



Progress of BDSIM and Interface with Placet

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Intro



-
- Brief intro to BDSIM
 - Brief intro to Placet
 - Brief intro to BDSIM+Placet



BDSIM



- Based on Geant4 framework
- Fast tracking in vacuum
 - Analytical formulae for paraxial approximation in linear elements
 - 4th order Runge-Kutte elsewhere
- Full geant4 processes available in material
 - A selection of physics lists allow the user to determine which processes to turn on:
 - Transportation
 - Electromagnetic
 - Low energy EM
 - Hadronic
 - Muons
 - ...
- Secondary particles generated and tracked automatically



Geometry



- Fast geometry description from gmad file
 - No need to hand code each element as in Geant4
 - gmad parser largely compatible with MAD
 - some tweaks necessary...
- Element types defined as separate C++ classes
 - Each class has its own geometry description, stepper, physics processes, particle cuts, etc
- Arbitrarily constructed elements can be specified using a Mokka-style SQL file



New features



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- Can start the particles from any named element in the beamline
 - Can define new materials in the gmad file



But...



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- Single particle tracking code
 - Tracks each particle from start to end before firing the next
 - Does not take into account collective effects!
 - Space charge?
 - Wakefields



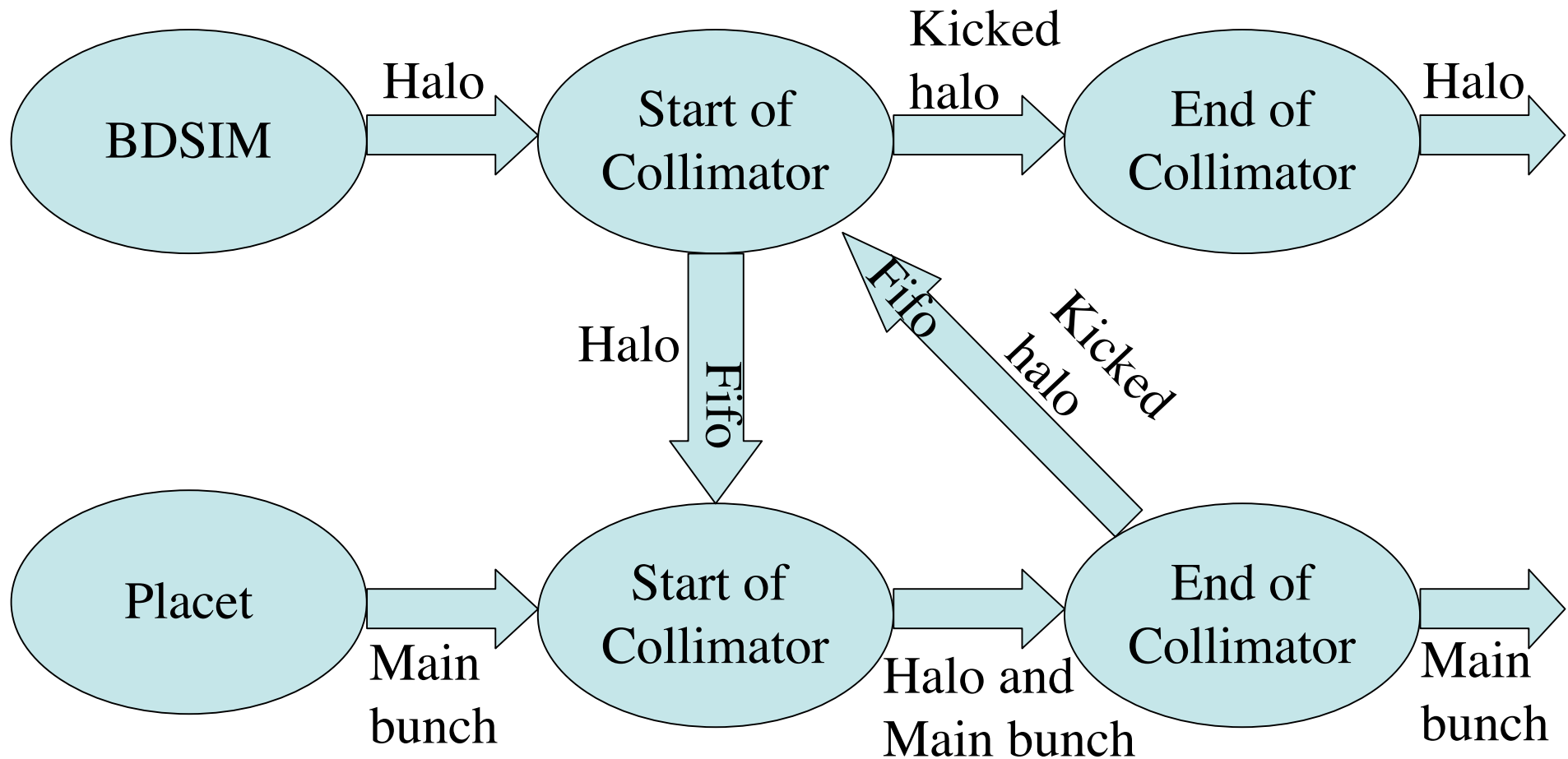
Placet



- Tracks the whole bunch element by element
 - Slices or macroparticles
- Calculates wakefields in collimators and cavities
- Can't do physics processes or secondary particle generation...



BDSIM+Placet





Halo descriptions - Placet



- Reads bunch data from fifo
- Halo particles added to the particle list
- Weighted to zero
 - Do not contribute to wakefields
- Tracked through collimators with main beam
 - Wakefield kicks applied to halo particles
- Write bunch data back to fifo
- Halo particle list cleared after each collimator



Halo descriptions - BDSIM



- Each particle tracked up to a plane at entrance to collimator
- After last particle is tracked, particle z position is adjusted based on time-of-flight compared to a reference particle
- Write particle descriptions to fifo
- Read kicked particle descriptions from fifo
- Start new run from start of collimator using kicked particles as new primaries



and finally...



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- Not limited to BDSIM↔ Placet
 - Any process which uses Guineapig format and can read/write to a fifo can be used