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Progress on the surface muon beamline S-Line at J-PARC MUSE

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The surface muon beamline (S-Line) in the experimental hall No.1 of the Materials and Life science experimental Facility (MLF), J-PARC is designed to provide low-energy muon beam, which is mainly utilized by materials and life science experiments. The final goal of S-Line is a beamline with four experimental areas from S1 to S4, of which the first experimental area S1 started in 2017 for user experiment programs. In 2022, beam tests in the second experimental area S2 finally started, where a group led by Prof. Uetake at Okayama University has set up an apparatus for laser spectroscopy of muonium. Using the electric beam kicker in the S line, a double-pulse muon beam can be used as a single-pulse muon beam in the S1 and S2 areas simultaneously. Beam commissioning started in January 2022 confirmed that 3x10^6 /s of positive muons are extracted to the S2 area when the proton beam of 700 kW is operated. Besides, we have had several beam kicker problems due to failures in the Marx high voltage circuits using semiconductor devices. It is the beamline component that requires improvement for stable operation at the highest priority.

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