# Hollow e-beam for LHC collimation

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**A hollow electron beam in high-brightness high-energy proton rings**
E.G. in Large Hadron Collider (LHC)

- beam cleansing/collimation
- beam-beam compensation

**An advanced collimator:**

- not subject to overheating
- destruction
- controllable

**<u>This Document: End-to-end E-Gun design</u>**

Emission from cathode + transport/focusing by solenoids + dumping in the collector.

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## Previous Designs:

Guassian Beam (Solid Cathode)

https://indico.fnal.gov/materialDisplay.py?contribId=6&materialId=slides&confId=1514

Hollow beam ("Dented" Cathode)

http://beamdocs.fnal.gov/AD-public/DocDB/ShowDocument?docid=3308

Hollow beam (True Hollow  Cathode)

http://accelconf.web.cern.ch/AccelConf/e08/papers/mopc098.pdf

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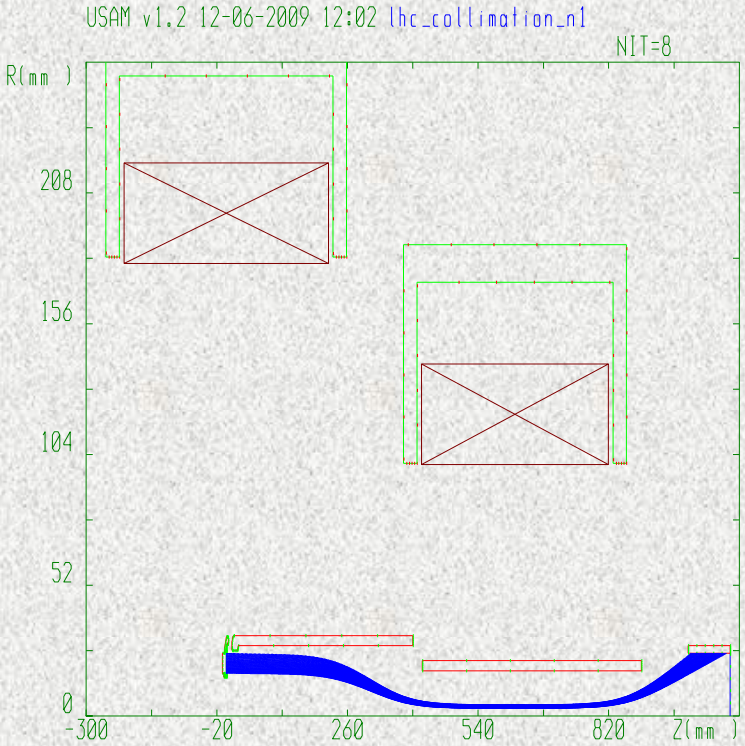
**Variant 1:**

**The 1st solenoid is standard, the 2nd soledoid (4T) is shorter.**
**Collector has zero potential (the very right electrode)**

## General Layout:

Solenoids →




## E-Gun:

From Cathode to Collector →

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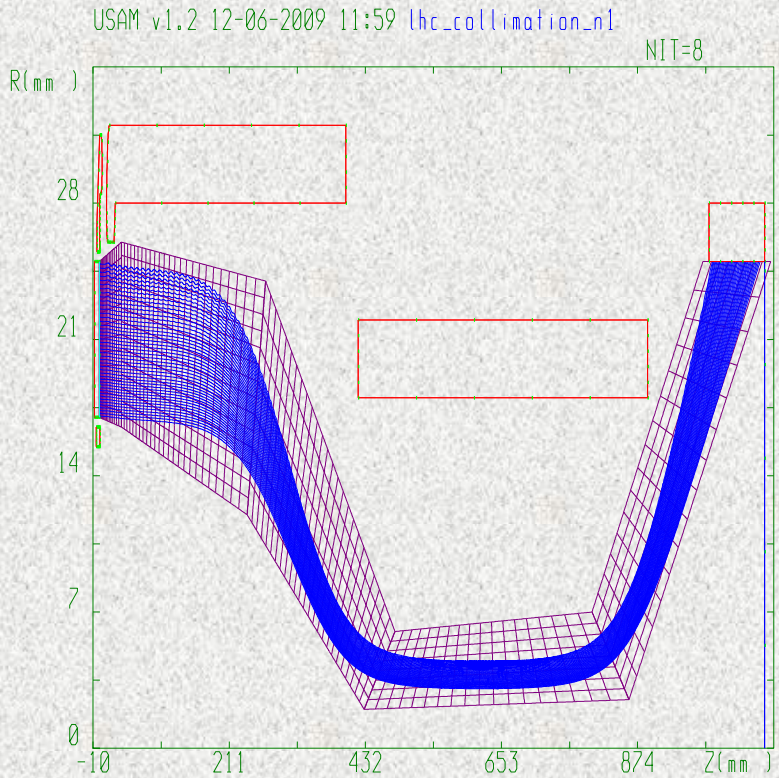
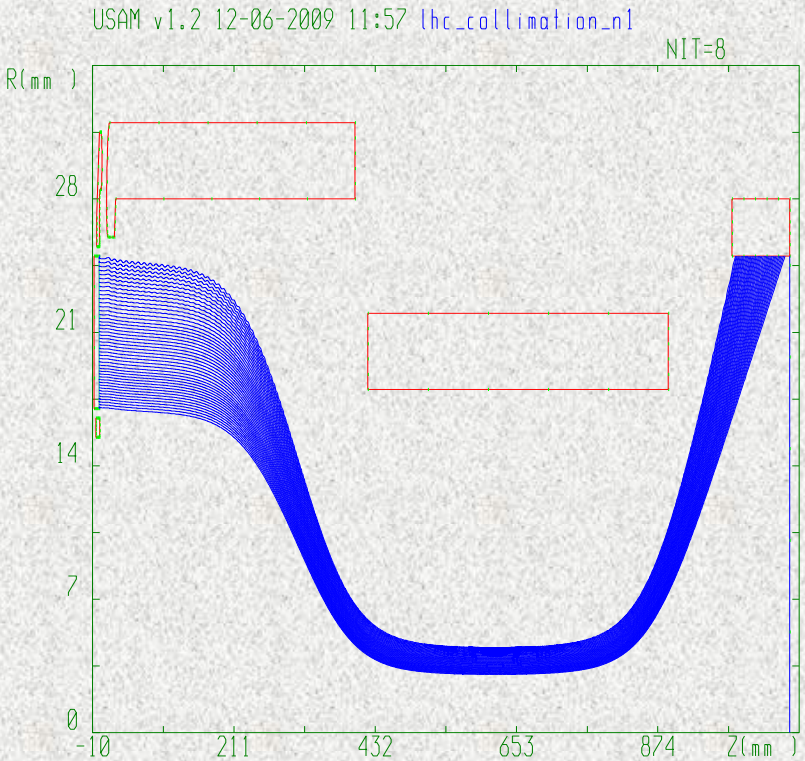
Spatial grid with variable dimensions/meshes: consistent for different numbers of space-charge iterations.




Spatial grid overlapping the e-beam




Collimation region to be extended