Contribution ID: **94** Type: **Oral presentation**

# The status of the MEGII experiment

*Thursday, 16 February 2023 12:20 (20 minutes)*

Since the observation of neutrino oscillations, lepton number conservation is known to be a non-exact symmetry of the Standard Model lagrangian: yet there is still no evidence of lepton flavour violating processes involving charged leptons (cLFV), such as $\to e$, $\to eee$ or $\to eN$: according to minimal extensions of the Standard Model including neutrino masses, these processes are too rare to be observed experimentally (e.g. $BR(\to) \sim \mathcal{O}(10^{-55})$). Nontheless, after more than 70 years of research the effort to observe these phenomena continues because any experimental observation would be a clear evidence of Physics beyond the Standard Model and most New Physics scenarios awaits for a positive result just below the current sensitivity limits.

Between these new experiments shines MEGII @Paul Scherrer Institut, designed to overtake the current measurement of
$BR(+ \to e+)\ 4.2\times10^{-13}$ (MEG 2016), with a predicted sensitivity of $6\times10{-}14$ (three years of data taking). MEGII experiment works in the following way: $^{+}$ of 28MeV/c are stopped on a thin plastic target at the center of a detector system designed to detect the products of the two-body $\to e$ decay, i. e. a coincident signal from anti-parallel $e^{+}$ and with fixed energy ($\simeq 52.8$ MeV). To achieve a sensitivity of $6\times10^{-14}$, the experiment exploits the most intense muon beam in the world (up to $108\ ^{+}/s$) as well as newly conceived particle detectors to reduce background contamination and to improve the resolution of the particles' kinematic properties: the photon detector is a 900 l liquid Xenon detector instrumented with more than 4000 SiPM and hundreds of phototubes; the spectrometer to track the positron is composed of a ultra-light ($1.58\times10^{-30}$) and ultra-segmented (more than 1700 signal wires) cylindrical drift chamber, a highly segmented detector with scintillating tiles read by SiPM. These detectors are immersed in a non-solenoidal magnetic field.
Auxiliary detectors help to improve the background rejection.
A trigger and data acquisition system WaveDAQ allows to digitize the waveforms from each of the $\sim 9000$ detector channels for offline event reconstruction, while simultaneously rejecting most of the background events: the event rate is reduced from $10^{7}$ Hz down to 10 Hz while keeping a 97 % selection efficiency.

Currently, MEGII has ended its second year of data acquisition.
In this presentation In will review MEG~II's experimental concept and status.

**Primary author:** VENTURINI, Antoine (Istituto Nazionale di Fisica Nucleare)

**Presenter:** VENTURINI, Antoine (Istituto Nazionale di Fisica Nucleare)

**Session Classification:** Young Researchers Session

**Track Classification:** CKM & LFU