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Studies and R&D efforts of the EMuS muon facility at CSNS

CSNS (China Spallation Neutron Source) is a large scientific facility which was completed and entered in operation in March 2018. It is based on a high-power proton accelerator complex and is mainly for multi-disciplinary research based on neutron scattering techniques. Other applications including muSR techniques have been considered from the beginning. The design study for an experimental muon source (the so-called EMuS) was started in 2007. Now a simplified scheme of EMuS is included in the CSNS-II project which has been approved and will start the construction soon. A study collaboration team from different institutions in China has devoted to the scheme design, physics design and R&D studies including prototyping of key devices. The user league for research at the future EMuS was also formed. EMuS will employ a proton beam of 1.6 GeV in beam energy, 25 kW in beam power and 2.5 Hz in repetition rate, which shares about 5% of the total beam power of 500 kW provided by the accelerator. Two design schemes on the target station and muon beamlines have been studied. The Baseline Scheme uses a conical graphite target that is placed in a superconducting solenoid of 5 T in magnetic field, and the muon beam transport line is also mainly based on superconducting solenoids. Up to eight endstations for different research fields using different kinds of muon beams can be arranged. The Simplified Scheme uses a free and stab-like graphite target of long interaction length, and four muSR spectrometers are foreseen. The two schemes share the same general layout, thus the simplified Scheme can be upgraded to the Baseline Scheme easily. This presentation will introduce the design aspects and R&D efforts of EMuS.

Primary author: TANG, Jingyu (IHEP, Beijing)

Presenter: TANG, Jingyu (IHEP, Beijing)

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