Developments in the STAR Simulation Software

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STAR Collaboration Meeting

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Credits

Lidia Didenko, Valeri Fine, Yuri Fisiak, Jerome Lauret, Ron Longacre – and many other STAR collaborators

Special thanks to Pavel Nevski

Overview

- STAR simulation status and performance in 2003
- STAR Detector Geometry Updates
- Recent infrastructure changes, 2004 and beyond
- Detector Geometry Description and Modeling

Simulation status and performance in 2002/2003

- Main simulation tool in 2003: STAF/GSTAR
  - code base unchanged since 2002
  - code maintained in a CMZ file, not in CVS
  - root4star libraries were using a slightly variant version (i.e. no common code base)
- Infrastructure changes to rectify this will be discussed below

Simulation status and performance in 2002/2003

Generator	E_{cms},GeV	System	Comment
Hijing 1.382	200	d-Au	year2003,min bias
Hijing 1.382	200	d-Au	year2003,min bias, wide Z
Pythia 6.203	200	p-p	year2003
Pythia 6.203	200	p-p	Pt>5 GeV
Pythia 6.203	200	p-p	Pt>15 GeV
Hijing 1.382	200	Au-Au	Heavy flavor embedding y2003x (J/Psi, Upsilon, Omega)
Mevsim	200	Au-Au	year_1e
Mevsim	200	Au-Au	year2001

STAR Geometry Development in 2003

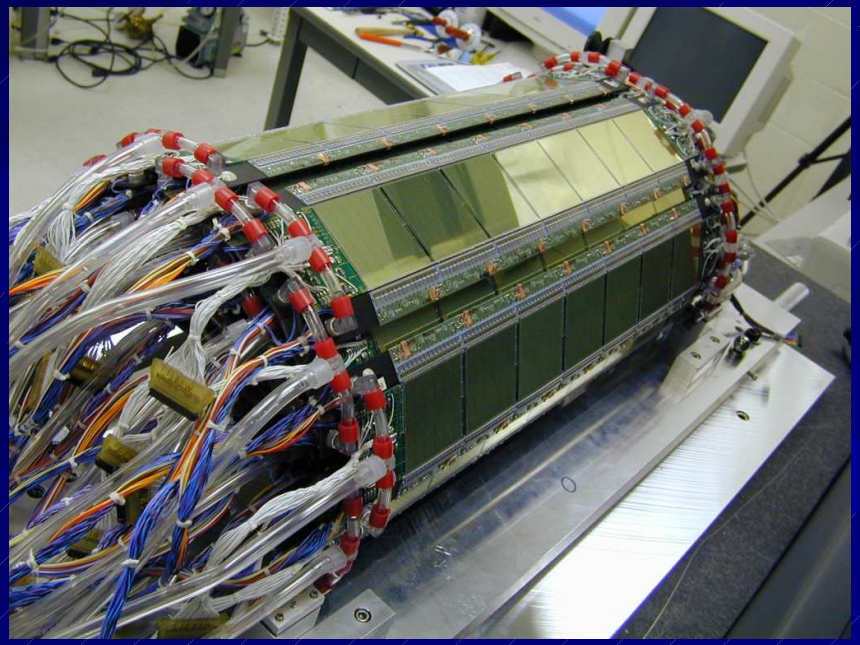
- Changed the material distribution in the silicon vertex detector (SVTT)
- Added PHoton Multiplicity Detector (PHMD)
- Augmented endcap calorimeter (ECAL)
- Changed the TOF geometry (BTOF) (F.Geurts, W.Llope)
- Augmented barrel calorimeter (CALB)
- Added the Pixel Detector (PIXL)
- Redesigned the Silicon Strip Detector (SISD) geometry code
- Made additions to the FTPC code
- Improved the main steering code (geometry.g)

