standard $\mathrm{t\bar{t}}$ and $\mathrm{W} + \mathrm{jets}$

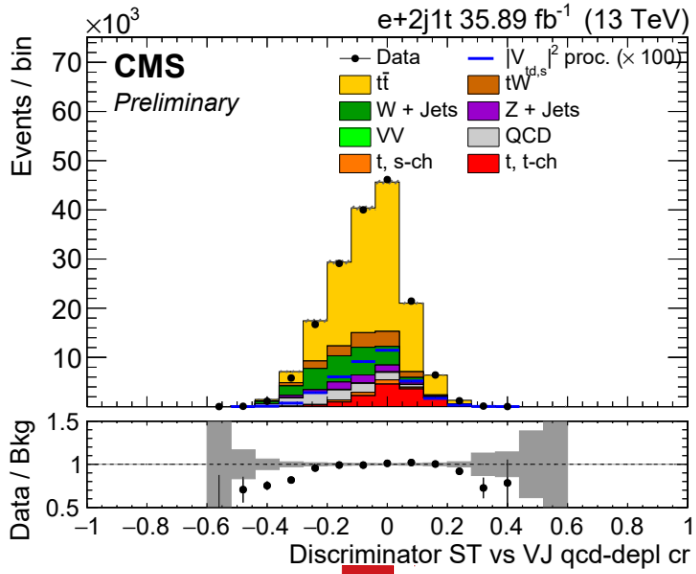
3j2t

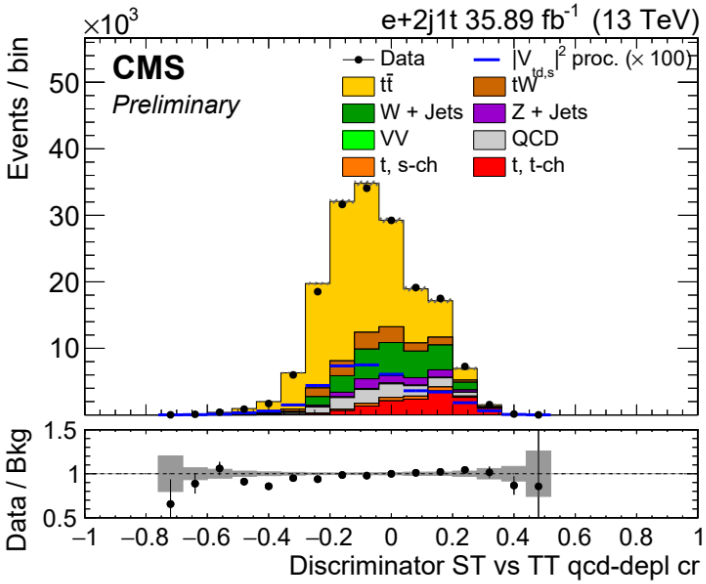
no sub-category

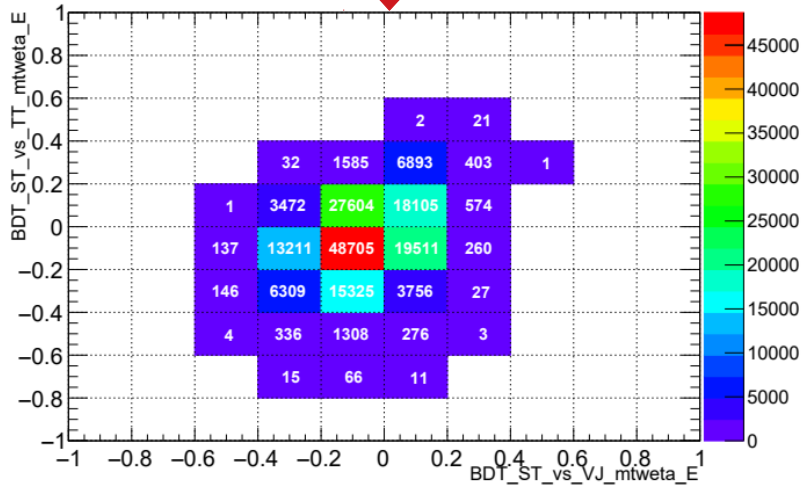
- single top t-channel vs $\mathrm{t\bar{t}}$

