The Resistive Plate Chamber

The Resistive Plate Chambers (RPC) are planar gaseous detectors working with a uniform electric field generated by two parallel plates of high bulk resistivity electrodes.

The uniform field makes them very fast detectors with an excellent time resolution, suitable for timing measurements and for triggering.

RPC under test: 2 mm gas gap RPC with 1.8 mm electrode thick.

Avalanche and streamer operation mode

- Primary ionization
- Electron acceleration and avalanche charge formation
- Avalanche working mode
- Electron-ion recombination processes with UV photon emission
- Streamer formation

Best gas mixture selected: 2% C$_3$H$_2$ClF$_3$

Conclusions

Excellent performance achieved for the first time with a RPC operating with a totally environment-friendly gas mixture (GWP ~ 10)

References: G. Proto et al 2022, JINST 17 P05005