Interface to Unity for High Energy Physics detectors visualization

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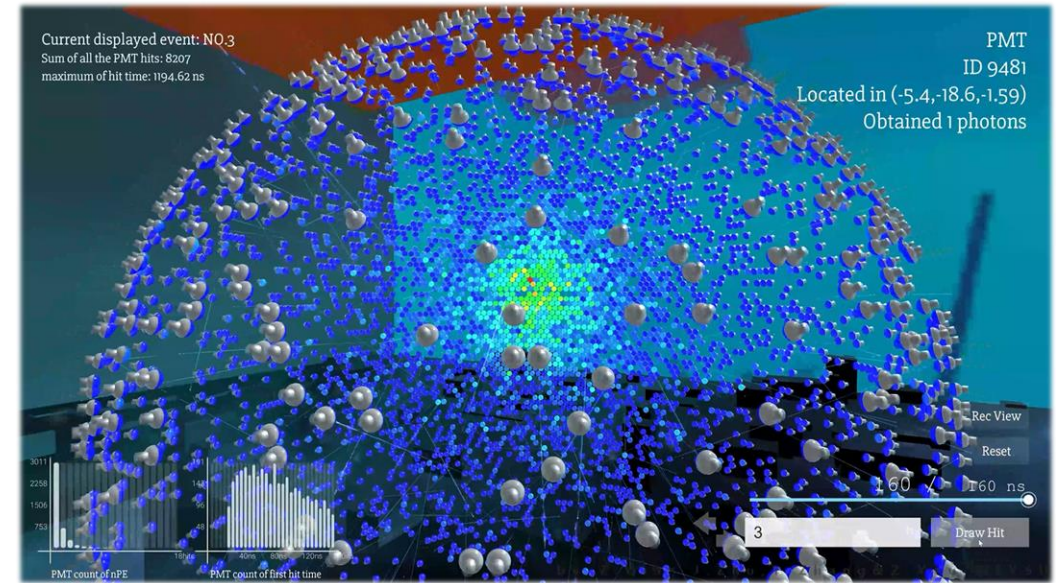
- Detector design
- Detector construction & assembly
- Detector commissioning
- Experiment operation & maintenance
- Data quality monitoring
- Simulation & reconstruction
- Event display
- Physics analysis
- Education
- Outreach

