Discussion on EM bug reports and problems

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Outline

- Bugzilla bug reports

- Jira issues

- Geant4 Forum

- Not formalized known problems

- Documentation

Bugzilla bug reports 2022-2023

- The state of the problem:
  - Green – responsible person knows what to do and the problem can be resolved
  - Red – responsible person does not know how to address
  - Blue – responsible person does not yet have an opinion

- 2543 (V. Ivanchenko) Muon/Pion pair generation difference between Geant4 v11.0.4 and 11.1.1
  - Compared to 10.7 pair cross section is reduced by factor 1000
  - This is due to the default enhancing factor to these process 1 instead of 1000
  - User feedback is needed to close the problem

- 2542 (V. Ivanchenko) Particles tracking forever
  - This is a continuation of closed #2353 – bug was introduced in 11.1
  - Should be fixed in 11.1.p02 and 11.2beta
  - User feedback pending to close the problem

- 2532 (V. Ivanchenko) Position of carbon ion Bragg Peak
  - Code of the Lindhard-Sorensen model was finalized
  - Several validations were performed with 11.2beta
  - Conclusion at this workshop is required

- 2524 (V.Ivanchenko) Ionisation x-section disappears in some example
  - Likely problem of user – to be confirmed
  - Any volunteer to address/close this problem?

Old Bugzilla bug reports

- **2442 (D. Sawkey) Wrong velocity after an optical transition with non-polished surface**
  - issue with the velocity during transition between two dielectrics (scintillator and WLS) sharing a non-polished surface.
  - reproduced by user with OpNovice2.

- 2368 (V. Ivantchenko) Issue with Reproducibility in Geant4 10.7
  - the fact that FTFP_BERT does not show the problem in contrary with FTFP_BERT_EMZ means that the problem is likely in Geant4 and not in your code.
  - In the event where non-reproducibility happens the process is the photoelectric effect. In one case it is generating final e- + two extra particles likely due to atomic de-excitation, in another - no secondaries which is wrong, because no secondaries may be only in the case if "ApplyCuts" option is enabled, which is not the case.
  - There is also a possibility that it is a secondary effect of the real problem.
  - Not clear how we can address or close it, the only hint is FTFP_BERT/FTFP_BERT_EMZ difference.

- 2279 (V. Ivantchenko) problem with dexcitationIgnoreCut seen in TestEm14
  - Electrons in range 1 keV -> 2 keV are fictious. They do not exist in other plots
  - It must not have electrons below 100 eV : cut.
  - The problem is seen in 2021 and was partially reduced at that time
  - Required re-check now, any volunteer to check the issue in master?

- 2246 (V. Ivantchenko) Wrong X-ray de-excitation of Am241 decay daughter if PIXE is OFF
  - Comparison gamma ray spectra of Am241 decay with and without PIXE.
  - if simulate the Am241 decay gamma spectrum of an HPGe detector, I see that the spectrum is very different from the experimental one because these (and other) high energy X-ray peaks should not be present.
  - If turn ON the PIXE, these X-rays are not produced with this high probability anymore and the "gamma spectrum" of the Am241 decay is compatible with the experimental one.
  - Any volunteer to check the problem in the master?

JIRA issues

- **UR-83: Webpage, with information about Geant4 for medical applications**
  - Is it Geant4 page or the page is supported by G4-med?
- **UR-82: Geant4-DNA physics processes for positrons**
  - Currently, in DNA Physics List standard processes for positrons
  - DNA physics implementation will require significant manpower
- **UR-79: Mesoscopic chemistry approach development (high dose rates, longer times), including extended example**
  - Pure DNA requirement
- **UR-78 and UR-77 are similar: Provide an example of physics list activating both Geant4-DNA and hadronic physics, including radioactive decay**
  - Implemented in Geant4 11.1
- **UR-73: Ability to define thresholds in energy**
  - Double conversion Energy => Range => Energy is redundant in ALICE
  - Requirement may be implemented in ALICE code – implementation inside Geant4 may provide wrong message to users

Geant4 Forum

- Many tanks to Geant4 members who actively participate is discussion with users
  - Susanna Guatelli, Daren Sawkey, Mike Kelsey, Hoang Tran, Michel Maire
  - There are many requests from novice users
    - Often incorrect questions, when user do not understand basic things
    - We may have a hint how to improve our documentation
  - Sometimes indeed a real problem is raised
    - Sometimes a new requirement to Geant4 may be formulated
- For today there are ~5 EM questions in the Forum without answers

Known problems

- Technical problems in MicroElec models (Christophe Inguimbert)
  - See Coverity analysis
  - Many maps are created and not deleted end of run
- Very recent reports on some effects in calorimers resolution in Geant4 11.ref08 (Sunanda Banerjee)
  - Need confirmation and independent checks
  - Any volunteers?
- The requirement from the Geant4 core team (Ben Morgan and Gabriele Cosmo) to remove dependence of dna from analysis
  - To make granular libraries flexible at link time extra non-natural dependences should be reduced

Documentation

- Status of the G4LEDATA structure
  - Current version G4EMLOW8.4
  - In this version README file is added to each subdirectory
  - README in the top directory includes references to subdirectories
    - Please have a look and comment if needed

- Application Development Manual
  - I am trying to review for any new release
  - Options and UI commands are described
    - Independent checks may be useful

- Physics Reference Manual
  - Was not updated for several years, except EPICS2017 last year
  - New processes/models/options are introduced but not documented
    - Who can contribute to check if text correspond to the current physics

- With Geant4 11.2 new models/processes will be released
  - We need to extend documentations
  - Helmut Burkhardt, Alexei Sytov, Hoang Tran, others are responsible for these additions
    - For new models we may add a limited descriptions if the work is not fully published