# Collimation tracking studies: efficiency and wakefield issues

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Collimation meeting 07-04-09

# From meeting 15th January 2009

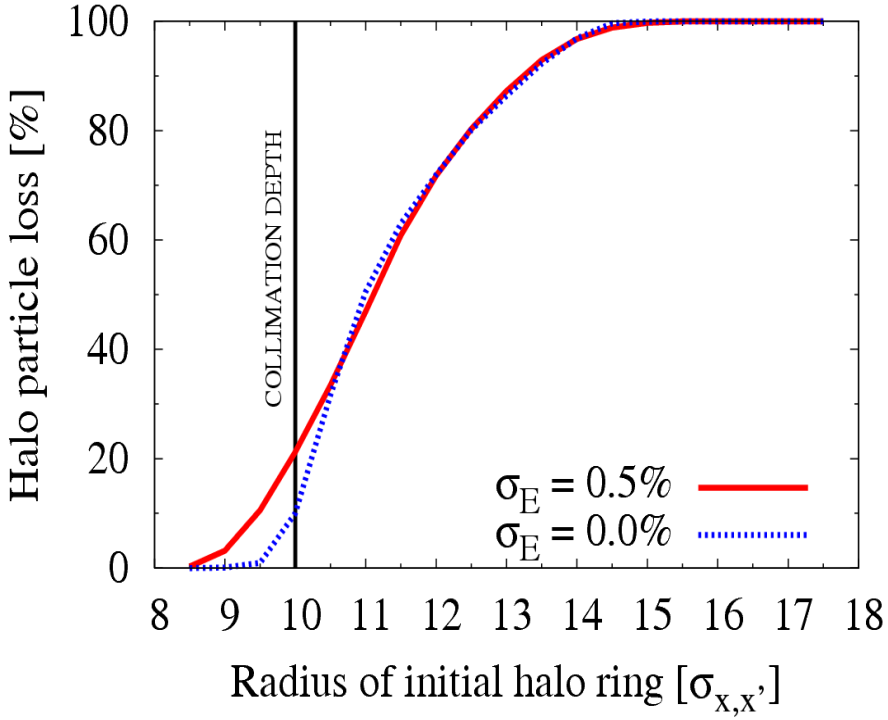
- Actions:
- Betatron collimation efficiency with monochromatic beams ($\sigma_E = 0$)
- From previous studies: transverse collimation less effective that for the old lattice
  - Study of the effects from the E-coll section
  - Benchmarking with other tracking studies:
    - using MERLIN (F. Jackson), BDSIM (S. Malton)
- Simulation of luminosity loss due to collimator wakefield effects considering a beam position jitter of 0.2 $\sigma_y$

# Collimation efficiency

Halo particle loss versus radius of the halo ring

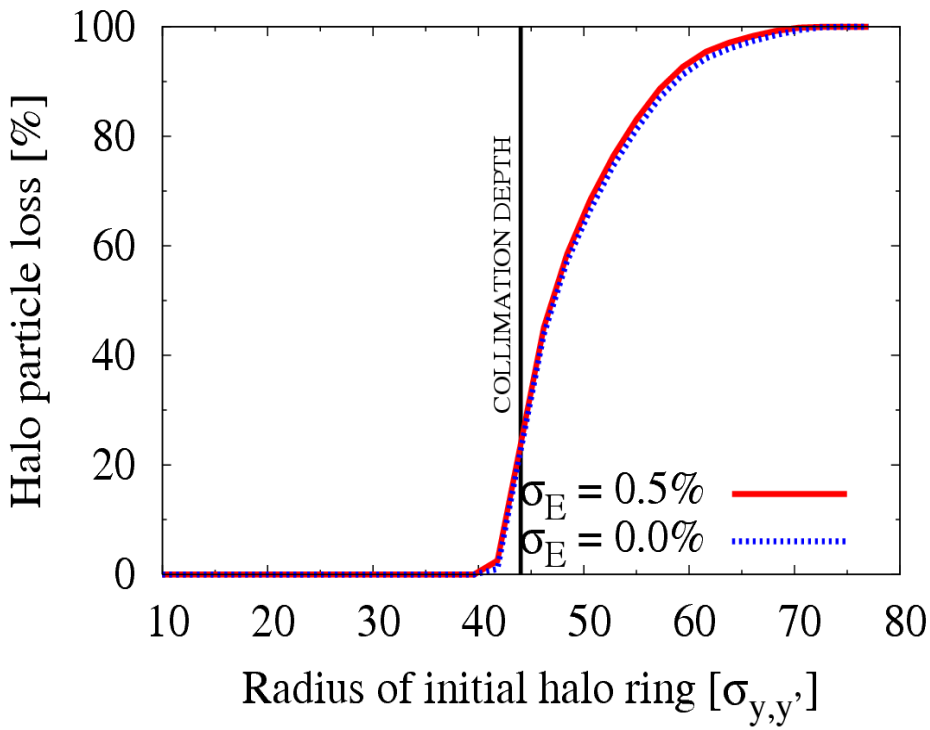
Comparison of monochromatic and chromatic beams

