

# Joint 20th International Workshop on Hadron Structure and Spectroscopy and 5th workshop on Correlations in Partonic and Hadronic Interactions



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## Dark sector searches at the electron accelerator MESA

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The existence of dark matter has been supported by decades of accumulating evidence, making it one of the most compelling unsolved mysteries in modern physics. While its presence is widely accepted, the true nature of dark matter remains elusive. Among the many experimental strategies to probe this enigma, fixed-target experiments at particle accelerators offer a promising avenue, with the MESA accelerator set to play an important role in future investigations.

MESA is a high-intensity electron accelerator operating in the low-energy regime, currently under construction at the Institute for Nuclear Physics at the Johannes Gutenberg University Mainz, Germany. It hosts three key experiments - MAGIX, P2, and DarkMESA - each contributing to a diverse and ambitious physics program. As the first accelerator combining the innovative concept of energy recovery with high-precision physics measurements, MESA will provide two operation modes: an energy recovery mode and an extracted beam mode.

A primary objective of MESA's research is to explore the dark sector, a potential solution to the dark matter puzzle. Both MAGIX and DarkMESA are crucial to this effort. MAGIX is a high-resolution, two-spectrometer experiment utilizing an internal gas jet target in MESA's energy recovery mode, while DarkMESA is a beam-dump experiment situated behind the P2 experiment that will be operated in extracted beam mode. Together, these experiments are designed to perform precise and competitive measurements sensitive to light dark matter (LDM) models.

This talk will present an overview of the dark sector searches planned at MAGIX and DarkMESA.

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