

Geant 4

Test49: prototype of ROOT GUI for improvement of Geant4 models

Mikhail Kosov, 14th Geant4 Users and
Collaboration Workshop, 2009

Introduction (test49 was made by a summer student R. Atachiants)

- **Test49 is a successor of test19/test39 (PAW)**
 - ROOT is used instead of PAW with the similar functionality
 - ROOT script feels & reads data and starts Geant4 simulation
 - Experimental DB (Publications) is created
 - Powerful ROOT analysis is used for data/simulation comparison
- **Migration to test49**
 - All data (subdirectories) of test19/test29 are converted to the DB
 - Automated scripts for acquiring data from other DB's (EXFOR)
 - Extension to the differential elastic and reaction cross-sections
 - Transferring of the Geant4 model name to the test49 executable
 - Separate temporary DB for MC output files for reanalysis

To start in ROOT: gSystem->Load("libGui.so"); gSystem->Load("libG4ModelTester.so");
gGUIHelper->ShowMenu();

The diagram illustrates the workflow of the ROOT GUI for Geant4. A central menu box with three buttons: "Make Publication", "Run Simulation", and "Run Analysis", is connected by red arrows to four configuration panels.

Top Left Panel (Publication Settings):

- Publication file: p_90_A127_data.root
- Inelastic Cross Section: 450
- MC Model: CHIPS
- Runs: 25
- Use existing data: ☐
- Run button

Top Right Panel (Particle Settings):

- Publication file: p_90_A127_data.root
- Particle number (0 for all): 0
- Rur button

Bottom Left Panel (Projectile and Target Settings):

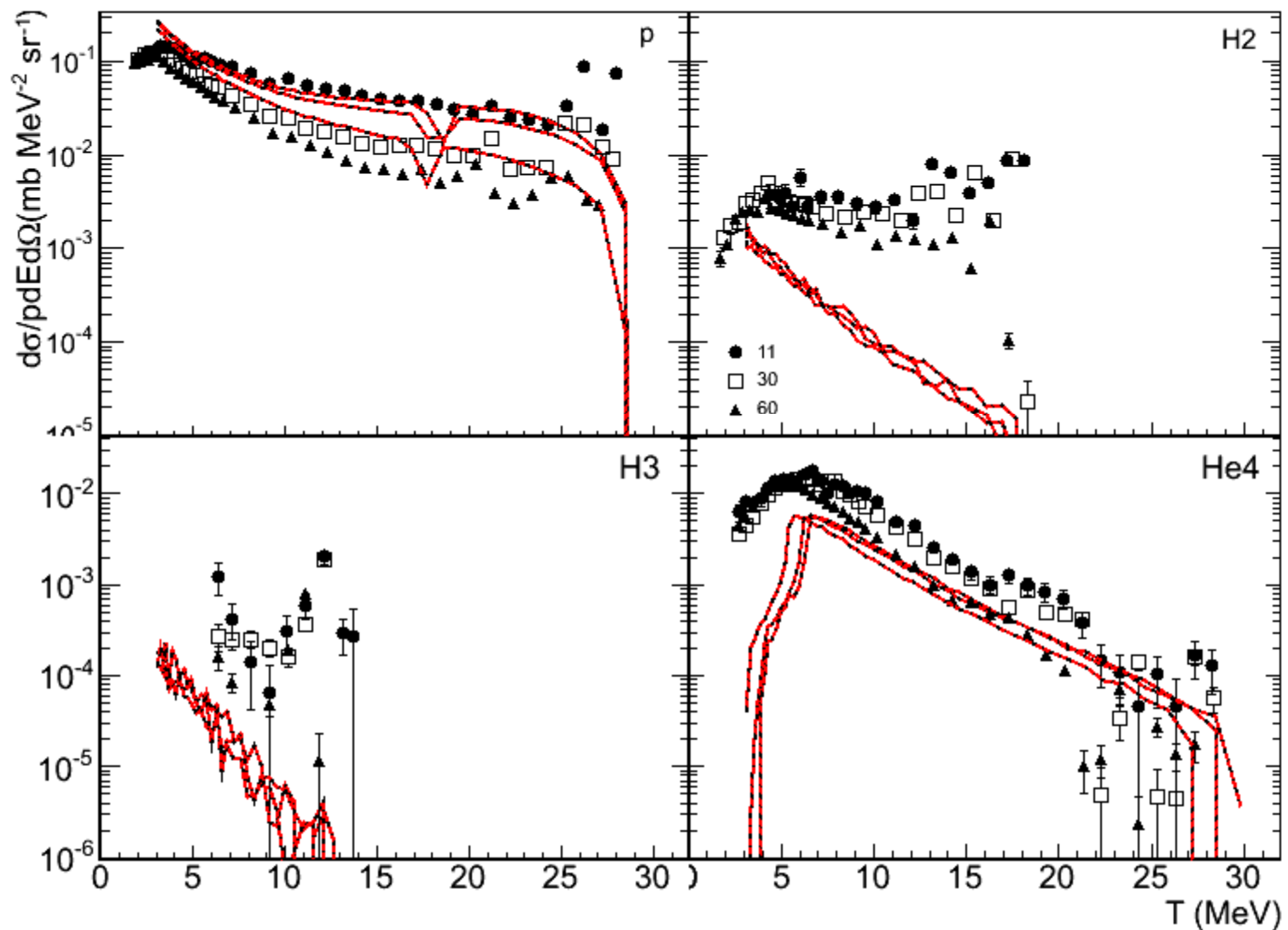
- Projectile PDG: p
- Target PDG: A127
- Argument Type: E_Kin
- Argument Value: 29
- Argument Units: MeV
- ASCII File: /home/Kel/Geant4/geant4.9.2.p01/tests/test49/
- Secondary Particle (using the angles):
 - Secondary Particle PDG: p
 - Cut Type: Theta
 - Cut Value: 11
 - Cut Delta: 5
 - Cut Units: Degrees
 - Function Type: dS_over_dE
 - Function Units: MeV
 - Argument Type: E_Kin
 - Argument Units: MeV
- NOTE: repeat step2 for each sub-item of the publication
- Buttons: 1. Create Publication, 2. Add Secondary, 3. Create File

