7. Example 1 (Cavity Wakes, Flash) – 2\textsuperscript{nd} attempt
wake-cavity fields: “Taylor” = monopole + dipole
rf-cavity fields: 3d field maps (including coupler kick)
comparison: rz 200kp <---> rz 1MP

1 MP run not completed

long. cavity wake counteracts chirp

r56/mm = 150.0

r56/mm = 66.4
comparison: rz 200kp <---> rz 1MP

1 MP run not completed

good phase advance of optics: compensation of effects
ASTRA: rz space charge model

particle tracking: point particles

rz space charge solver: ring charges

our usual rz s2e simulations use a centroid extraction method!

not this comparison!
ASTRA: centroid extraction method

3d: slices & centroids

1) extract centroid offsets

ASTRA rz-model for s.c. calculation

charge density is underestimated

2) ASTRA tracking of particles with extracted centroid offsets
3) transport centroid offsets (matrix)
4) restore new particle coordinates (add centroid offset)

remark: 3d space charge models create more noise (or need more particles)
comparison: rz 1Mp <---> xyz 1MP

both runs not completed

long. cavity wake counteracts chirp

r56/mm =
150.0
66.4
63.4

bc2
bc3

rz
xyz
comparison: rz 1Mp <-> xyz 1MP

both runs not completed

compensation of effects even better!
current and longitudinal phase space: rz 1MP

1 nC

current, before bc2

50 A

current, after bc2

220 A

current, before bc3

current, after bc3

2.5 kA

pz vs. z
current and longitudinal phase space: xyz 1MP

1 nC

current, before bc2

50 A

current, after bc2

220 A

current, before bc3

2 kA

current, after bc3
comparison $xyz$, $rz$ before $bc3$
comparison \textit{xyz, rz after bc3}