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学位申請者：Nguyen Minh Truong

論文題目： Estimation of Cosmic Ray Induced Background and a FPGA-Based Data Compression Algorithm for DeeMe Experiment

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場所：理学研究科 H 棟 7 階 7 階セミナー室（H701 号室）

主査 ：久野良孝
副査 ：岸本忠史、中野貴志、能町正治、青木正治

論文要旨:

The muon to electron conversion (μ-e conversion) in the nuclear field, $\mu^- + N \rightarrow e^- + N$, is one of charged-Lepton Flavor Violation (cLFV) processes. This process is forbidden in the Standard Model (SM) of particle physics. However, in many predictions of theoretical models beyond the SM, this process may happen at a level of few orders of magnitude below the upper limits given by previous experiments.

DeeMe experiment aims to search for μ-e conversion at 10^{-15} level of a single event sensitivity (SES) and will be conducted at J-PARC Materials and Life Science Experimental Facility (MLF). The pulsed proton beam from Rapid Cycling Synchrotron at J-PARC is used to bombard a production target. The muonic atoms are produced inside the production target and the electrons from μ-e conversion may be emitted. These electrons will be transported to a spectrometer by a secondary beamline. The momenta of electrons will be measured by the spectrometer. The physics run will start to take data when the construction of the beamline at MLF has completed.

In order to achieve the SES above, it is very important to understand and control potential backgrounds. A cosmic ray induced background is one of potentially dangerous backgrounds in DeeMe experiment. A Monte-Carlo study has performed to estimate its rate. Based on this result, a data acquisition system has been developed so that it is not only used to collect the μ-e conversion signals but also used to monitor the cosmic ray induced background.