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Synergia: a new platform for beam dynamics with multiple bunch interactions

JAMES AMUNDSON, Fermilab

Synergia is a dynamic platform for the simulation of beam dynamics scales from simple simulations on the desktop to complex simulations requiring massively parallel computers. Synergia has the capability to simulate collective effects in both single bunches and trains of bunches, including space charge within a bunch and intra- as well as inter-bunch wakefields. We have recently extended Synergia to simulate dual overlapping trains of bunches in order to study slip-stacking the Fermilab Recycler storage ring. I will present an overview of Synergia along with recent applications to the Recycler.