2D Plots

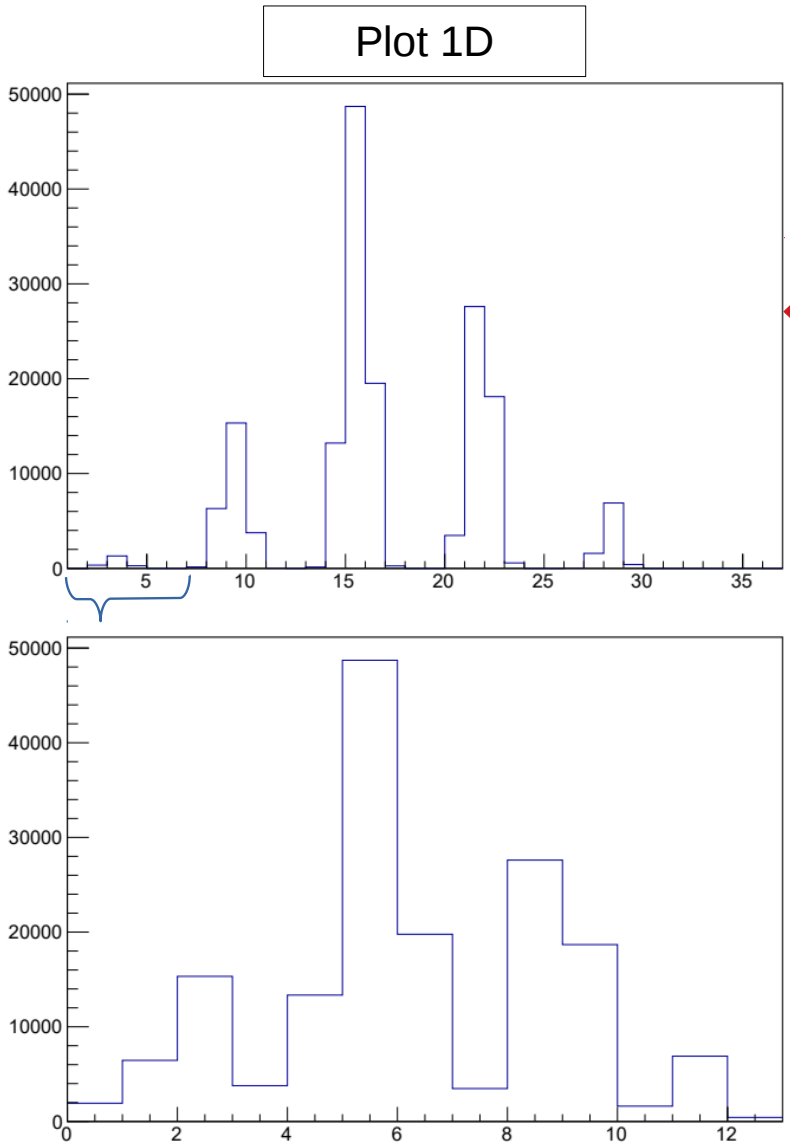
For all the regions of the n-jets–1-tag categories the MVA variables are combined together in a single 2D plot.

