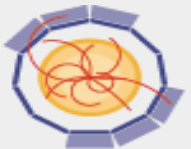


Common Geometry Primitives library

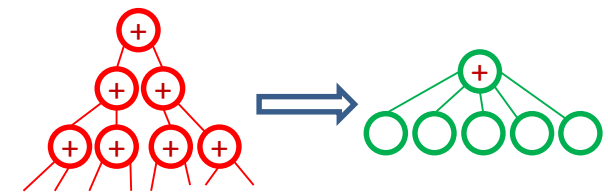
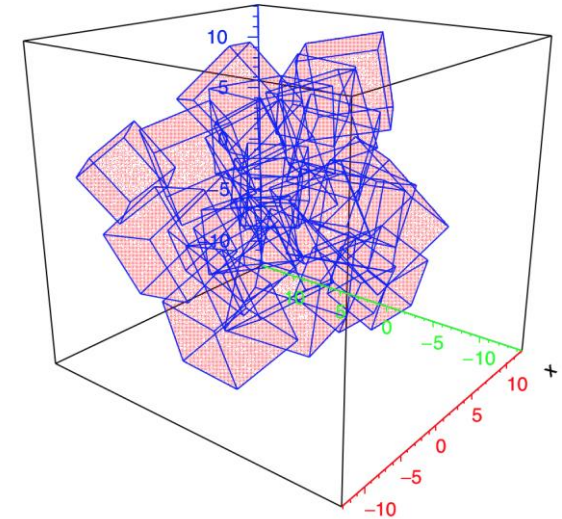
WP3 – 27/06/2018

G.Cosmo, M.Gheata (CERN EP/SFT)



VecGeom multi-union

- Boolean unions are represented as binary trees
 - Pathologically slow in simulation - too many individual checks
- Multi-unions representing nodes at same level
 - Implementation in Geant4 using voxelization helper
- Re-implemented in VecGeom based on Bounding Volume Hierarchies (BVH)
 - Vectorized search of candidates

