Common Detector Simulation Activities for the ICC

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Outline:

- Motivation
- Identified Synergies between simulation frameworks
- Activities status
- Summary

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Motivation

Request from the ICC to get together the developers of the GANIL-SPIRAL2 detector simulations.
(ICC workshop 02/2014 – Bormio)

- To take advantage of all the simulation work/tools developed during the SPIRAL2 PP.

- To exchange information regarding tools/frameworks (including FairRoot at FAIR) and explore the synergies.

- To work toward more realistic simulations:
  - Combine the standalone detector simulation to simulate multi-detector setup .
  - Add beam characteristics (from LISE/MOCADI outputs) to the event generators
  - Add realistic geometry of the mechanical structure & detector (from CAD drawings).

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Identify synergies

- First meeting at IPN Orsay (Nov 2014):

  o overview of the different simulation tools:

  - NPTool (GASPARD)   / A. Matta
  - NEDA   / M. Palazc
  - SToGS (PARIS)   / O. Stezowski – U Companis
  - ActarSim   / H. Alvarez-pol
  - R3BRoot,   / D. Kresan
  - FAIRRoot-FAIRDB   / D. Bertini
  - Kaliveda (FAZIA)   / J. Frankland
  - AGATA   / myself

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Identify synergies

- Main outputs:
    - No obvious choice for a unique framework
        - all have pros and cons, potentials and limitations

    - But , a clear interest to develop the different frameworks for a common purpose:
        - Facilitate exchanges between frameworks
        - Try to adapt each framework rather than duplicate from scratch

    - First tasks defined:
        - Adopt a standard format of geometry files to facilitate exchange from one frame work to another
        - Develop tools/interface so LISE/MOCADI outputs can be used as inputs
        - Explore the option of creating event files in appropriate format that can be used as input by all frameworks
        - Train users (as potential future developers)

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Activities to be reported

- ## Detector geometry file exchange:
  - Standard formats chosen: GDML and ROOT
    - GDML = alternative to native geant4 geometry.
    - Interfaces exist to convert CAD to GDML format.

  - AGATA, NPTool, SToGS, R3BRoot/ENSARoot are all now GDML compatible
    - GitHub repository in place to store all GDML files:
      - https://github.com/malabi/gdml-files

  - Kaliveda, R3BRoot and SToGS are also ROOT geometry compatibles

  - ACTARSim is looking toward the FAIRRoot/ENSARRoot to then become "ACTARRoot".

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Activities to be reported

- "Interfaces" to read the ASCII input files (from LISE/MOCADI) are available within most framework.
  - Some may simply need to be modified to read the LISE/MOCADI output format.

- User training:
  - Several hands-on Workshops took place:
    - ICC funded: AGATA/SToGs (Nov 2015) and NPTool (Nov 2016)
    - Non-ICC funded:
      - R3BRoot (July 2015), a new one is scheduled for March 2017 (https://indico.gsi.de/conferenceDisplay.py?confId=5496)
      - ENSARRoot workshop not scheduled yet (~2018)

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As a result of these activities

- GDML geometry of AGATA defined in SToGS has been transferred successfully into NPTool.

- CAD drawings converted into GDML and imported successfully into the AGATA code.
  - The gdml files are available on the Git Repository and can be imported into SToGS and NPTool.

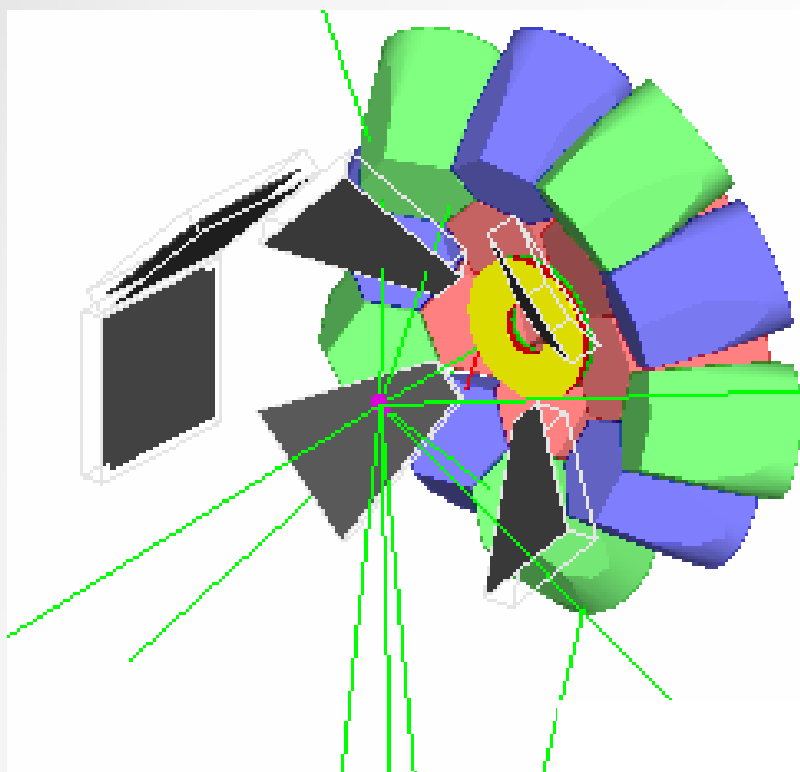- Direct users feedback & new ideas coming out of the hands-on workshops