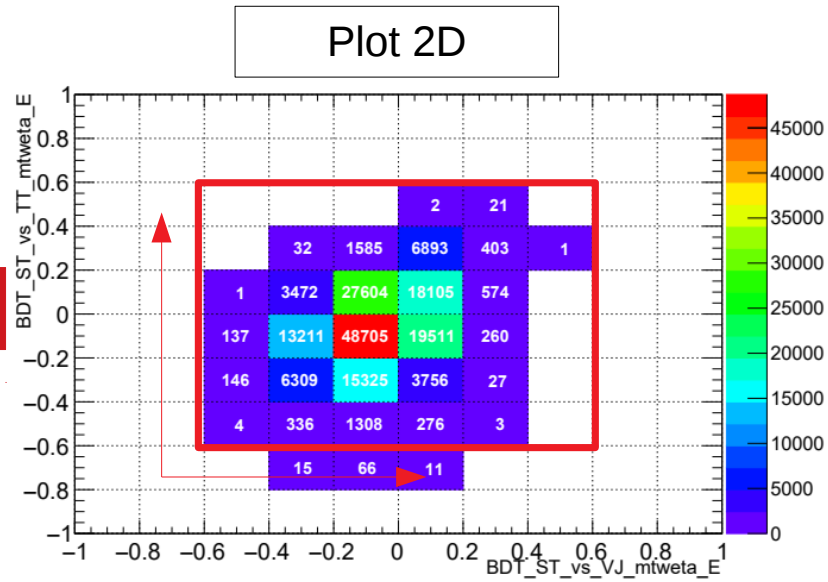






1D Plots



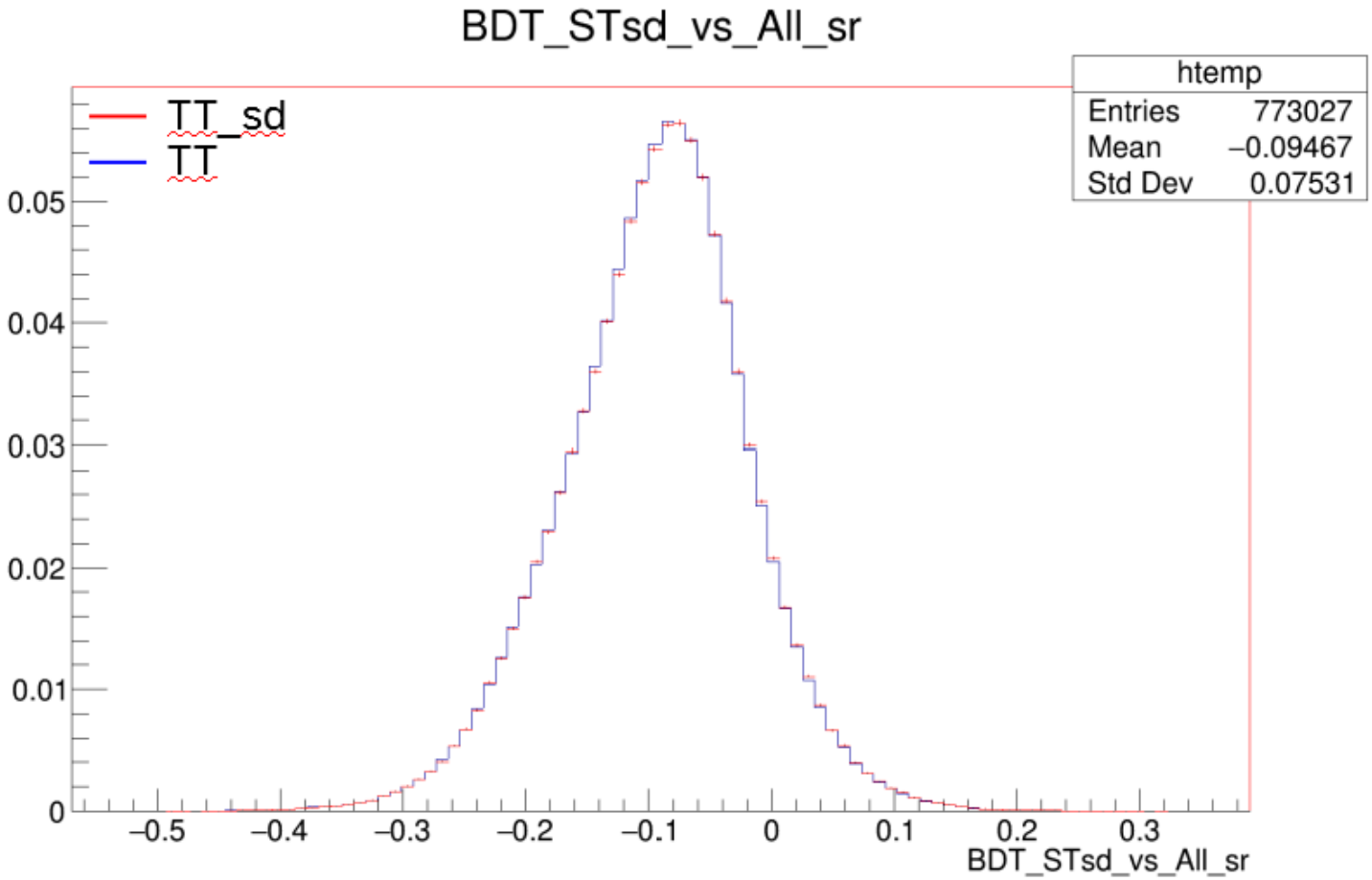


Then the 2D plot is read from the bottom by proceeding to the right, line by line, and transformed in a 1D plot.
The plot so obtained is rebinned in order to avoid instability in the fit due to empty bins.

