Referee Report to the 46th N.P. PAC at JINR

Concerning 9.1 experiments MEG-PEN

"Precise measurement of the π→eν branching ratio" (PEN)

"Search for the lepton violating μ→e+γ decay in the MEG experiment"

MEG-PEN both are experiments performed by large collaborations at the high quality meson beams of PSI, Switzerland, investigating fundamental processes in particle physics with highest sensitivity. The Dubna group has significantly contributed to the success of these experiments with designs, constructions, tests and supplies of important detector parts, and in participation on the data runs and analysis.

The **PEN** experiment was executed at PSI in three major runs during the years 2008-2010 measuring the branching ratio B of the pion decays R(**π→eν**) / R(**π→μν**) with highest precision ΔB/B < 10E-3. The Dubna group contributed greatly to almost all of the detector components (CsI crystals, mini-TPC, MWPC's, DAQ, etc). The written report gives an excellent description of the very sophisticated experimental setup, its functioning, the data structure, the systematics and the obtained spectra. The analysis of the 2.3x10E7 **π→eν** events is now just about finished and likely will meet the original experimental goal.

The **MEG** experiment at PSI is a search for the neutrino-less muon decay μ→e+γ and presents today by far the most sensitive test of searches for lepton flavor violation which would be an unambiguous signal of physics bejond the standard model. The MEG setup consists of a drift chamber spectrometer in a magnetic field to determine the energy and coordinates of the positron in coincidence with a gamma observed by a huge liquid Xenon detector. In the run periods 2009-2013 the MEG collaboration - using 7.5x10E14 μ+ stops - has achieved on the world scale the most sensitive upper limit B(μ→e+γ) < 4.2x10-13 (90% confidence level).

Presently the MEG setup is being totally upgraded into **MEG-II** where almost every aspect of the experiment will be significantly improved: increased statistics, less materials with reduced radiation length, better granularities and timing of detectors, refurbished liquid Xenon detector with twice larger solid angle acceptance, new DAQ, etc. The new MEG-II setup will be finished in 2017, with the goal to improve the sensitivity in running periods 2018-2020 by one order of magnitude, either to find the μ→e+γ decay or to set a new upper limit B < 4-5x10E-14.

Since MEG-II will clearly be a high light in the important quest for physics bejond the standard model, I strongly recommend continued participation of the Dubna group in MEG-II and to provide all necessary support by the laboratory.

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