Resistive Plate Chambers (RPCs), with their excellent time resolution (~ ns), were chosen as dedicated muon trigger detectors for the CMS experiment. RPCs fulfill the job of muon identification, estimate the momentum and unambiguously assign bunch crossing. The critical tasks of monitoring detector performances, debugging hardware, and certifying recorded data are carried out by the Data Quality Monitoring (DQM) system.

The CMS DQM framework provides tools for creation, filling, storage, and visualization of histograms and scalar elements. It also offers standardized algorithms for performing statistical tests and automated data certification. Within this framework, the RPC DQM system was developed. The latter is composed of a set of user defined algorithms and is intended to be used both online, during data taking, and offline, during the reconstruction stage at Tier-0 and re-reconstruction at the Tier-1s. Run by run, the system measures detector level and physics quantities which are subsequently stored in a dedicated database. Examples of monitored quantities are: occupancy, cluster size, synchronization, efficiency, and data integrity. We here describe the structure, functionalities, and performances of the DQM applications for the CMS RPC detector.

### Resistive Plate Chamber System

RPCs confer robustness and redundancy to the muon trigger.

- **Double gap design**
  - 2mm gaps
  - Common pick-up aluminum strips between the gaps
  - Bakelite resistivity 1010 Ohm cm
  - Operated in avalanche mode ( Operating HV = 9.3–9.4 kV )
  - Used gas mixture: 96.2% C2H2F4, 3.5% i-C4H9, 0.3% SF6

### Data Quality Monitoring Framework

- **Online DQM**
  - Monitors detector, trigger and DAQ hardware status.
  - Runs during data taking.
  - Special stream of events containing detector and trigger raw data, Level 1 and High Level Trigger (HLT) summary results and HLT by-products essential for monitoring trigger algorithms performance.

- **Offline DQM**
  - Certify the quality of reconstructed data and validate calibration results, software releases, and simulated data.
  - Run as part of the offline reconstruction task.

#### 2 Step Process

1. Histograms are created and filled event by event. Monitored information is stored in normal event data files.
2. (Harvesting) – Histograms and monitoring information produced in step one are extracted and merged into the full statistics. Quality tests are performed along with specific analyses. Summary histograms of relevant quantities are also produced here.