Contribution ID: **69** Type: **Oral Talks**

Towards a high-intensity muon source at CiADS

Saturday 20 April 2024 09:05 (25 minutes)

A high-intensity muon source driven by a continuous-wave superconducting linac holds the potential to significantly advance the intensity frontier of muon sources. Alongside advancements in accelerator technologies, breakthroughs in muon production target and collection schemes are essential. Here a novel muon production target is proposed, utilizing a free-surface liquid lithium jet capable of handling the heat power generated by the CiADS proton beam with an energy of 600 MeV and a current of 5 mA. It is predicted by our simulation studies that the lithium target is more efficient in surface muon production compared to the rotating graphite target. The parameter space of the front end consisting of a lithium target and a large aperture capture solenoid is explored, from the perspective of production efficiency, capture efficiency, and characteristics of the surface muon beam. The CiADS muon source is planned to be developed in two stages. In the first phase, the proton beam power will be 300 kW and the surface muon rate in the experimental area is expected to be 3.E9 /s. The conceptual layout and the design progress of the Phase I project are reported. The simulation study based on the preliminary design of the beamlines indicates that an overall transmission rate of more than 10% can be achieved. In the second phase, the beam power is expected to be upgraded to 3 MW and the liquid lithium jet target will be employed. The surface muon rate is expected to be 5.E10 /s. We believe that the unprecedented rate will enable entirely new experiments with considerable discovery potential and unique sensitivities in particle physics, condensed matter physics, and materials science.

Author: Dr CAI, Han-Jie (IMPCAS)

Presenter: Dr CAI, Han-Jie (IMPCAS)

Session Classification: Plenary-1