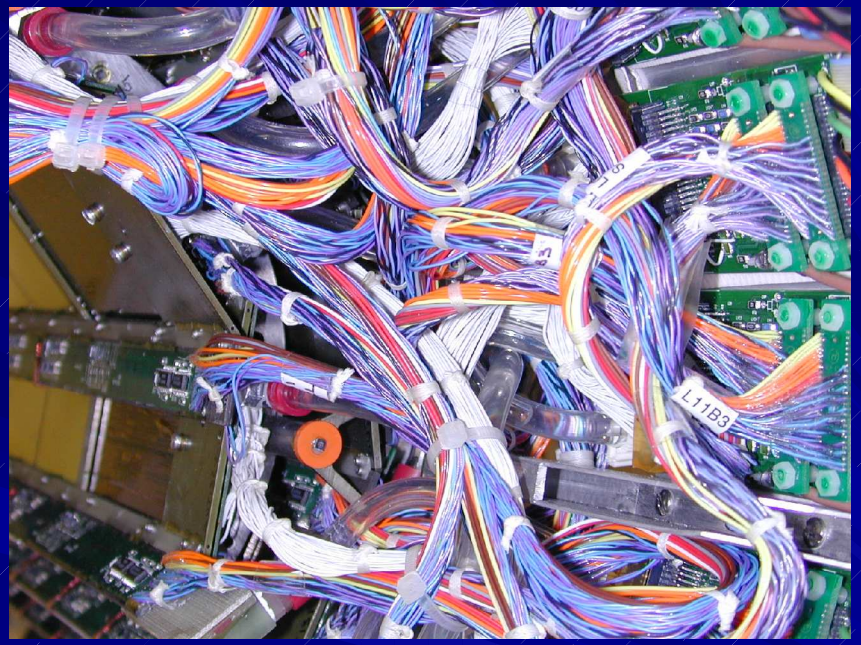
- Last but not least:
  - bug corrections

STAR Geometry Development – the SVT

- investigated the material distribution in the SVT using the photon conversion studies (I.Johnson, M.Potekhin) as a pointer
  - “extra material” plots presented last year
  - most of the extra material located on the rim of the SVT “barrel”
  - engineering data and images of the detector from D.Lynn
  - copper cables and water pipes identified as main contributors (about a pound of copper and two pounds of water)
  - added G10 circuit boards, previously missing
  - corrected the material of the main support struts
- Recent additions:
  - outer shielding , support "cage" made of carbon composite tubes

