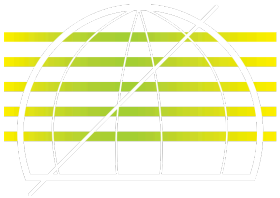

RPC 2022

Contribution ID: **73** Type: **Oral**

SI-GaAs wafers as resistive electrode for high rate RPC with very low dark count rate

Tuesday, 27 September 2022 15:40 (25 minutes)

The characterization of new materials for electrodes plate design is one of the central themes in the development of high rate RPC detectors.
Semiconductive crystals have been characterized since the 90s, showing an excellent response to high irradiation with the limitation to fall into destructive discharges.
The development of new front-ends with high signal to noise ratio allowed us to reduce the gas gain, operating the detector before destructive discharges occour.
In this way we can study RPC with electrodes made of semi-conductive materials, which have a crystalline structure with very high carrier mobility and high resistivity.
Semiconductor wafers are also characterized by a surface roughness of less than 5 nm, which is reflected in a negligible number of dark counts without the aid of surface coatings.
We believe that the study of this type of materials deserves to be deepened for the application to high rate RPC.
For this purpose a detector with undoped Gallium Arsenide electrodes was exposed to different values of uniform photon irradiation and characterized with $180 GeV/c$ muons. Stable operation without loss of efficiency was observed up to the maximum source irradiation, equivalent to a counting rate of $40\ khz/cm^2$. It was also observed a dark count rate lower than $0.01\ Hz/cm^2$ due to the very low surface roughness of the polished semiconductive wafers.

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