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XLR8: Accelerating Discoveries at Particle Accelerators with Computational Accelerators

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Particle accelerators are some of the largest scientific instruments ever built. They are some of the most complex nonlinear dynamical systems of practical importance. They are the enabling technology for science discoveries in high-energy, particle, nuclear and condensed matter physics, chemistry, and biology. The underlying fundamental science of accelerators is called beam physics. This talk will present some of the computational grand challenges and a few proposed solutions to nonlinear beam dynamics. Synergies with computational astrophysics, along with several shared features and differences will be touched upon.