STAR Geometry Development – the SVT

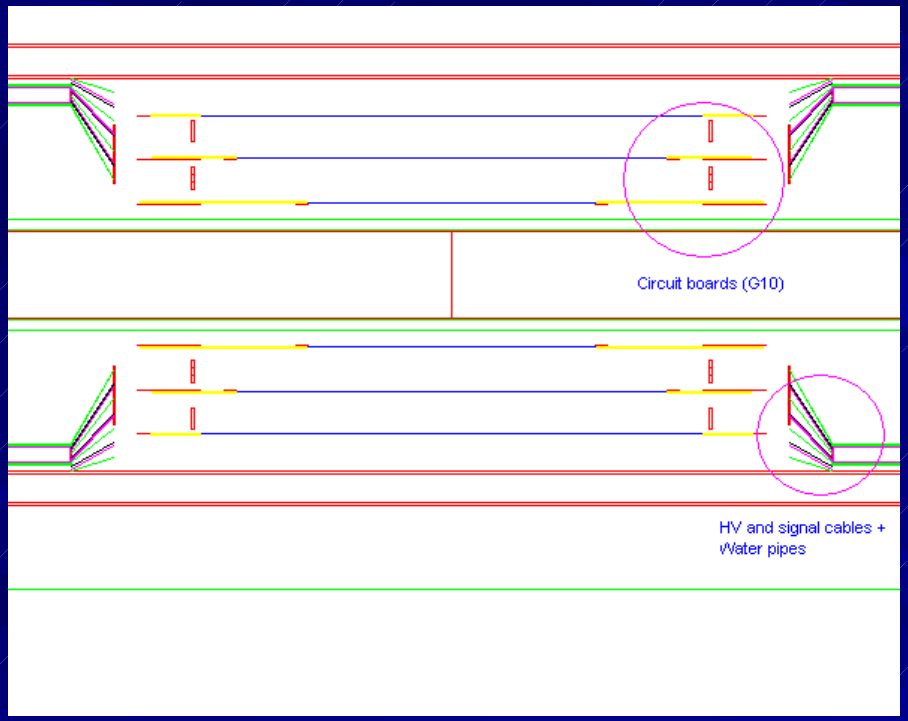


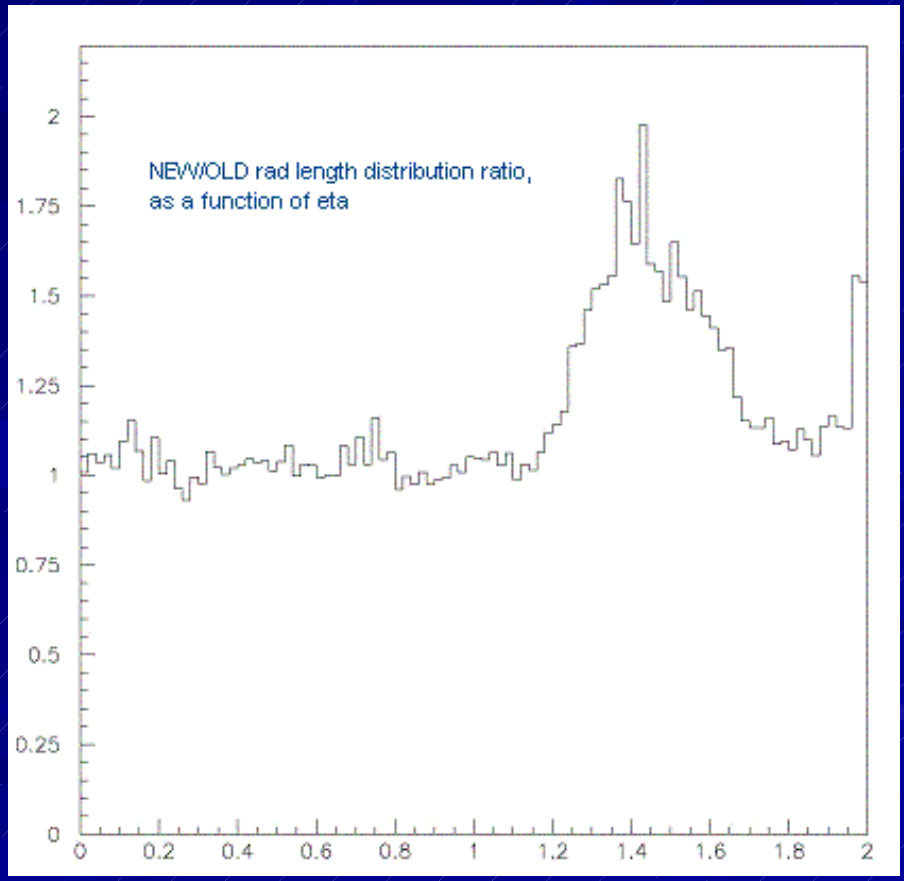


An illustration of the Cables and Water pipes in the SVT