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Examples

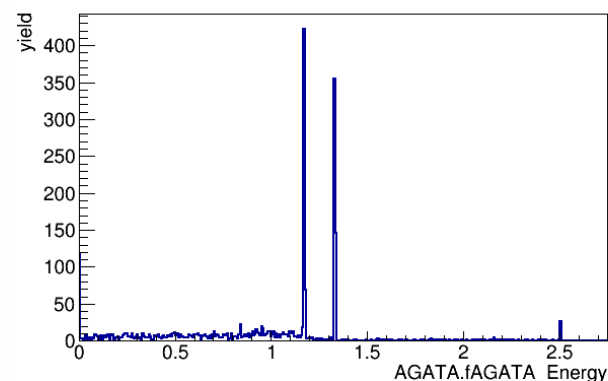AGATA + GDML VAMOS Vacuum chamber & Honeycomb:
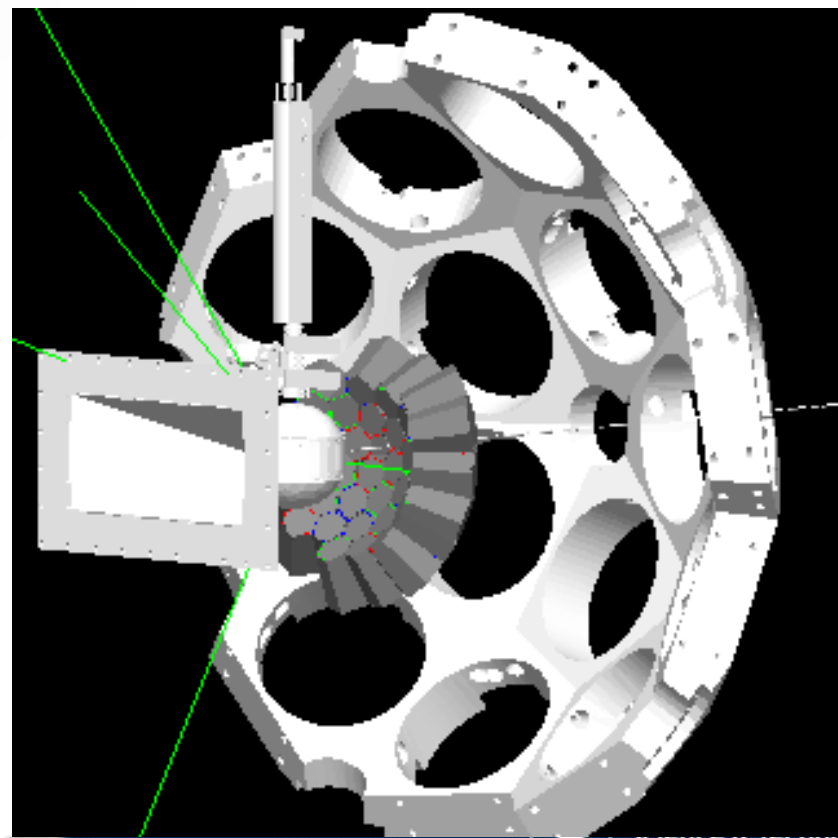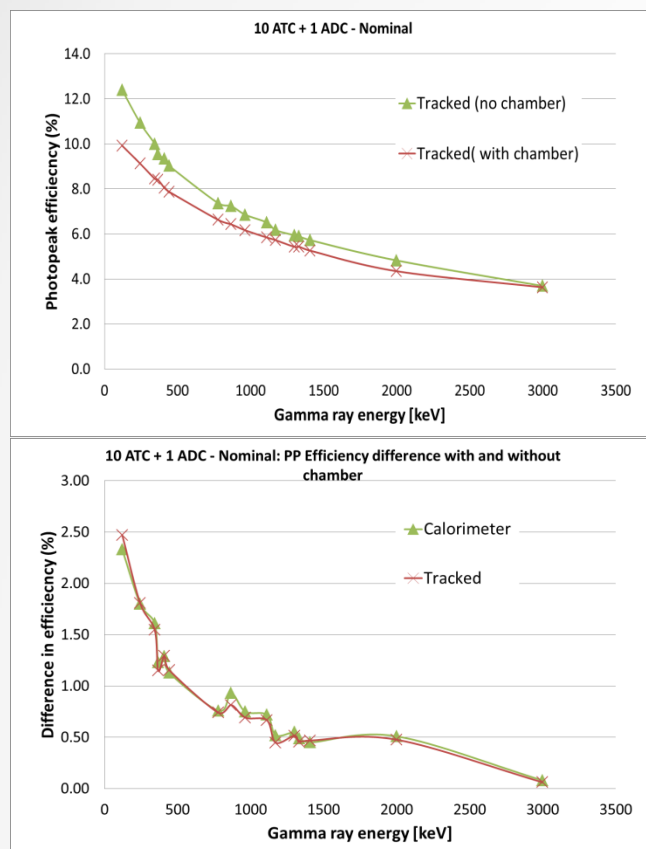
Examples

MUGAST+ GDML version of AGATA Demo <u>in NPTool</u>:

GDML file of AGATA demonstrator taken <u>from SToGS</u>

60Co Energy spectrum in Agata Demo
(calorimeter mode)

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Summary

- The ICC Simulation Working Group exists since Nov. 2014

- The work covers the development of existing simulations tools/framework to facilitate file exchanges between them.
  - Detector geometry files
  - Event generators or/and event files.

- Already some development have led to successful exchanges:
  - GDML capability added to NPTool and AGATA
  - Successful exchange of gdml files between AGATA, SToGS and NPTOOL

- Several workshops took also place to train new user and potential developers of this framework.

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