JUNO event display - ELAINA

mp-ph] 26 Nov 2018

HEP Software Foundation Community White Paper Working Group – Visualization

HEP Software Foundation: Matthew Bellis[a,b] Riccardo Maria Bianchi[c,1] Sebastien Binet[d] Ciril Bohak[e] Benjamin Couturier[f] Hadrien Grasland[g] Oliver Gutsche[h] Sergey Linev[i] Alex Martyniuk[j] Thomas McCauley[k,1] Edward Moyse[l] Alja Mrak Tadel[m] Mark Neubauer[n] Jeremi Niedziela[f] Leo Piilonen[p] Jim Pivarski[q] Martin Ritter[r] Tai Sakuma[s] Matevz Tadel[m] Barthélémy von Haller[f] Ilija Vukotic[t] Ben Waugh[j]
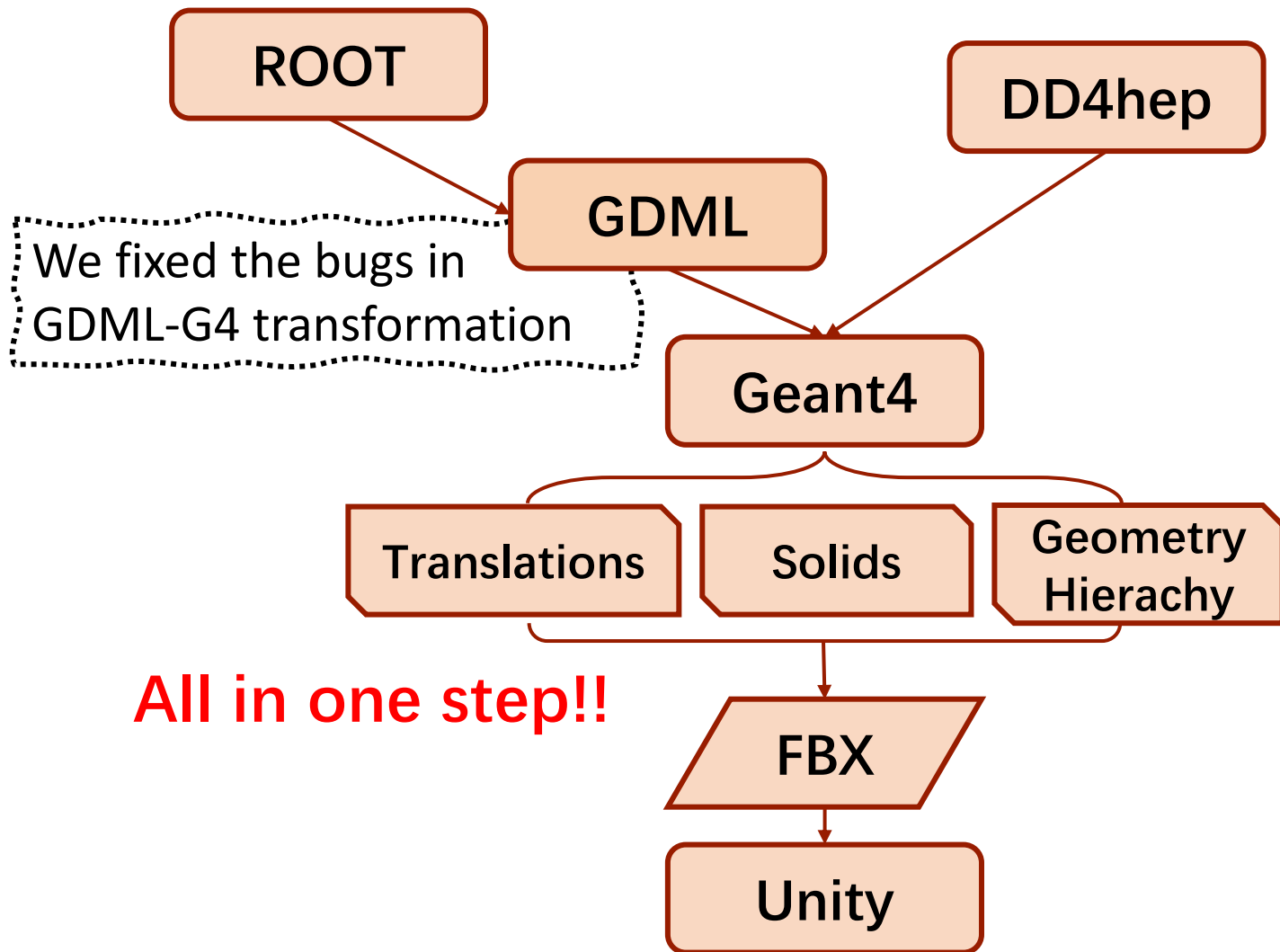
Visualization Technology from Industry

➢ **Unity** is a professional video and game production engine, which can help to visualize HEP detectors.

generate profitable outputs such as games, movies, industrial design, etc.,	→ stable economic support, and professional investment	→ Advanced technology
	the diverse needs of commercial clients	→ Software – Platform – System – Hardware seamless integration

➢ Professional 3D software.
➢ Provide access to VR or AR.
➢ Supports more than 20 platforms.

A new method provided by this work

ROOT

DD4hep

GDML

We fixed the bugs in
GDML-G4 transformation

Geant4

Translations   Solids   Geometry Hierachy

All in one step!!

FBX

Unity

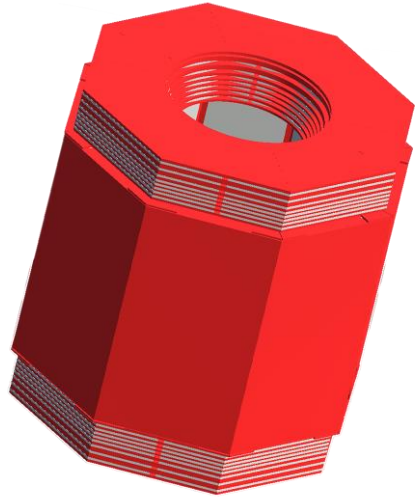**(develop based on HSF Geometry Writer)**

➢ Maintain the unique identifier.
➢ Support self-defined shapes and geometry classes.
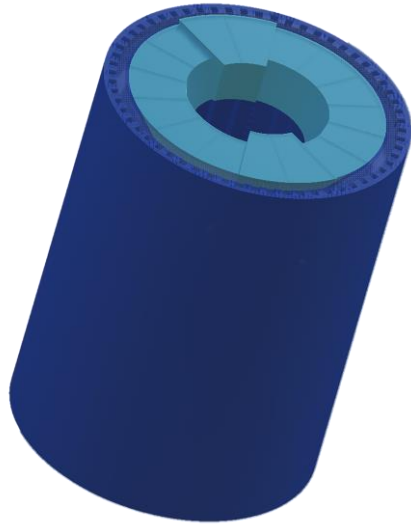➢ Is able to assist all four detector descriptions.
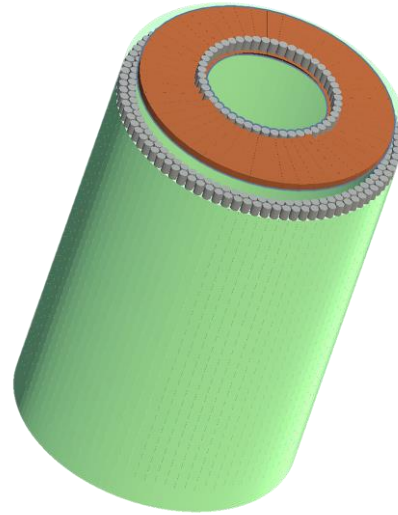
Visualization in Unity

