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Towards a surrogate computational tool to quantify the systematic uncertainties in EDM experiments in storage rings

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The searches for permanent Electric Dipole Moments (EDMs) of elementary particles provide a powerful tool to probe physics beyond the standard model (SM). This is particularly useful to investigate the CP-violation mechanisms that can explain the matter-antimatter asymmetry in the universe.
Conducting such searches in storage rings requires unprecedented understanding of beam and spin dynamics, dictated by the smallness of the EDM signal to be measured. Given the complexity of storage rings, the desired signal is mainly dominated by the systematic uncertainties of the machine. It is therefore mandatory to build a computational model that emulates the realistic machine in order to help to disentangle the real signal out of the fake one.
This talk will present a surrogate computational tool in the context of spin and beam dynamics, to quantify the hierarchy of uncertainties in a storage ring. This tool will be applied to a model of the Cooler Synchrotron (COSY) as a proof-of-principle.

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