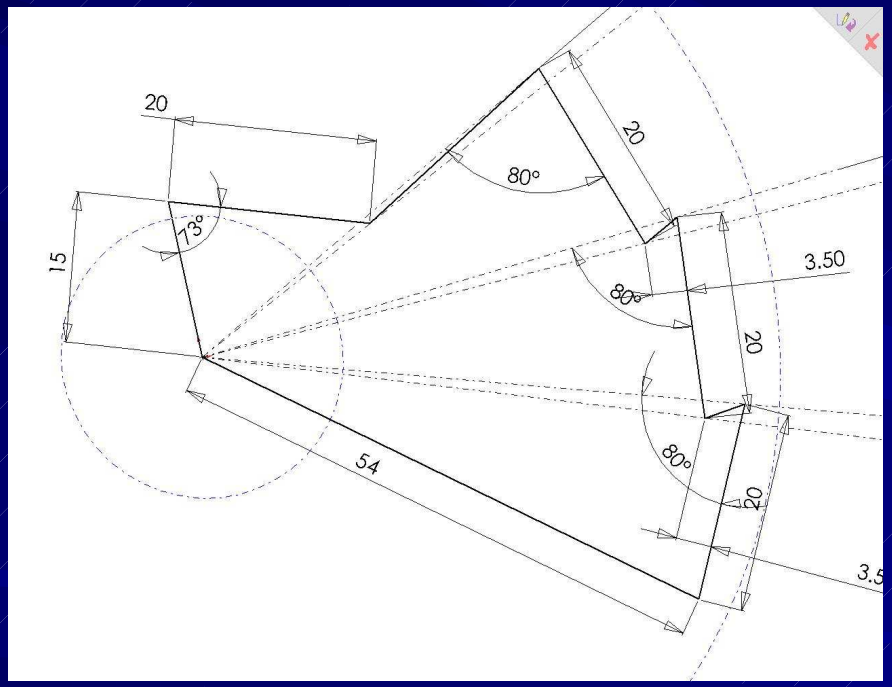
STAR Geometry Development – the SVT

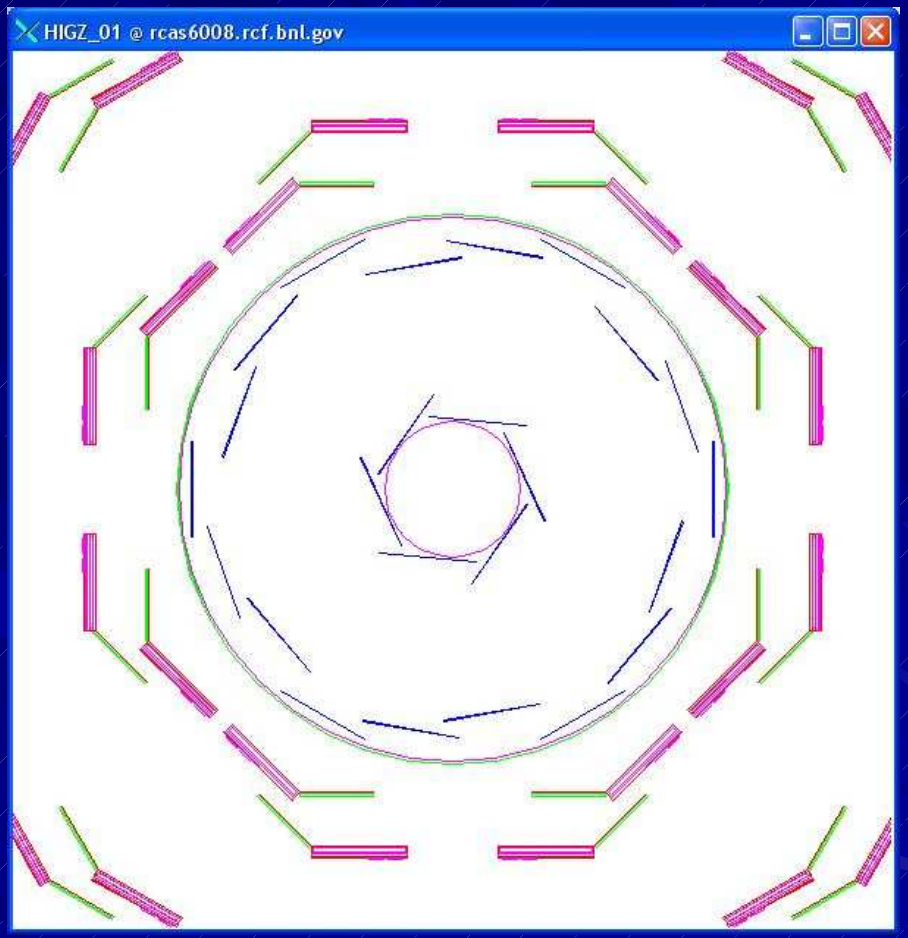
Added material: location and effect on rad length