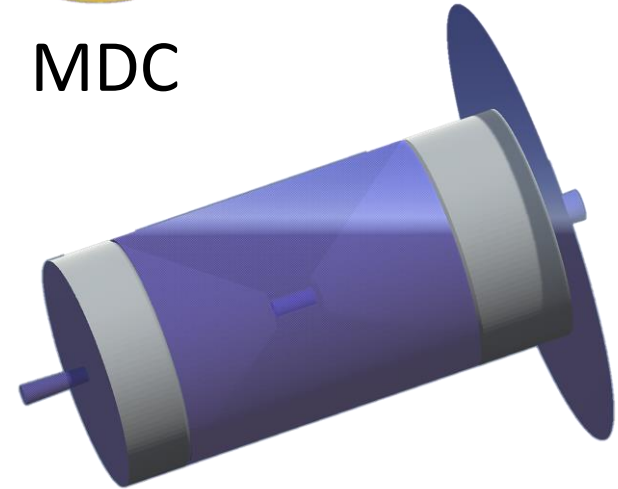**1. GDML to Unity with BESIII detector**

MUC   EMC   TOF   MDC

2. ROOT to Unity with EicC detector
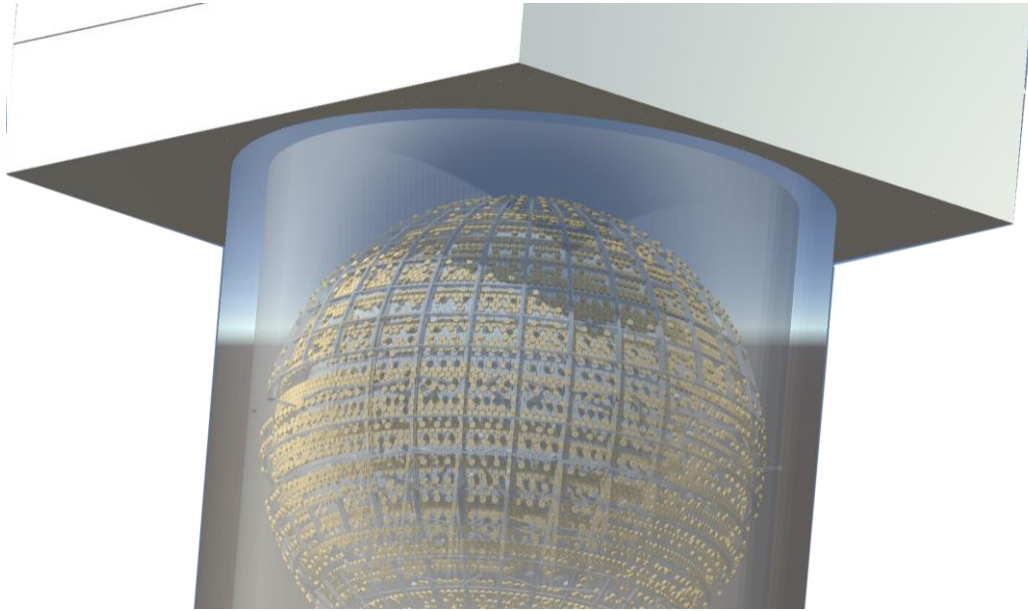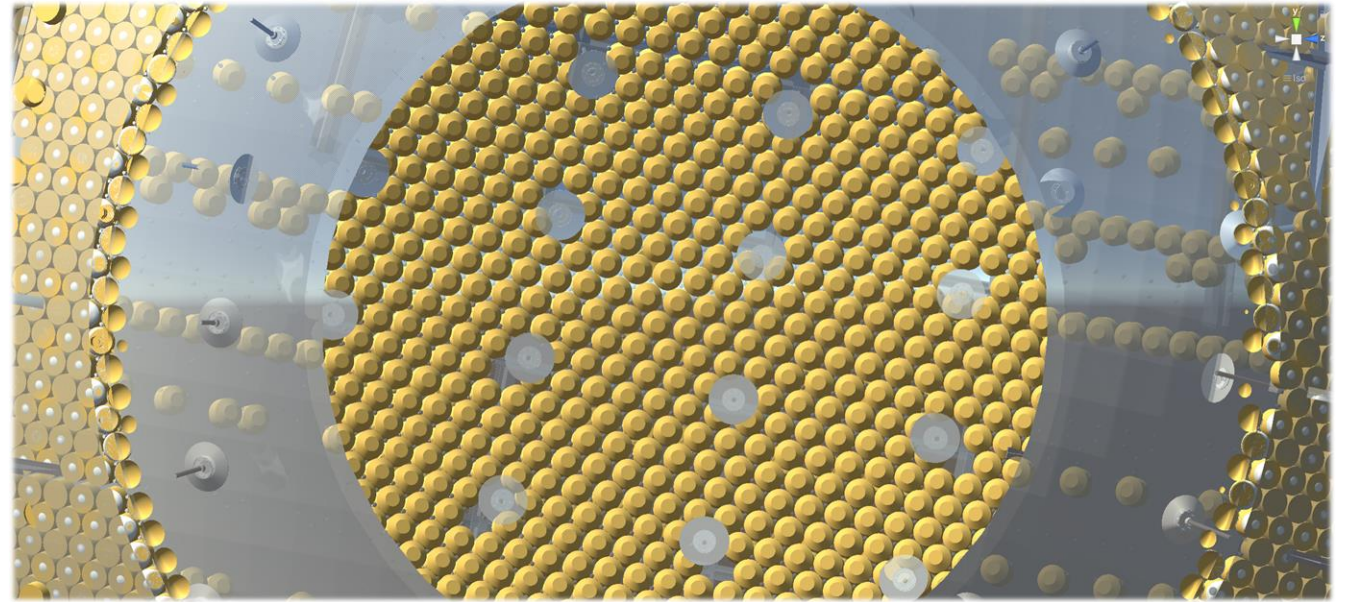
3. **Geant4 to Unity with JUNO detector**