Revision of the analysis strategy 1

Problem with the TT_sd

- We realized that the kinematics of the $\mathrm{t\bar{t}}$ events with a $|\mathrm{V_{tq}}|^2$ vertex is very similar to that of the $\mathrm{t\bar{t}}$ events with two $|\mathrm{V_{tb}}|^2$ vertexes



Revision of the analysis strategy 2

Implications

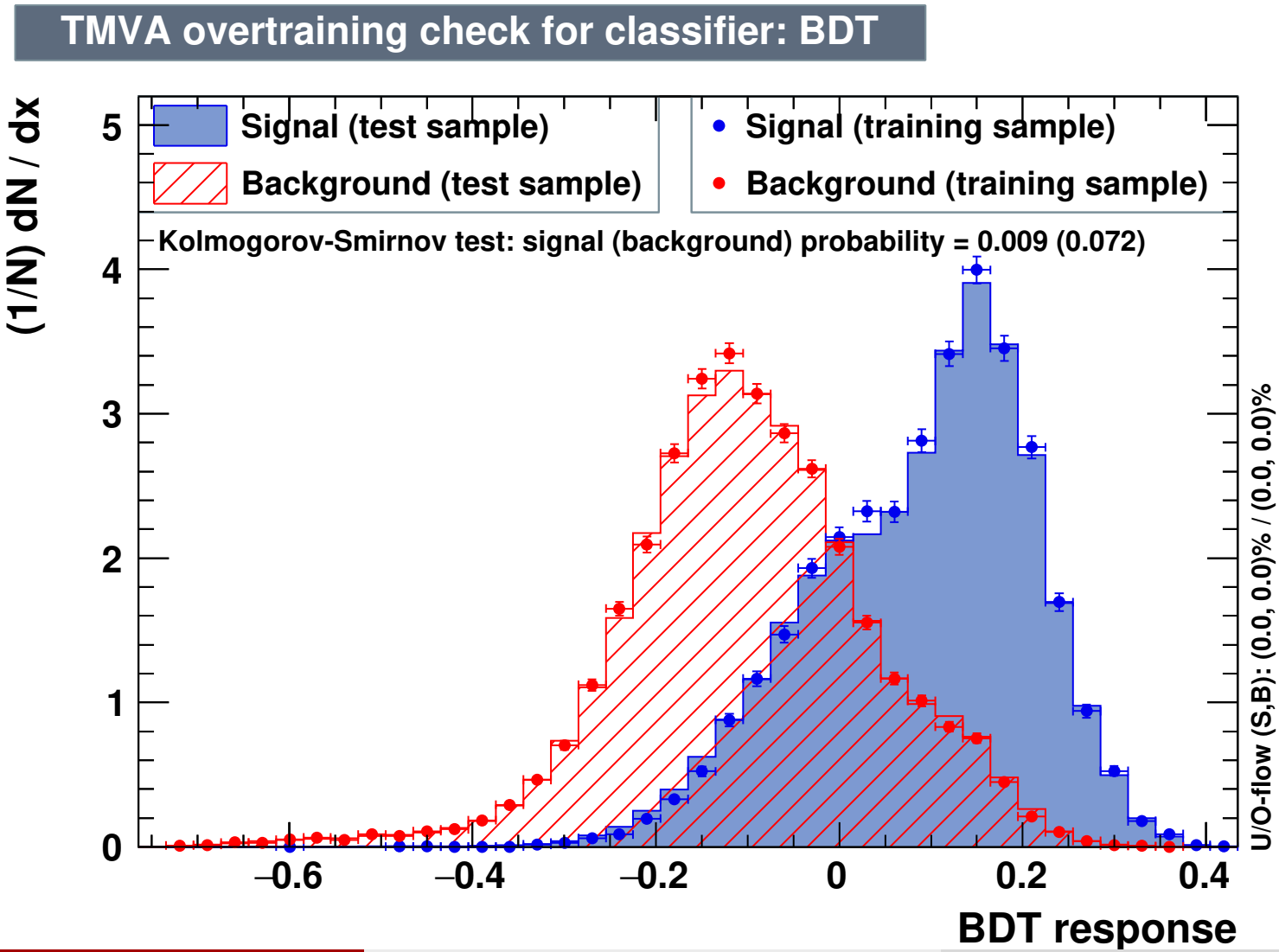
- No enough discriminating power in the BDTs to distinguish between the non standard $\mathrm{t\bar{t}}$ decays and the standard ones
- When the fit is performed, the signal is absorbed in the systematics variations

