

Muon Beam Imaging at J-PARC MUSE using a Gated Image Intensifier

T. U. Ito^{1,2#}, A. Toyoda³, W. Higemoto^{1,2}, M. Tajima⁴, Y. Matsuda⁴, and K. Shimomura^{2,5}

¹*Advanced Science Research Center, JAEA, Tokai, Ibaraki 319-1195, Japan*

²*Materials and Life Science Division, J-PARC Center, Tokai, Ibaraki 319-1195, Japan*

³*Institute of Particle and Nuclear Studies, KEK, Tsukuba, Ibaraki 305-0801, Japan*

⁴*Graduate School of Arts and Sciences, University of Tokyo, Meguro, Tokyo 153-8902, Japan*

⁵*Institute of Materials Structure Science, KEK, Tsukuba, Ibaraki 305-0801, Japan*

a corresponding author: E-mail ito.takashi15@jaea.go.jp

For muon beam experiments using pulsed intense beams, it is important to not stop muons in materials surrounding the experimental target since the muons that missed the target create undesirable background in experimental data. The fraction of such stray muons must be reduced as much as possible by tuning beam line optics.

Here we report a new muon beam profile monitor developed for efficient interactive beam tuning at J-PARC MUSE [1]. This device is mainly composed of a scintillation screen, a gated image intensifier (II), and a cooled CCD camera, and designed to be compact so that it could be used without removing a μ SR spectrometer at the exit of the beam line. A full 2D profile of a 4-MeV muon beam was successfully obtained in several tens of seconds. The spatial resolution of the 2D beam profile was estimated to be 1.4 mm. Decay positron background on the muon beam image was significantly reduced by high-speed gating of II (gate width~50 ns). Details of evaluation experiments (3D beam imaging, observation of a 4-MeV negative muon beam, etc.) will be presented.

References

[1] T. U. Ito, A. Toyoda, W. Higemoto, M. Tajima, Y. Matsuda, and K. Shimomura, Nucl. Instr. Meth. A **754**, 1-9 (2014).