side view from outside of
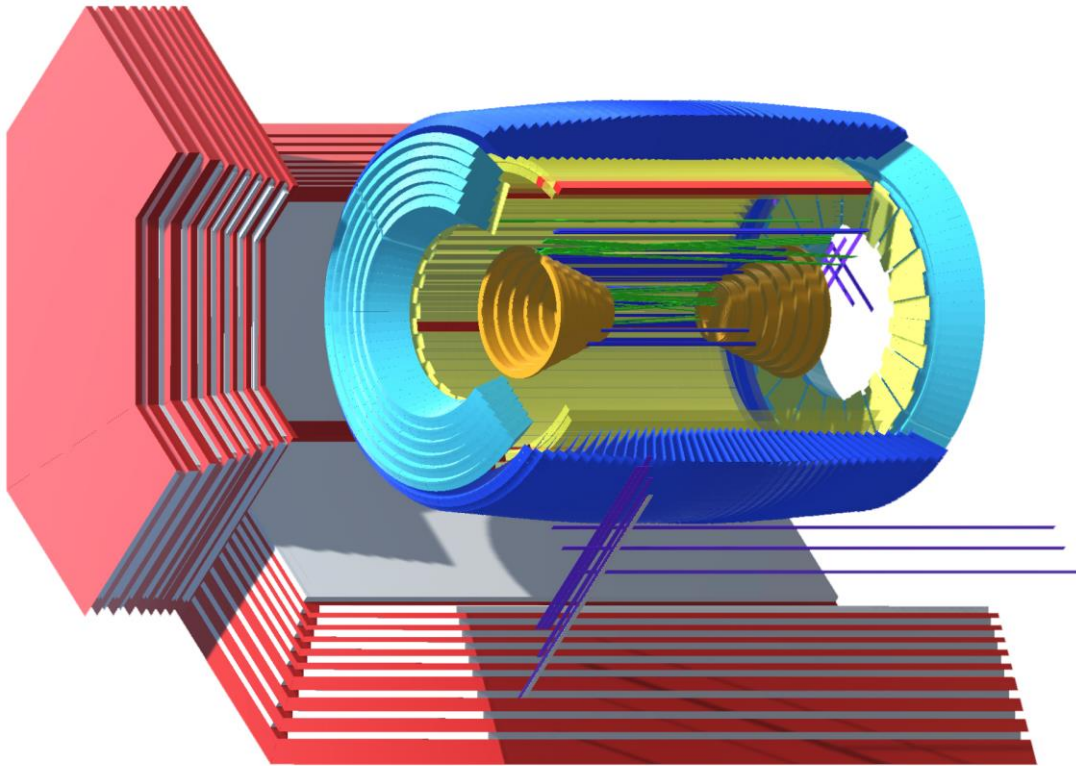JUNO detector

Inner view of JUNO
central detector

Further applications

➢ **Event display, AR / VR ……**

JUNO detector in VR

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