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Portable solutions for digital twins

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Digital twins of highly-nonlinear, time-dependent complex systems require to include knowledge on the initial experimental conditions, all relevant detection modalities and the complex system itself. In the case of plasma accelerators, these systems can be seen both as compact accelerators and complex systems to study. In both cases, they require considerable computational power to reach predictive capabilities compared to experiments. With the help of AI invertible surrogate models for specific cases, compute requirements can be significantly reduced while being able to make reasonable accurate predictions and allow for fast inference. In the end, we need to interconnect open solutions to some of the most pressing problems in fast and accurate data analytics and simulations to allow for near real time feedback from digital twins to the real machine and experiment. This talk presents some of the building blocks needed for that.

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