J-PARC Muon Source, MUSE

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The muon science facility (MUSE), along with the neutron, hadron, and neutrino facilities, is one of the experimental areas of the J-PARC project, which was approved for construction in a period from 2001 to 2008. The MUSE facility is located in the Materials and Life Science Facility (MLF), which is a building integrated to include both neutron and muon science programs. Construction of the MLF building was started in the beginning of 2004, and was recently completed at the end of the 2006 fiscal year. We have been working on the installation of the beam line components, expecting first muon beam in the summer of 2008. For Phase 1, we are planning to install one superconducting decay/surface channel with a modest-acceptance (about 40 msr) pion injector, with an estimated surface muons (μ^+) rate of 3×10^7/s and a beam size of 25 mm in diameter, and a corresponding decay muons (μ^+/ μ^-) rate of 10^6/s for 60 MeV/c (up to 10^7/s for 120 MeV/c) with a beam size of 50 mm in diameter. These intensities correspond to more than ten times what is available at the RIKEN/RAL Muon facility which currently possess the most intense pulsed muon beams in the world. In addition to Phase 1, we are planning to install, a surface muon channel with a modest-acceptance (about 50 mSr) mainly for experiments relating to material sciences, and a super omega muon channel with a large acceptance of 400 mSr for the study of thin film magnetism, as well as for experiments in negative muon physics. In the case of the super omega muon channel, the goal is to extract 4×10^8 surface muons/s for the generation of ultra slow muons and 1×10^7 negative cloud muons/s with a momentum of 30-60 MeV/c. One of the important scientific goals for this beam line is to construct the ultra slow muon apparatus the associated laser system. Approximately $2\sim5\times10^5$ ultra slow muons/s will be expected, which will allow for the extension of μSR into the area of thin film and surface science.

In the symposium, the current status of J-PARC MUSE will be reported.