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The MEG positron spectrometer

We have been developing an innovative spectrometer for the MEG experiment at the Paul Scherrer Institute (PSI) in Switzerland. This experiment searches for a lepton flavour violating decay $\mu + \longrightarrow e+ \gamma$ with a sensitivity of 10 −13 in order to explore the region predicted by supersymmetric extensions of the standard model. The MEG positron spectrometer consists of a superconducting solenoidal magnet, a drift chamber system, and a time measuring counter system. In the MEG experiment, the spectrometer must cope stably with very high muon stopping rate up to 10 8 sec−1. Our special superconducting solenoidal magnet which has a highly graded magnetic field allows a background of lower energy Michel positrons to be swept away more effectively from the fiducial tracking volume. Furthermore, the ultimately low-mass drift chambers, which cause much less multiple scattering, ensure precision measurements of 52.8MeV/c positrons. They also help to reduce annihilation gamma-ray background for the gamma-ray detector. The commissioning run of the MEG positron spectrometer will be performed in the end of 2006. This innovative positron spectrometer and the commissioning run are described here.

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