Solutions

- $\mathrm{t\bar{t}}$ non standard decays have been neglected
- the BDTs have been re-trained by removing them from the signal samples

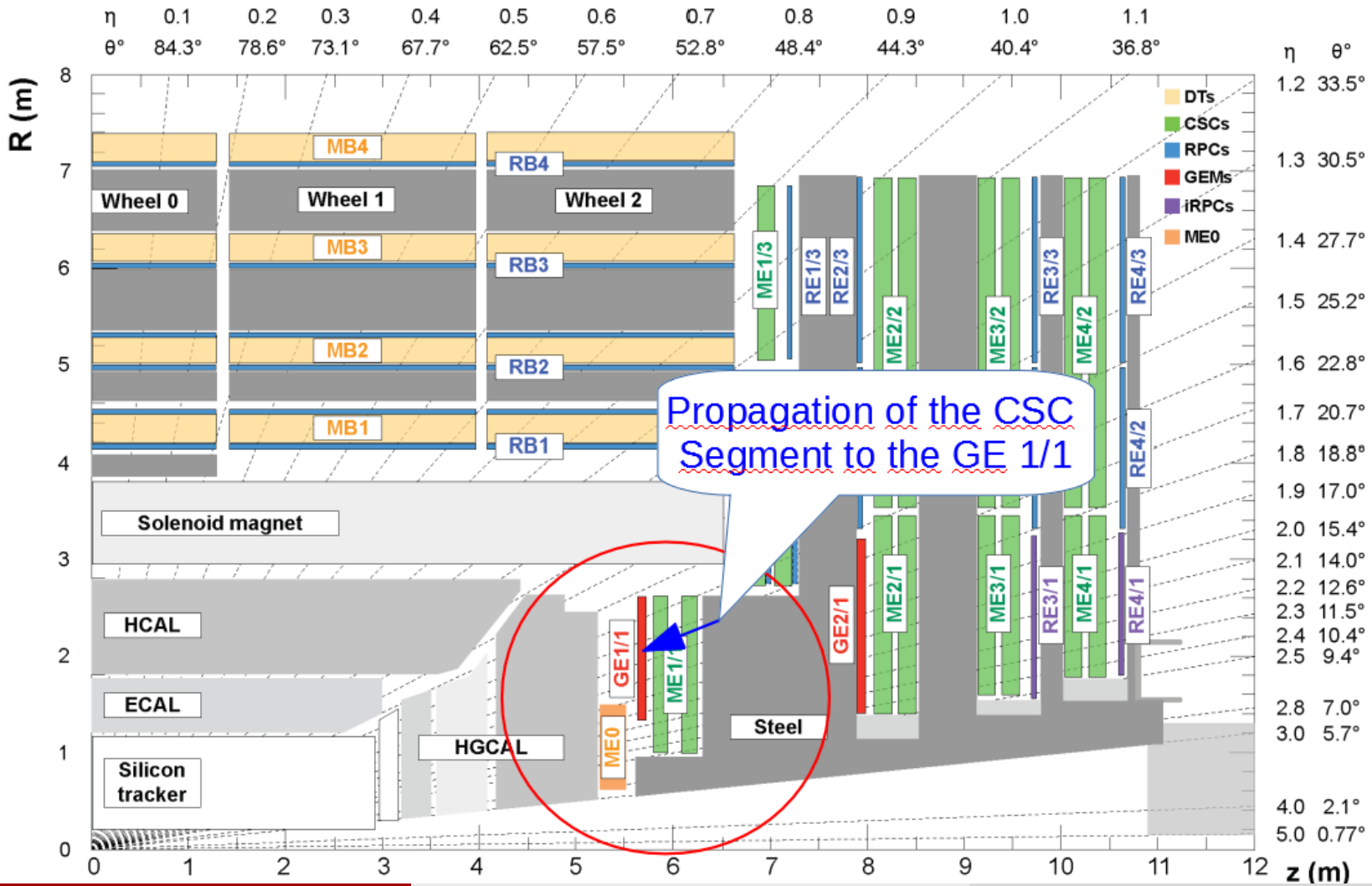
New BDTs trainings

New BDTs trained on dedicated samples from the muon channel. In this way, the Kolmogorov-Smirnov test is fine:



