

# Common Geometry Primitives library

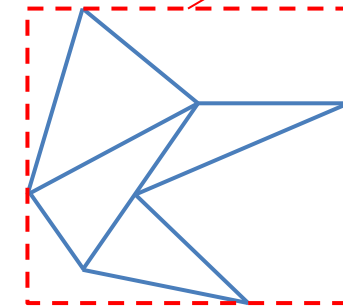
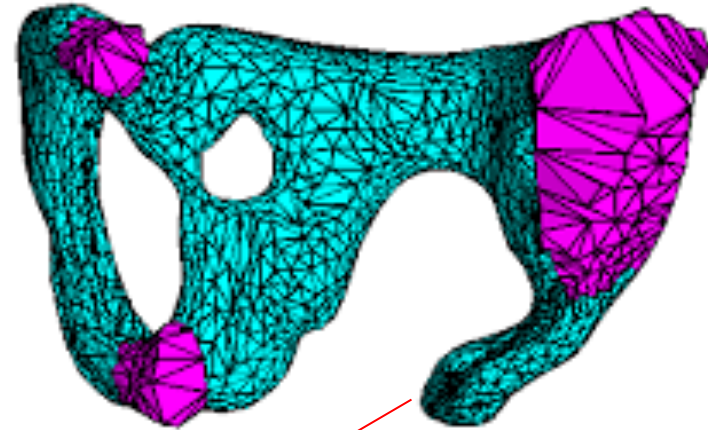
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# Work in progress: tessellated solid

- Objective: implement a faster tessellated solid by vectorizing on its facets
  - Group facets in clusters of size equal to the vector size on the machine (vectorize on facets)
  - Cluster bounding boxes in hierarchical groups of the same size (vectorize the search of the touched clusters)
- Base structure for the tessellated cluster now implemented
  - Inside(), DistanceToIn/Out(), SafetyToIn/Out()
- Navigation optimizer based on bounding boxes used for navigating volume daughter generalized
  - Can now be used as utility directly to store clusters
- Ongoing: clustering algorithm, construction, implementation of navigation at solid level

M.Gheata



TessellatedCluster

Method	SIMD gain (AVX) (*)
DistanceToIn	1.85
DistanceToOut	2.72
SafetyToIn	2.25
SafetyToOut	2.46

2020

(\*) Preliminary numbers related to the clustering algorithm

# Ongoing activity...

- Code robustness & correctness
  - Reviewing/fixing issues on existing shapes detected by the testing suite
  - Extending coverage to different possible topologies
- Completing refactoring of code to VecCore
  - Currently addressing Cone, Polycone, Torus
  - VecGeom can now be built with VecCore as independent library
- Verification of correctness in complex geometry setups
  - Resolved issues observed when running with full CMS setup
  - Now moving to analyse other geometries (LHCb, ATLAS shapshots)
- Phasing out old USolids implementation and API
  - Wrappers in Geant4 being revised to simplify interfaces and adopt direct dispatching to VecGeom shapes

# Resources

- Assuming current resources sum up to  $\sim 1.5$  FTE, adding up contributions from PH/SFT:
  - John Apostolakis
  - Gabriele Cosmo
  - Andrei Gheata
  - Mihaela Gheata (AIDA PJAS)
  - Evgueni Tcherniaev
  - Sandro Wenzel