Horizontal halo




For $\sigma_E$ = 0.5% higher number of losses at radii < 11 $\sigma_x$

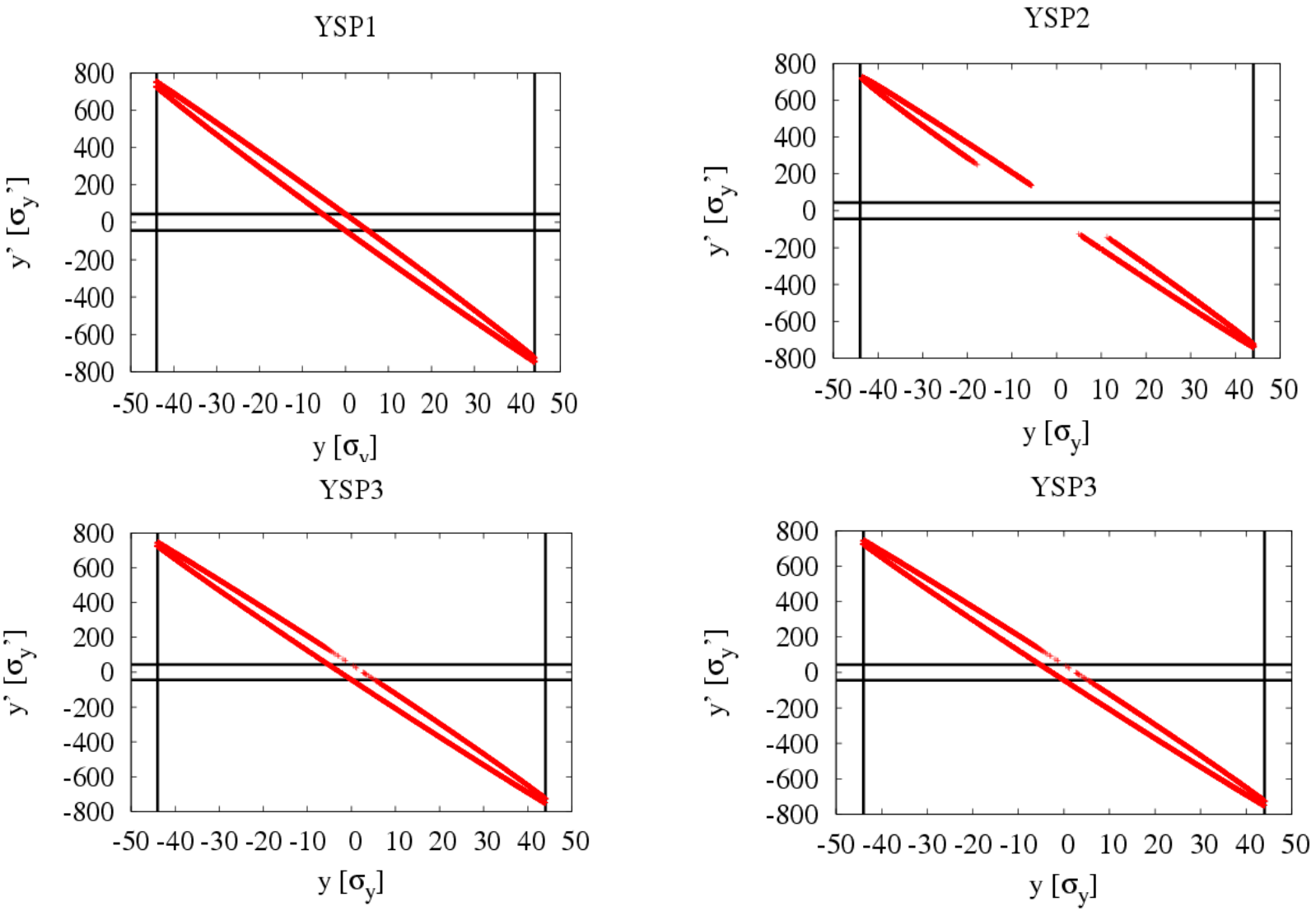
Vertical halo




Practically no effect on y-y' halo

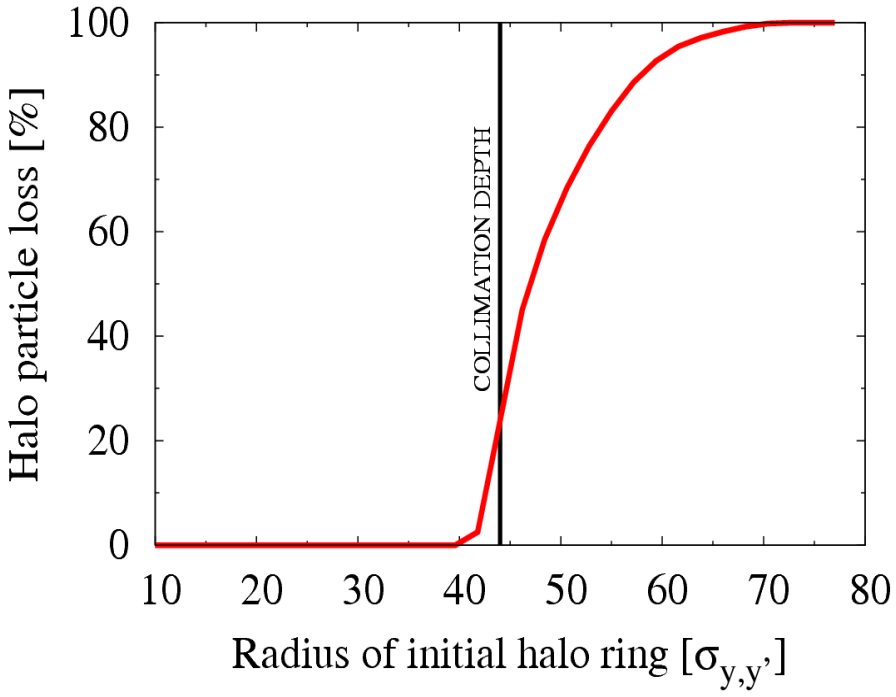
