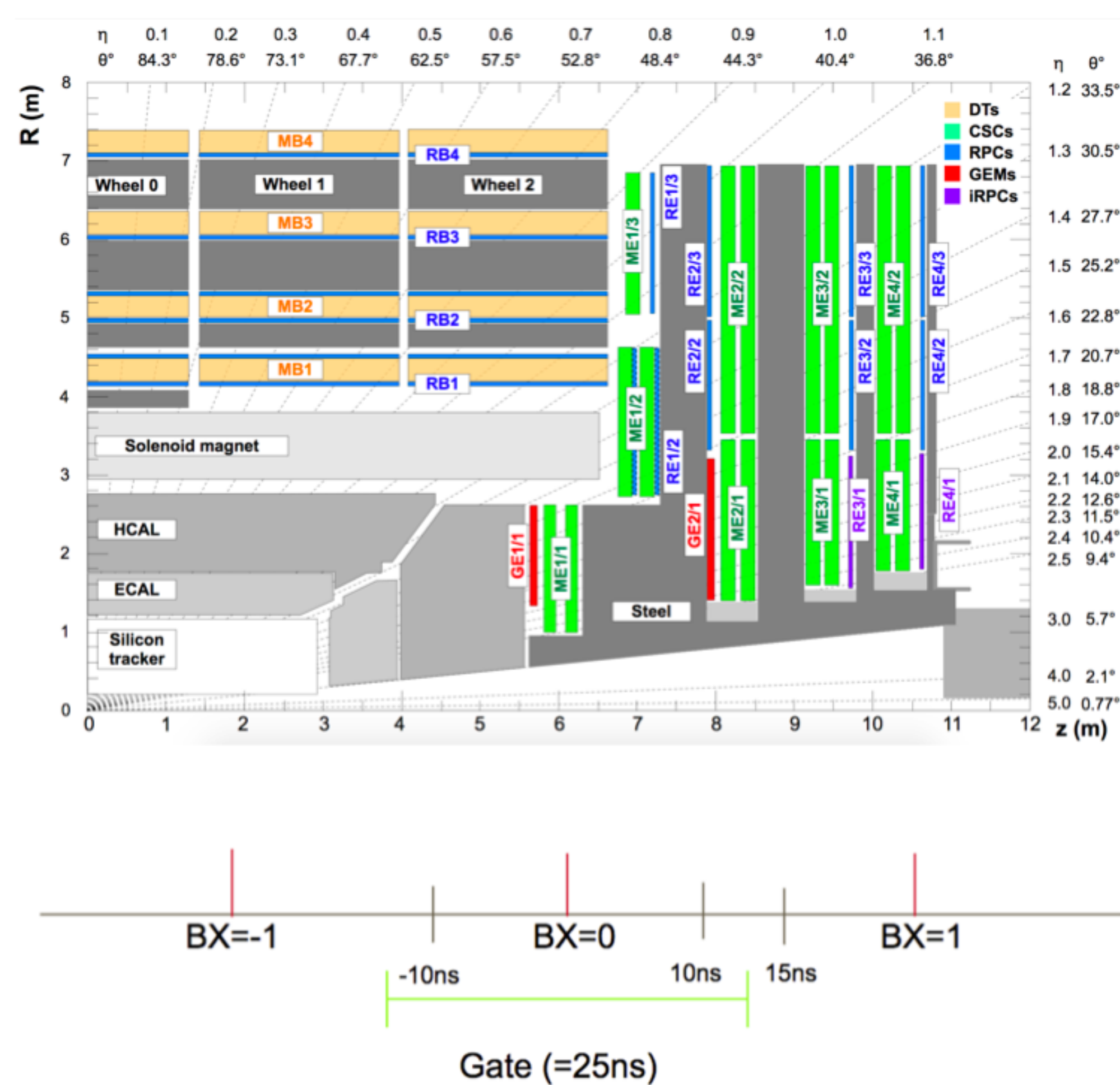


Junghwan Goh on behalf of the CMS collaboration

Several theoretical models accommodate the possibility of Heavy Stable Charged Particles (HSCP). With improved data acquisition in the phase-II upgrade of the CMS-RPC system, triggering and identification of HSCPs are expected to be possible using the Time of Flight technique. Moreover, new RPC chambers will be installed to extend the acceptance up to $|\eta| < 2.4$ with improved time and spatial resolution which can complement this search. Performance of new Level-1 trigger strategies to detect HSCPs at the High Luminosity LHC is shown.

