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Progress and scientific activities of the Japanese DC muon facility

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We started to provide DC muon beams to world wide users in 2015 at Osaka, Japan. The DC muon facility was built in Research Center of Nuclear Physics (RCNP) of Osaka University, and was named MuSIC.

In MuSIC, muons are generated using 392 MeV protons hitting a Graphite target. Then, all charged secondary particles are immediately captured by a 3.5 Tesla magnetic field. This particle capture system is the most unique feature of the MuSIC system. A radiation tolerant superconducting solenoid magnet was developed for the system. The captured pions and muons are transported by a 2 Tesla large-bore solenoid channel. The muon intensity at the end of the transport solenoid was measured as about 10^8/s for 1 μA proton beam in 2012. This successful demonstration is a great milestone toward the COMET experiment, which plans to use 10^{10}/s with a 56 kW proton beam at J-PARC. The second pion capture system designed for the COMET experiment is now under construction.

On the other hand, in 2013, the MuSIC transport solenoid was expended by a 18 m-long normal-conducting beam line to start muon programs at RCNP. After the beam line commissioning, finally official operations for users were started from November 2015. Sixteen user experiments have been already performed by 2019. The DC muon beam from the MuSIC beamline offers new opportunities to various users not only particle and nuclear physicists, but also material scientists, archaeologists and so on.

Progress and prospects of the RCNP-MuSIC facility will be presented in this paper.

Working Group

WG4 : Muon Physics

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