# Collimation efficiency

- Example of 44 $\sigma_{v,v'}$ phase space ellipse at each betatron spoiler

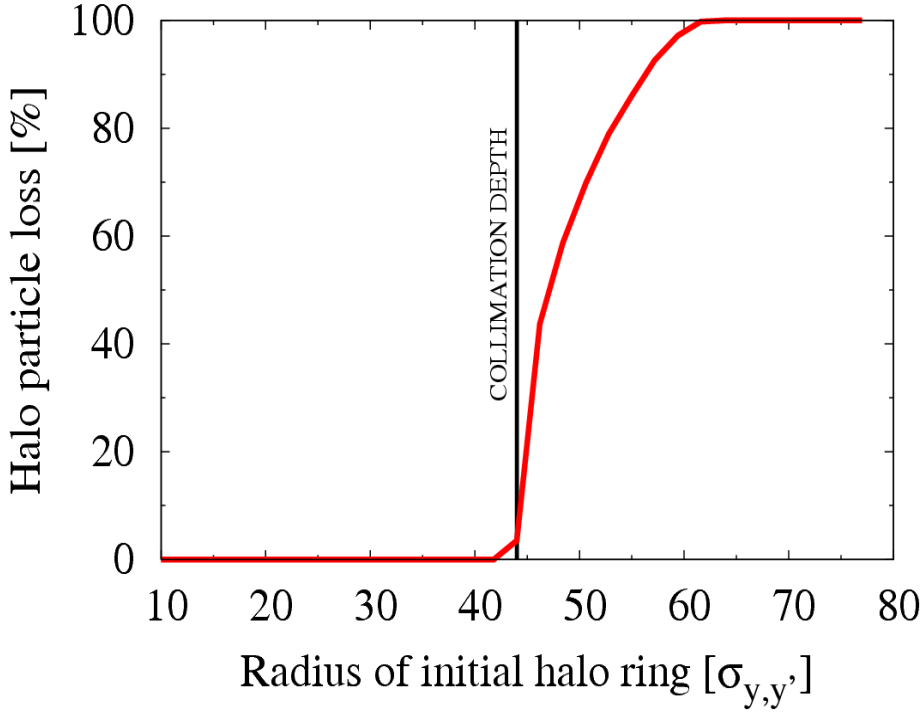


# Collimation efficiency

Tracking E-coll + beta-coll




Tracking only beta-coll

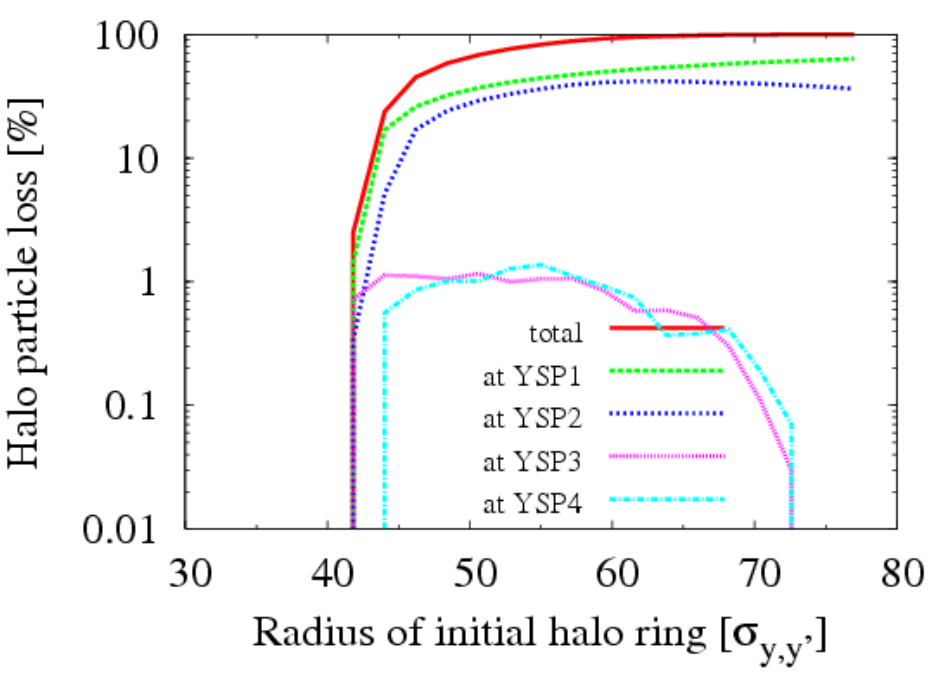



