High Granularity Resistive Micromegas for Tracking Detectors in Future Experiments

The contribution will focus on the state of the art of our development, started in 2015, of resistive Micromegas detectors for applications as tracking device in high rate environment. After having explored different solutions and tested several options, our technology is now mature enough to offer efficient operation up to particle fluxes of 10 MHz/cm^2, maintaining the amplification in gas above 10^4, with a large margin before breakdown in order to ensure stable and reliable operation.

The detector exploits small-size readout pads for occupancy reduction and a double diamond-like carbon (DLC) resistive layer with a network of dot-connection to ground for fast charge evacuation. The double DLC layer allows to preserve the minimum resistance to suppress the discharge intensity for stable operations.
Performance measured with proton and pion beams at CERN have shown spatial resolution down to <100 um for mm-wide readout pads and few ns time resolution.
The technology is being now scaled to larger area, with the construction of detectors with an active area of 20x20 cm^2 already achieved and new 40x50 cm^2 prototypes under construction. An effort to transfer the technology for detector construction in industries is ongoing too.
The presentation will give an overview of the detector technology with the latest results in terms of gain and rate capability measured in laboratory, and efficiency, time and spatial resolution measured at the CERN SPS.
Possible applications in HEP experiments as well as future development will also be reported.