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The cylindrical drift chamber for the MEG II

The MEG experiment, at the PSI in Switzerland, aims at searching the charged lepton flavor violating decay $\mu^+ \to e^+\gamma$. MEG has already determined the world best upper limit on the branching ratio: BR<4.2×10^{-13}@90\%CL with the full data set collected in the years 2009-2013.\\
The new positron tracker is a high transparency single volume, full stereo cylindrical Drift Chamber (DC), immersed in a non uniform longitudinal B-field, co-axial to the muon beam line with length of $1.93\ m$, internal radius of $17\ cm$ and external radius of $30\ cm$. It is composed of 10 concentric layers, divided in 12 identical sector of 16 drift cells. The single drift cell is approximately square, with a 20 μm gold plated W sense wire surrounded by 40 μm silver plated Al field wires in a ratio of 5:1. For equalizing the gain of the innermost and outermost layers, two guard layers have been added at proper radii and at appropriate high voltages. The total number of wires amounts to 12288 for an equivalent radiation length per track turn of about 1.45x10^{-3} X_0 when the chamber is filled with an ultra-low mass gas mixture of helium and iso-butane. Due to the high wire density ($12 wires/cm^2$), the use of the classical feed-through technique as wire anchoring system could hardly be implemented and therefore it was necessary to develop new wiring strategies. The number of wires and the stringent requirements on the precision of their position and on the uniformity of the wire mechanical tension impose the use of an automatic system (wiring robot) to operate the wiring procedures. \\
Several tests have been performed in different prototypes of the drift chamber, exposed to cosmic rays, test beams and radioactive sources, to fulfill the requirement on the spatial resolution to be less than 110 μm. The drift chamber is currently under construction at INFN and should be completed by the end of 2017 to be then delivered to PSI.

Experimental Collaboration

Meg collaboration

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