Starting tracking from the centre of the quadrupole QDBCOL immediately upstream of the spoiler YSP1→ slightly sharper cut

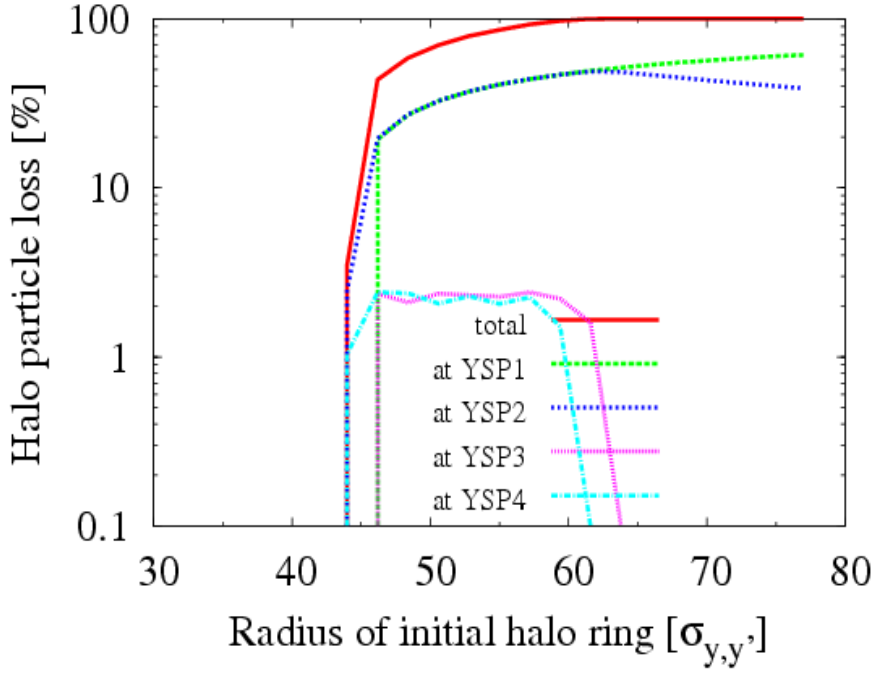
# Collimation efficiency

Particle loss at each spoiler:

