The $\mu^+ \to e^+\gamma$ decay search with the full dataset of the MEG experiment

A. Papa (MEG collaboration)[1,]

[a] *Paul Scherrer Institut, Villigen, Switzerland*

Abstract

Lepton flavor violation (LFV) research is currently one of the most exciting branches of particle physics due to its high sensitivity to new physics. The observation of neutrino oscillations has clearly demonstrated that neutral lepton flavor is not conserved. This implies that charged LFV (cLFV) processes, such as the $\mu^+ \to e^+\gamma$ decay, can also occur in simple extended Standard Model (SM) versions (i.e. including Dirac neutrinos) which takes into account for neutrino oscillations, although strongly suppressed. On the other hand, Beyond SM (BSM) extensions strongly enhance the predictions for cLFV branching ratios. Therefore such decays are ideal probes for new physics.

The MEG experiment at the Paul Scherrer Institut searches for the $\mu^+ \to e^+\gamma$ decay and has completed the data collection at the end of the 2013. The analysis of the full data set acquired in the period 2009-2013 for a total amount of 7.5×10^{14} stopped muons on the target has been recently completed and it will be presented. Using the full data sample we set a new upper limit on the branching ratio of this decay of 4.2×10^{-13} (90% confidence level): It is a factor 30 improvement over the previous limit set by the MEGA experiment and also the strongest bound on any forbidden particle decay.

The strong scientific motivation to search for the $\mu^+ \to e^+\gamma$ decay pushes the collaboration for an upgrade of the MEG experiment: MEGII. The status of the MEGII experiment will be also given.

Key words: Charged lepton flavor violation, the MEG experiment
PACS: 29.40.Cs, 29.40.Gx

*Corresponding author