

DRD1 Collaboration meeting in Warsaw



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The modeling of rate effects in RPCs

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Abstract: This work introduces Markov modelling to describe how resistive plate chambers (RPC) deteriorate under uniform background irradiation. The model works for high irradiation rates and arbitrary charge spectra. Applied to M. Abbrescia's single-cell RPC model (RC circuit), it agrees with Monte Carlo simulations and can also describe RPCs with polarizable resistive layers and in two dimensions. Including streamer-like events (large charge) allows the model to match experimental efficiency curves, showing that these events cause the reduction of the efficiency plateau at high irradiation rates. For eco-friendly gas mixtures, this means suppressing streamers is key for reaching high-rate capability.

Presenter: STOCCO, Dario (ETH Zürich)

Session Classification: Working Group 4: Detector physics, simulations, and software tools