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The μ -RWELL-based preshower and muon detectors of the IDEA detector concept

The IDEA detector concept has been designed to operate at a future large circular e^+e^- collider, like FCC-ee or CEPC. IDEA has an innovative design with a central tracker enclosed in a superconducting solenoidal magnet. After the magnet there is a preshower system, followed by a dual readout calorimeter. In the iron yoke that closes the magnetic field are then located three stations of muon detectors. The preshower and muon detectors employ the μ -RWELL technology. The μ -RWELL detector inherits the best characteristics of the GEM and Micromegas detectors, being spark robust and simple to assembly. Both the preshower and the muon detector have a modular design, with the basic μ -RWELL tile of an active dimension of 50×50 cm², with the anode segmented in parallel strips. The preshower main requirement is a spatial resolution of the order of 100 μ m, while the muon detector must have a reasonable total number of channels.

In order to define the best values of the resistivity and the strip pitch, we have built 2 sets of μ -RWELL detectors. Each set is made of 5 and 3, 16×50 cm² detectors, with 50 cm long strips. In the preshower set the strip pitch is 400 μ m and with a varying DLC resistivity, ranging from 10 to 200 M Ω /square. In the muon detector set, the strip pitch is 800, 1200 and 1600 μ m, respectively. All these detectors have been exposed in October 2021 to a muon beam at the CERN SPS. The results obtained will be presented.

Primary experiment

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Track Classification: Gaseous Detectors