CMS RPC upgrade

The CMS experiment is planning upgrade to operate at High Luminosity LHC (HL-LHC). The upgrade of Resistive Plate Chamber (RPC) system involves new chambers in the forward region at $1.9 < |\eta| < 2.4$ with improved detector technologies, and new electronics (Link System).



The CMS RPC detector has an intrinsic time resolution at 2ns, provides precise bunch crossing (BX) assignment with 25ns window. New Link System provides precise timing information from the front-end electronics of the RPC detectors. Time of the flight (TOF) can be measured with a resolution of $O(1)$ ns.

HSCP Trigger performance

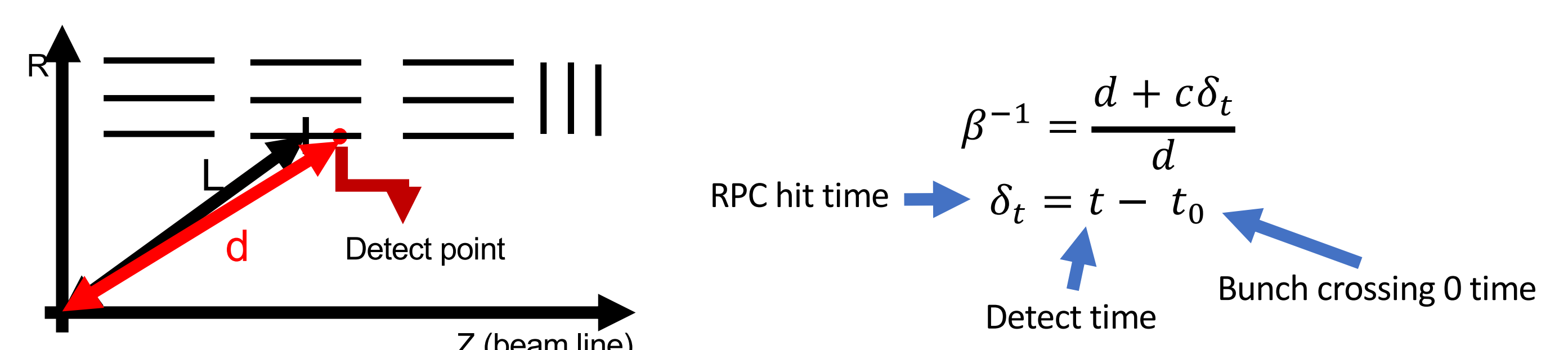
A model with stable supersymmetric-tau is used as a benchmark point. Full simulation of CMS Phase-II upgrade is performed with the Link-System and iRPC upgrade.

Speed of particle is measured by least-squares fitting method. New algorithm improves trigger efficiency of HSCPs in $\beta < 0.7$ at $\sim 90\%$.