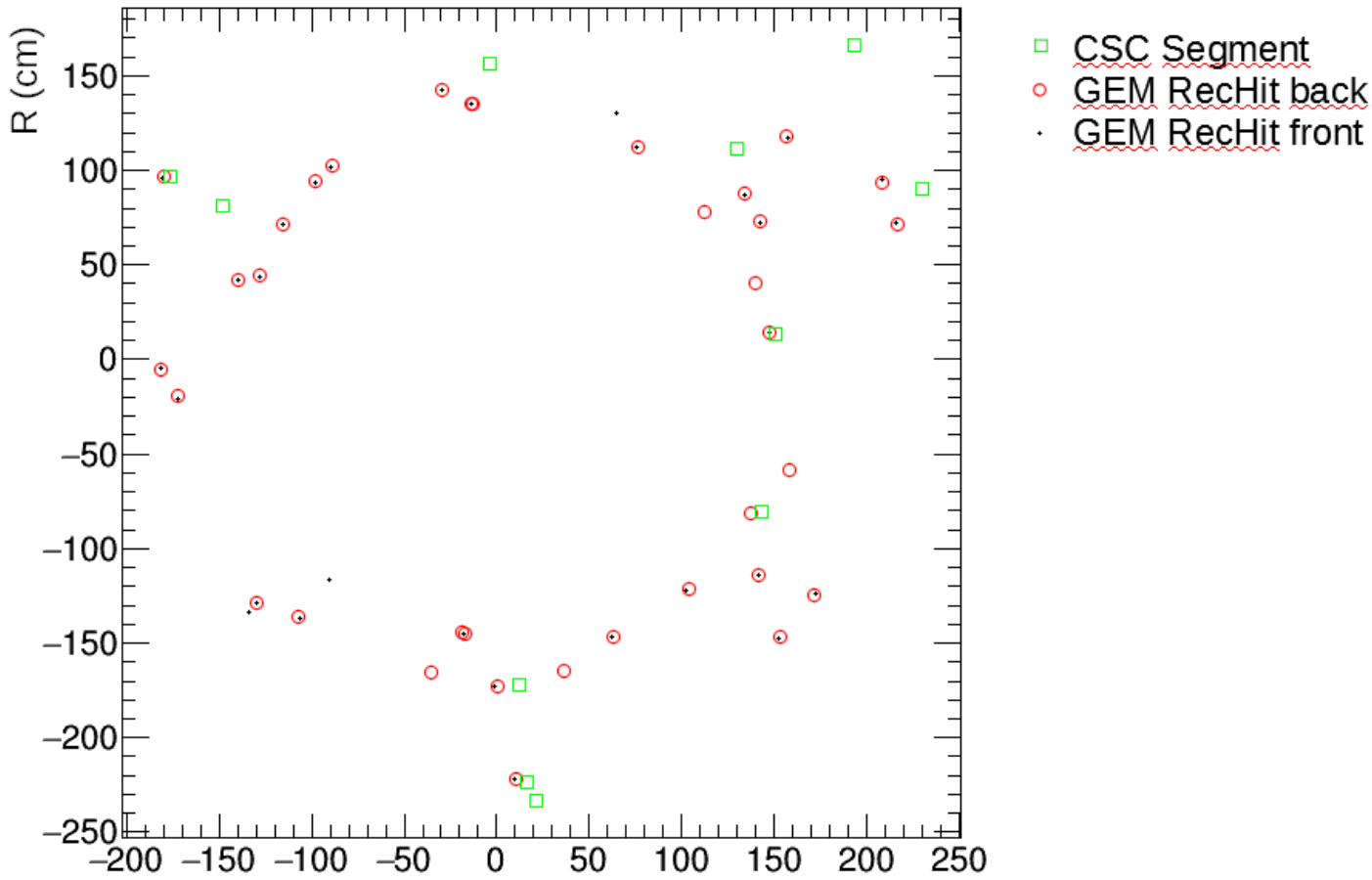
GEM activity 1

The aim of the service task is to develop the code for the propagation of a CSC Segment on the surface of the GEM.



GEM activity 2

The first step is to figure out the GEM RecHit in relation of the CSC Segment.
A MC file is used in this step.



GEM activity: future plans

Next steps are:

- Run over a real data file
- See the comparison between the plots produced with the analyzer and the event displayer Fireworks.
- Write the code for the propagation of the CSC Segment to the GEM Surface in order to find a match with the RecHits of the chamber.
- Once the code for the propagation will be stable and completely understood, it will be included in the CMSSW code