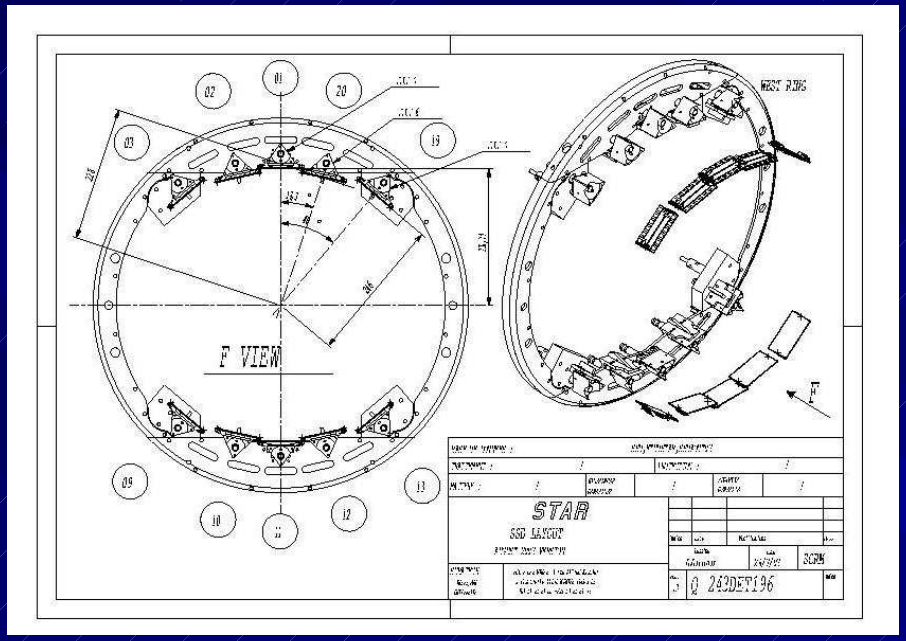
STAR Detector Geometry Development – the Pixel Detector