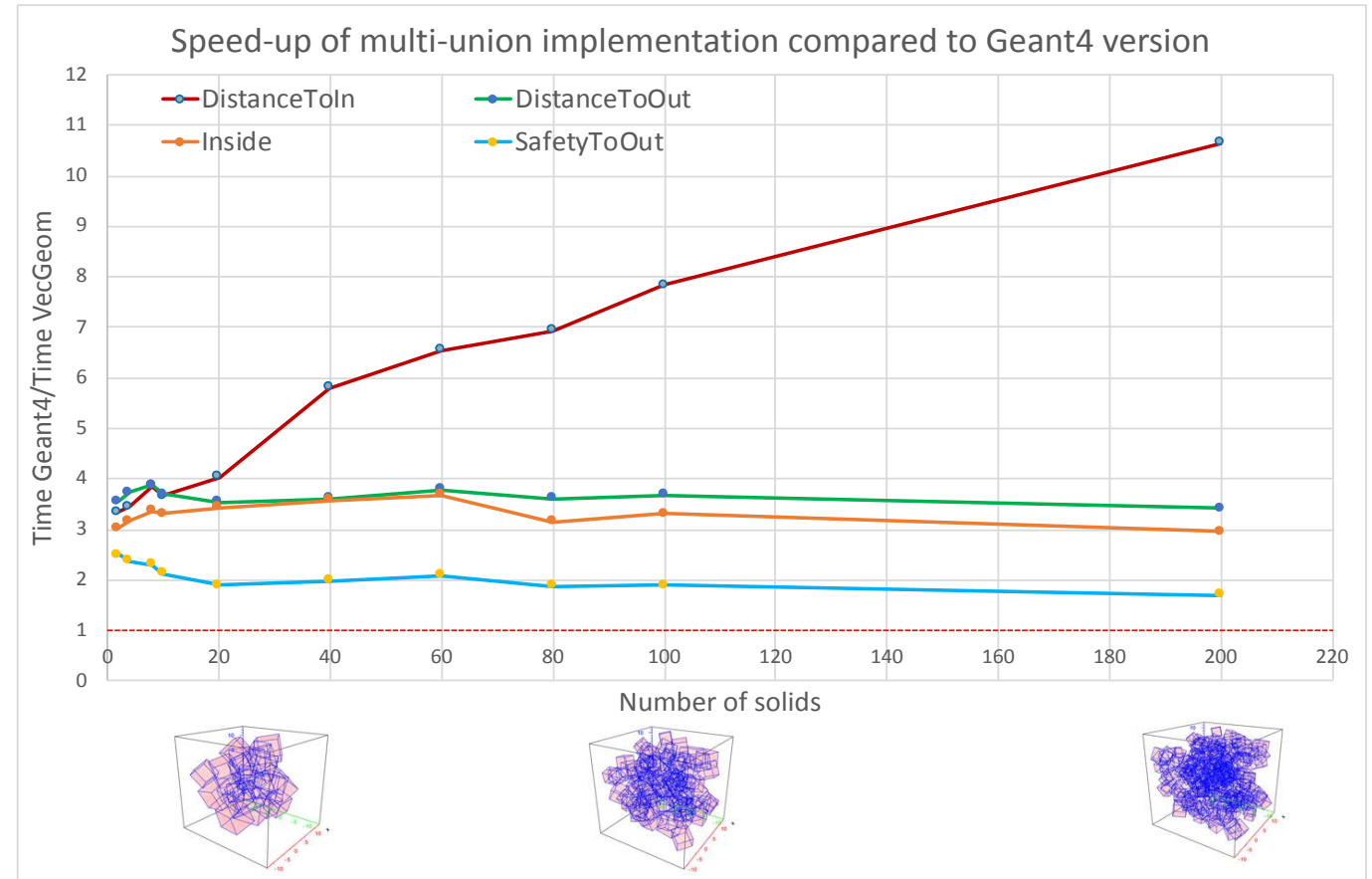


Boolean union

Multi-union

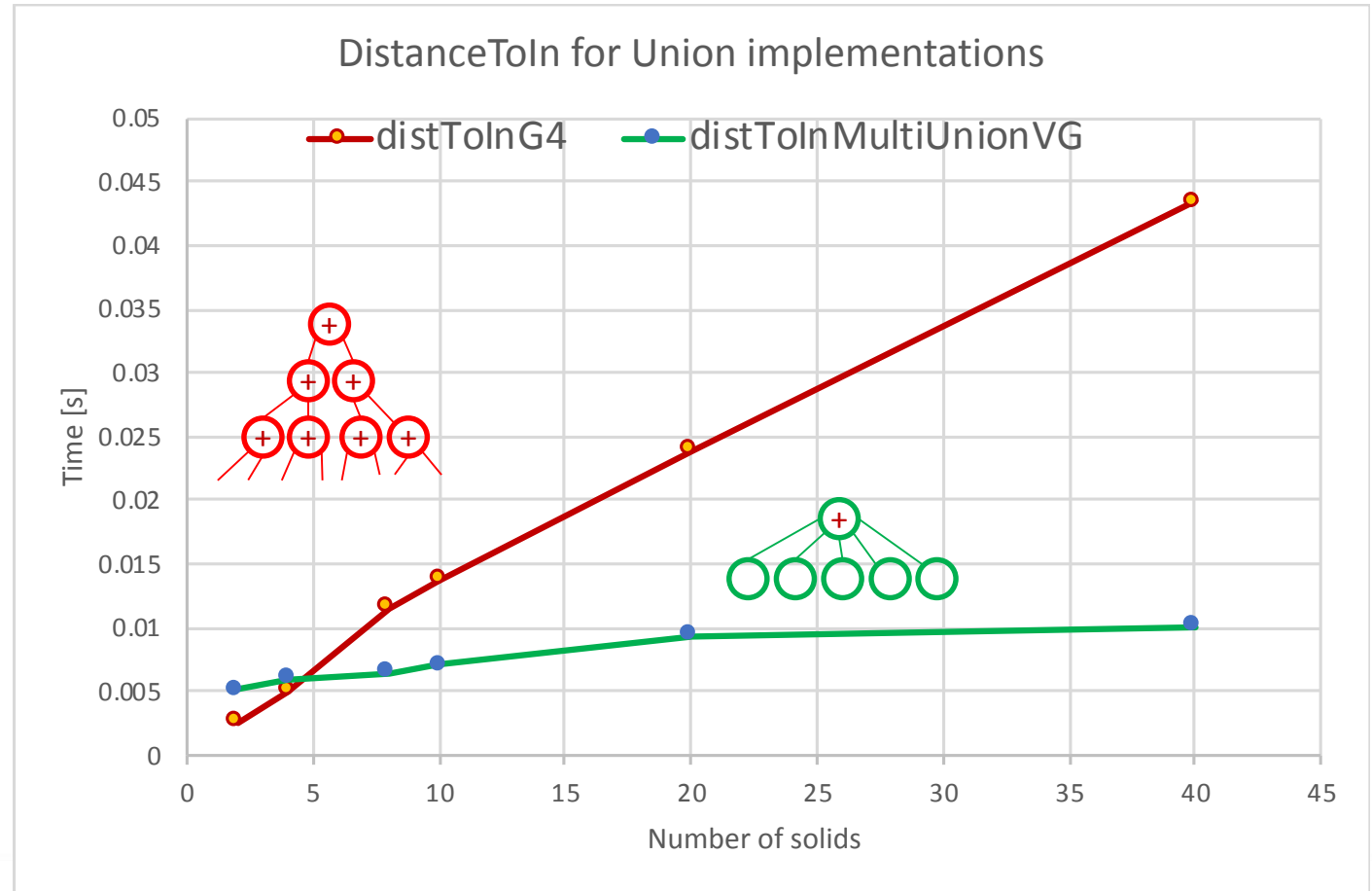
Multi-union Navigation performance

3x-4x speed-up compared to corresponding implementation in Geant4 for up to several hundred components



Replacing Boolean union with multi-union

- Implemented automatic conversion of classic Boolean union of volumes to the new multi-union structure
- Much better scaling performance for large number of components



Ongoing activity...

- Tagged version v1.0 of VecGeom containing all latest new features and fixes
 - Fixes for corner-case problems in tube
 - GDML I/O implementation based on Xerces-C ongoing (Dima Savin, GSoC)
 - Faster safety computation for tessellated solid
- Reference version for upcoming Geant4 10.5-beta release

Resources

- Contributions from CERN and EP/SFT:
 - John Apostolakis
 - Gabriele Cosmo
 - Andrei Gheata
 - Mihaela Gheata (AIDA PJAS)
 - Dmitry Savin (GSoC student)
 - Evgueni Tcherniaev
 - Sandro Wenzel