Tracking E-coll + beta-coll



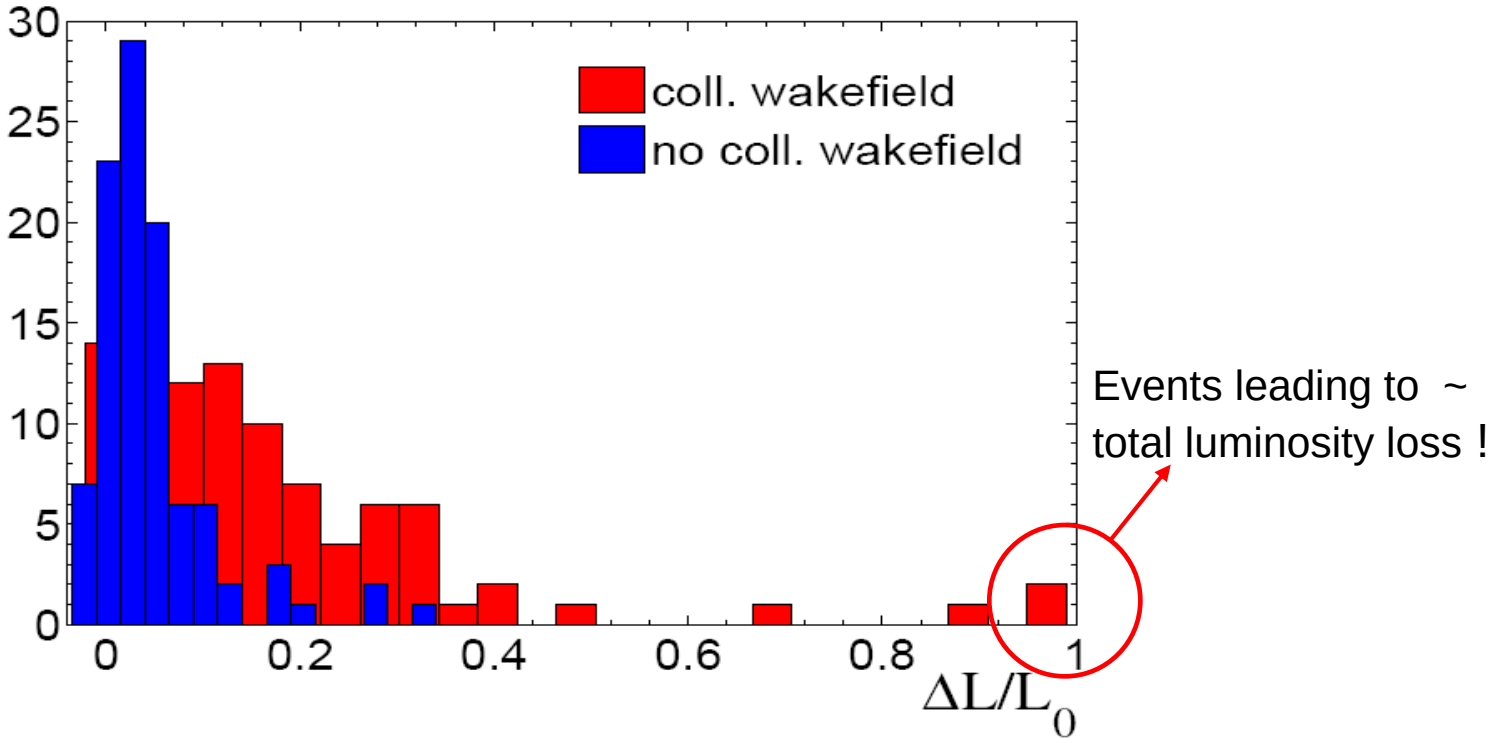

Tracking only beta-coll




When tracking only beta-coll, the particle loss increases by a factor $\approx$ 2 at spoilers YSP3 & YSP4 for 44 $\sigma_y$ <~ radii <~ 63 $\sigma_y$

# Collimator wakefield effects

Simulation of 100 machines, assuming $0.2\sigma_y$ jitter at the BDS entrance (using a normal offset distribution)




Wakefields in the BDS can cause severe single or multibunch effects leading to luminosity loss !