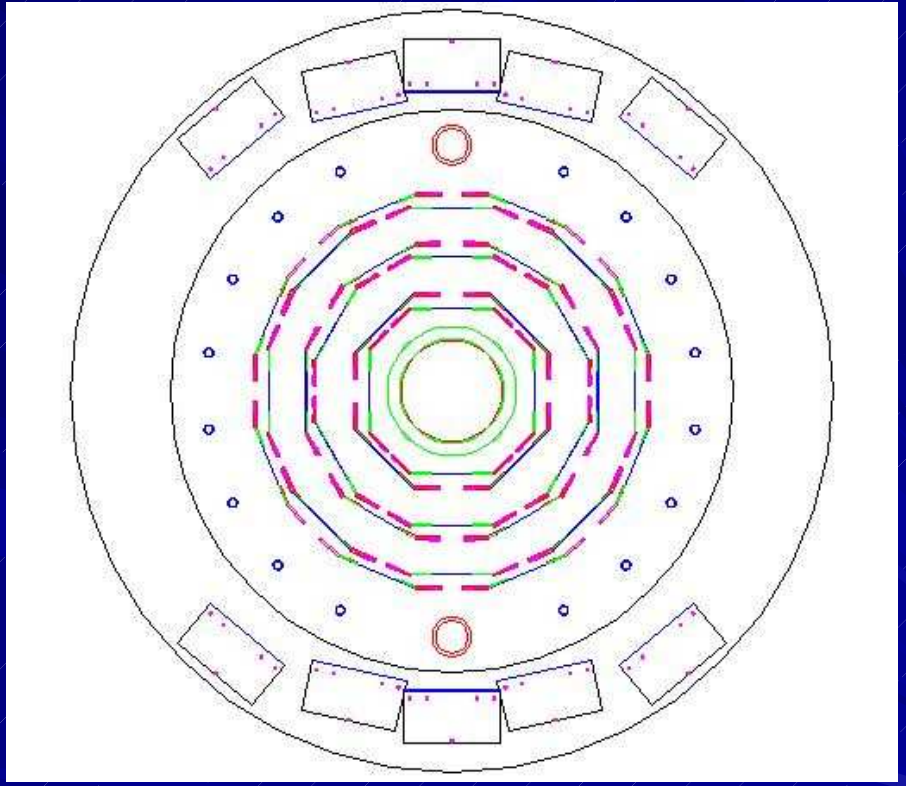




GEANT model of the Pixel Detector based on technical drawings

STAR Detector Geometry Development – the Silicon Strip Detector

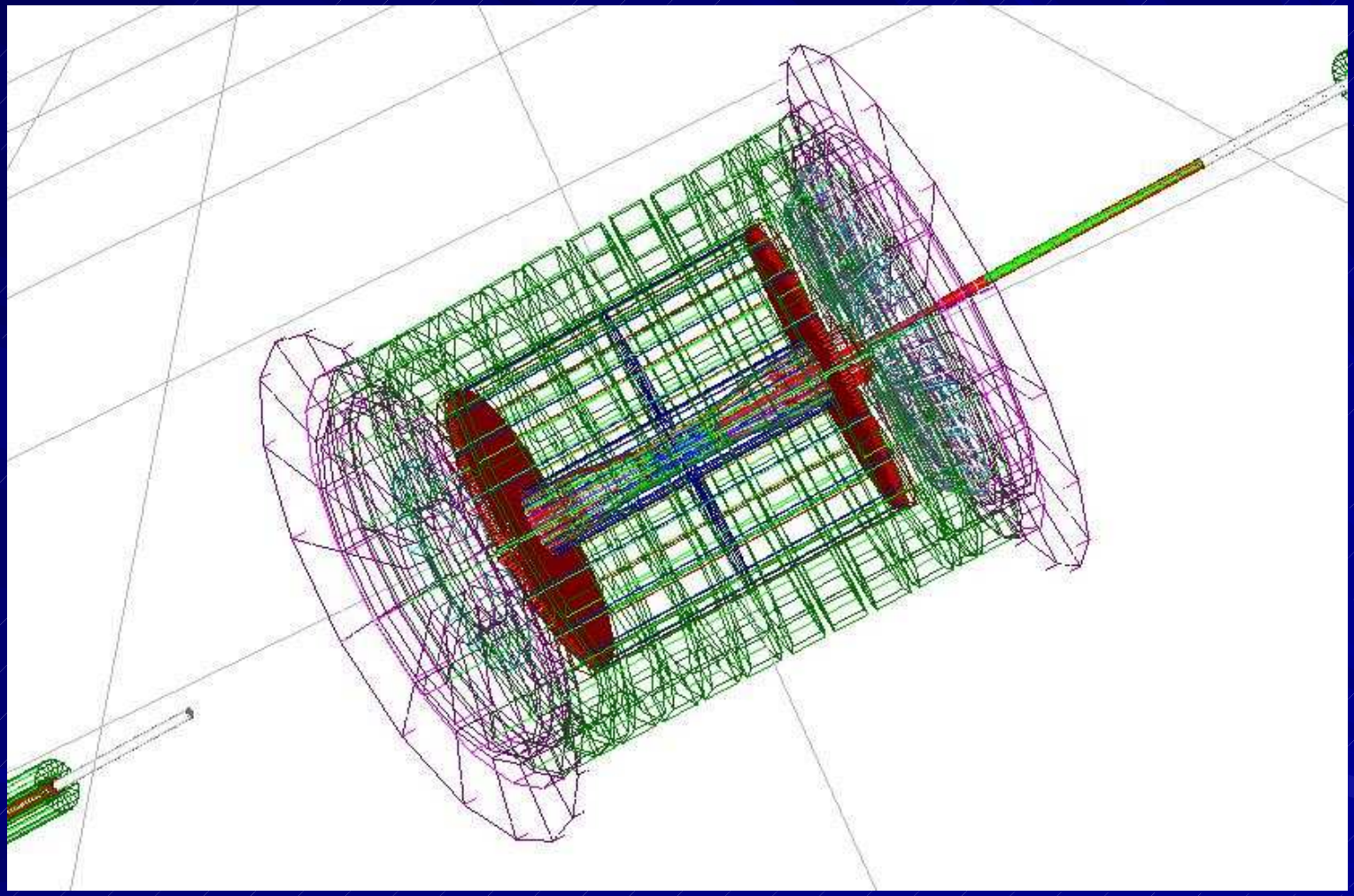




GEANT model of the Silicon Strip Detector based on technical drawings

From STAF to Starsim

- Evolution of the same underlying code
- Main difference: much improved code organization and corrections accumulated over the last 2 years

Feature	STAF	STARSIM
Common Code Base with root4star	No	Yes
Version control via CVS	No	Yes
GCALOR included in the code base	No	Yes
CONS based build	No	Yes
Logical source code partitioning	No	Yes

TGeo model of the STAR detector