

Physics at MESA

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The Mainz Energy-Recovery Superconducting Accelerator MESA is currently under construction at the Institute of Nuclear Physics in Mainz. In this talk, we report on the comprehensive physics program of the various fixed-target experiments at MESA. The versatile MAGIX experiment will use MESA's innovative energy recovery technique, which enables very high beam intensities. The setup is equipped with a gas jet target and magnetic spectrometers. The science focus is on high-precision scattering experiments including dark sector searches, the study of hadron structure and few-body systems, and investigations of reactions relevant to nuclear astrophysics. For the P2 experiment, an external beamline will provide spin-polarized electrons. An integrating magnetic spectrometer/detector apparatus will be used to perform sensitive tests of the Standard Model using parity-violating electron scattering. In particular, a precision measurement of the weak mixing angle is to be performed. Finally, the DarkMESA beam dump experiment, located behind P2, will search for light dark matter particles.

Autore principale: SCHLIMME, Sören

Relatore: SCHLIMME, Sören

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