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Realization of an Energy System-Informed Digital Twin of the KARA Accelerator at KIT in a Real-Time Simulation Environment: the ACCESS Project

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Particle accelerators are complex and energy-intensive facilities that require extensive and intertwined connections with the public electrical grid. Furthermore, accelerator facilities are well known for their low power demand flexibility, which depends only on experimental operations, and it must be accommodated independently from the grid. So, it is necessary to develop and test new energy solutions for an energy-efficient and stable operation of particle accelerators. However, validating novel solutions at a research facility is difficult, because technical problems can disrupt the operation and research process.

In the project ACCESS (ACcelerator Energy System Stability), an energy system-informed digital twin of the Karlsruhe Research Accelerator (KARA) will be realized at the Energy Lab 2.0 in a real-time simulation environment. The goal is to validate energy solutions that can be applied to accelerators in a safe and flexible environment (simulation) without interfering with experiments performed at KARA, while retaining high accuracy (digital twinning).

This contribution will provide a look at the first results of the project ACCESS and will highlight the need for fast measurement systems in particle accelerators.

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Footnotes

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Yes

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