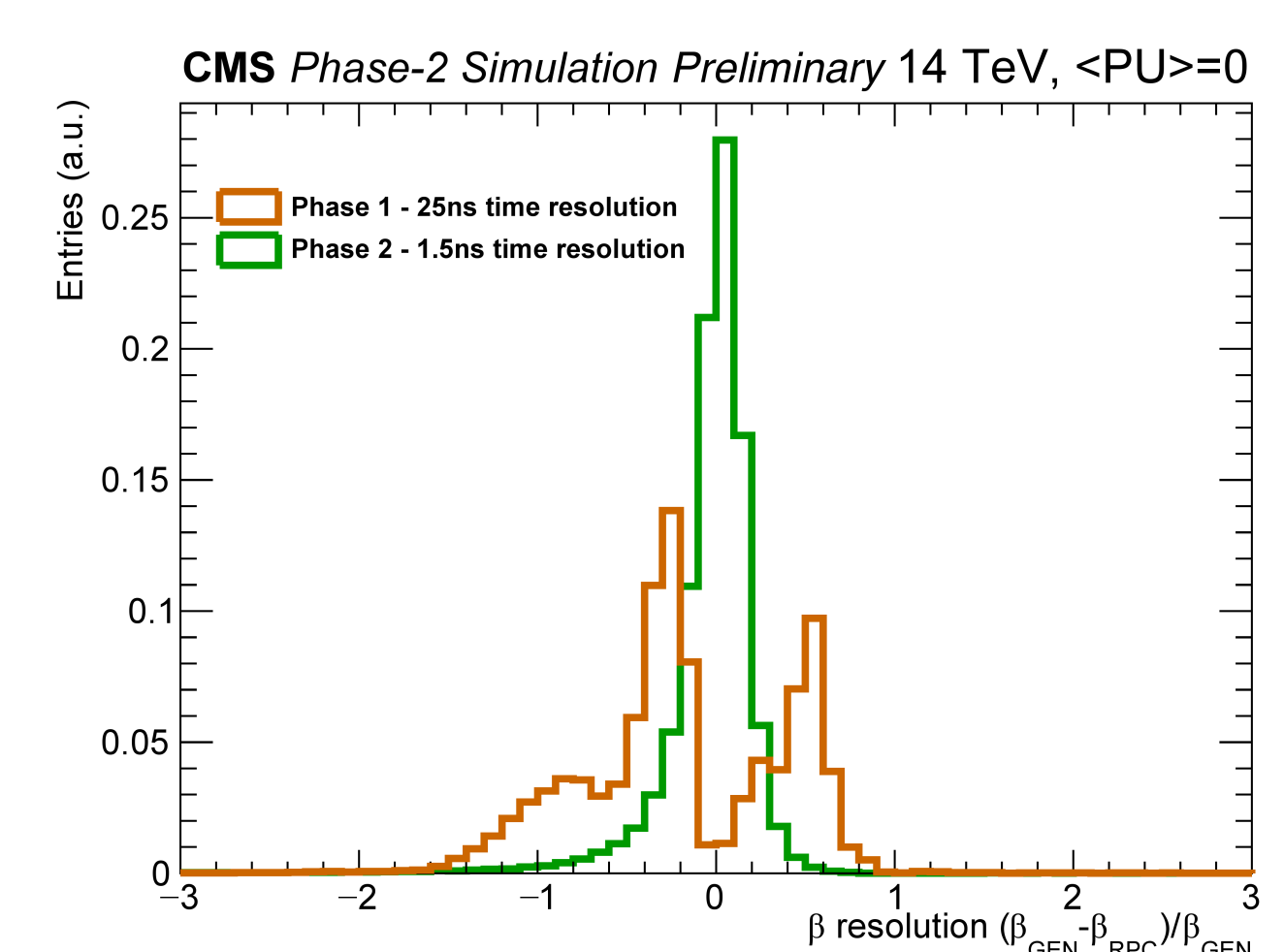
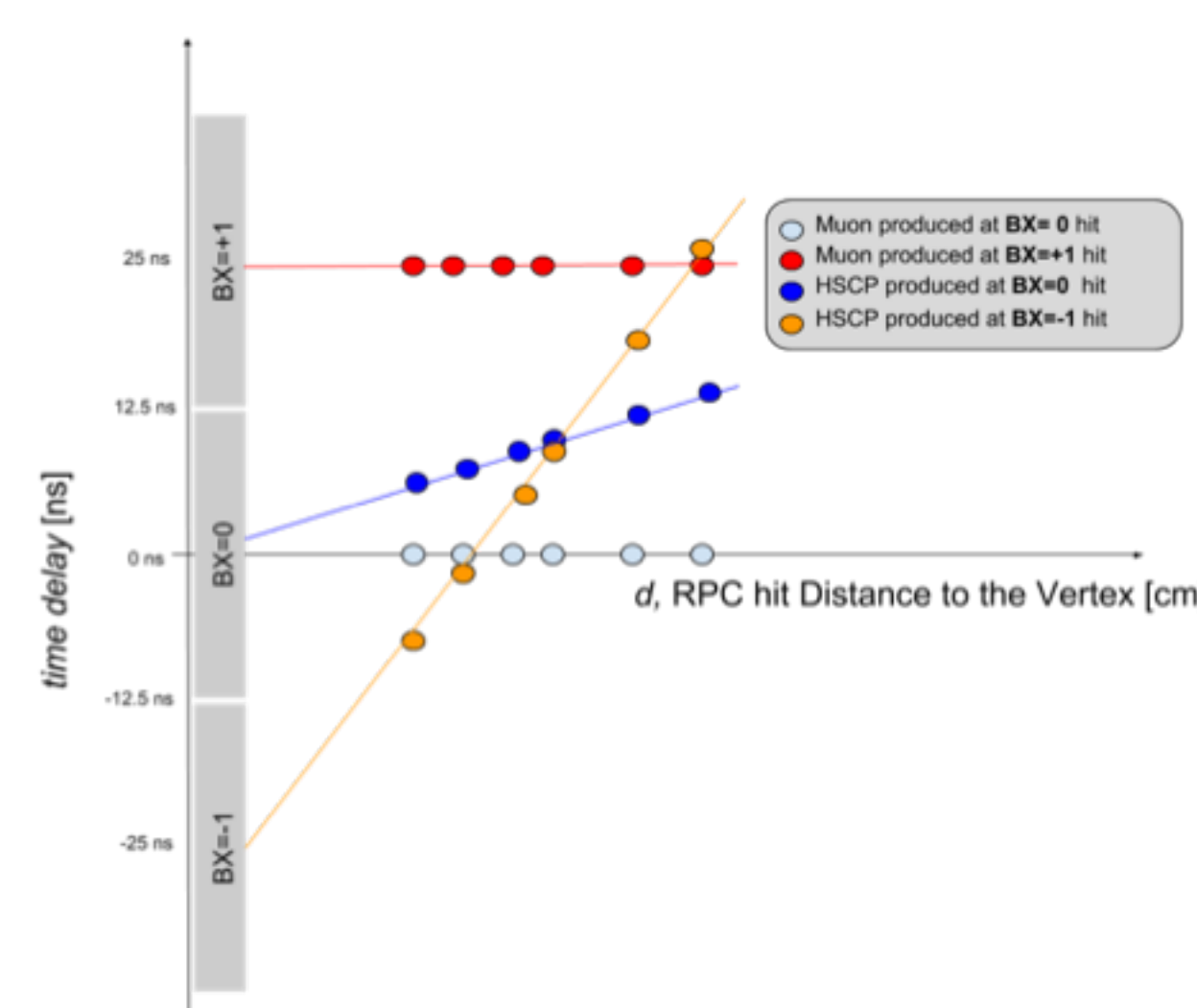
Upgrade of the RPC system can improve search for the HSCPs at the trigger level.

Time of Flight using RPC

Heavy Stable Charged Particles are reconstructed as slowly moving muon-like particle in CMS detector. Speed of HSCP can be directly measured using the TOF and the position of RPC hits.



Timing of each chambers are synchronized to particles at speed of light. Horizontal lines corresponds to ordinary muons traveling at near to the speed of light, slope with positive sign indicates a particle with small β .



RPC-TOF based trigger algorithms can be designed at the hardware level (Level-1). Resolution of particle speed from the TOF is improved with the upgraded RPC Link System.

