

Developing monitoring system with infrared camera for muon production target

S. Matoba^{1,2#}, H. Sunagawa^{1,2}, N. Kawamura^{1,2}, and S. Makimura^{2,3}

¹J-PARC Center, Tokai, Ibaraki 319-1195, Japan

²Institute of Material Life Science, KEK, Tsukuba, Ibaraki 305-0801, Japan

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

#smatoba@post.kek.jp

The Muon Science Facility (MUSE) at J-PARC MLF generates intense pulsed muon beams, which are used to study various elementary particle and material life. A muon production target is installed on the proton beamline between the 3 GeV synchrotron and the neutron target. The target is made of high-purity isotropic graphite IG-430U (Toyo Tanso), which is exposed to a strong radiation environment and heats up to high temperatures during beam irradiation.

In 2019, the rotating target was installed and is now operating smoothly at 1 MW. The ring-shaped graphite, 250 mm in inner diameter, 350 mm in outer diameter, and 20 mm thick, is divided into three sections to prevent failure due to thermal stress caused by thermal imbalance. By introducing a solid lubricant made from tungsten disulfide, we have achieved a long life of the rotating support under high heat, high radiation, and vacuum, which is expected to be about ten years.

Recently, we developed a real-time two-dimensional radiation thermometer to monitor the temperature of the target. We are accumulating the information of temperature and rotation state under 700 kW operation, shown in Fig.2, for the purpose of integrating the infrared camera into the safety system of the facility. In this presentation, current status and future prospect of the muon target at J-PARC MLF MUSE will be introduced.



Fig. 1 Pictures of the rotating target.

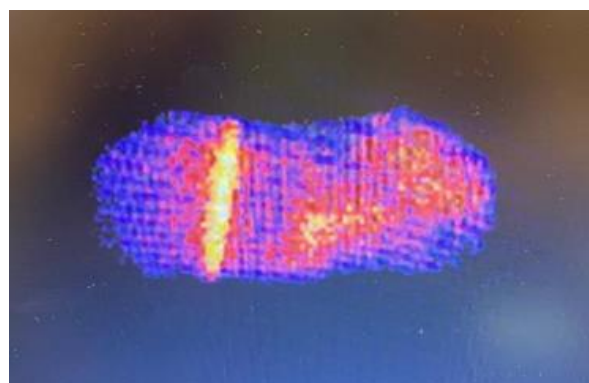


Fig. 2 Infrared camera image of the rotating target during a beam operation.