Bottom Right Panel (Secondary Particle Settings):

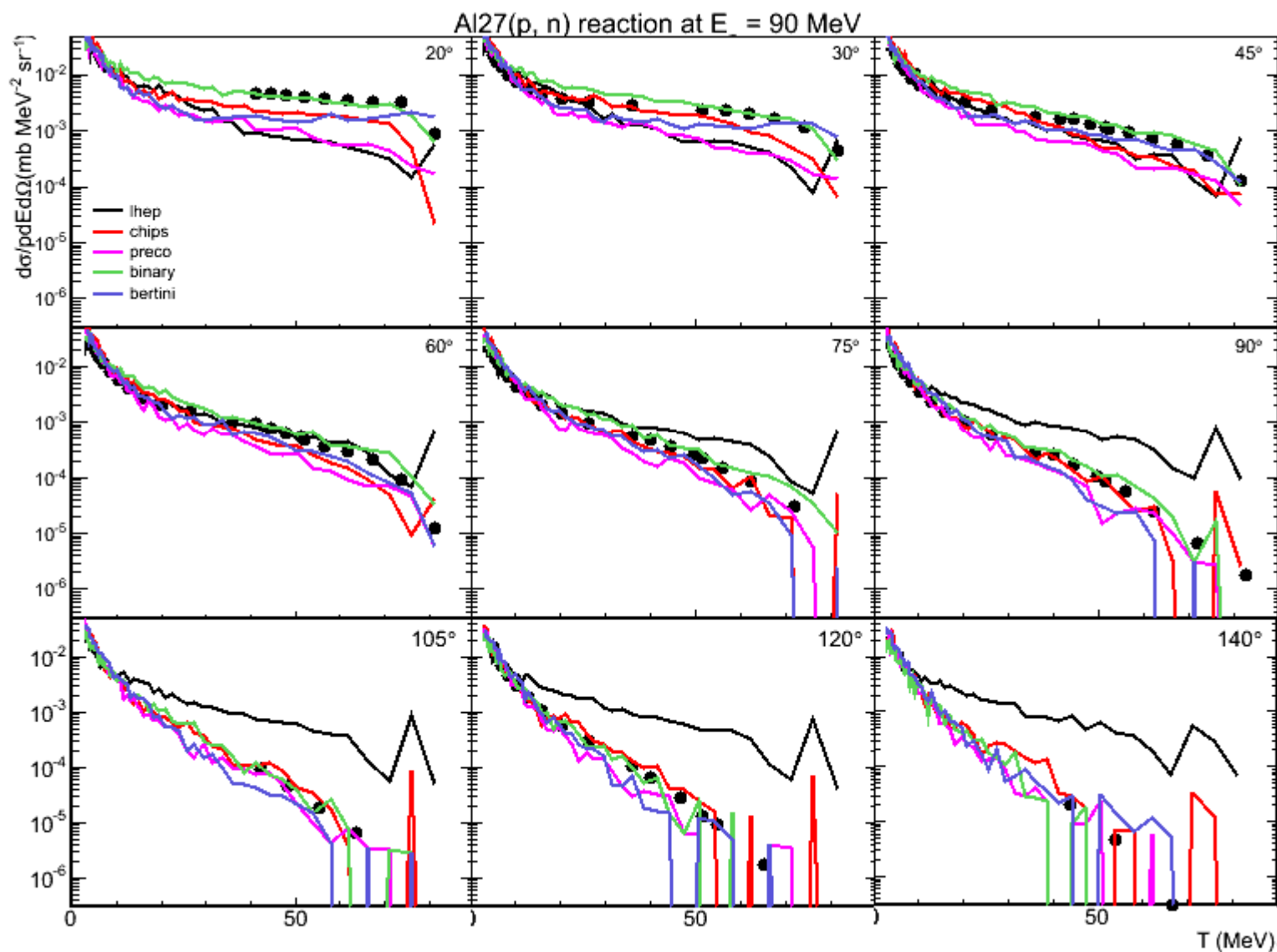
- Projectile PDG: p
- Target PDG: A127
- Argument Type: E_Kin
- Argument Value: 90
- Argument Units: MeV
- ASCII File: ant4/geant4.9.2.p01/tests/test49/ascii/p_e90_a11314_he3_120.dat
- Secondary Particle (using the angles):
 - Secondary Particle PDG: He3
 - Cut Type: Theta
 - Cut Value: 120
 - Cut Delta: 5
 - Cut Units: Degrees
 - Function Type: dS_over_dE
 - Function Units: MeV
 - Argument Type: E_Kin
 - Argument Units: MeV
- NOTE: repeat step2 for each sub-item of the publication
- Buttons: 1. Create Publication, 2. Add Secondary, 3. Create File

Typical simulation picture

$^{27}\text{Al}(p,f)X, E_{29}=\text{MeV}, \theta=11,30,60^\circ$ (bertini)



Typical analysis picture





Conclusion

- In more details the instruction for the test49 tool can be found on the Hasronic group Wiki-page
- All CHIPS development tools (test19 – onFlight, test29 – atRest, test39 – Elastic) should migrate to the universal ROOT based test49, because PAW is not supported any more
- To tune the CHIPS model an extensive data base of experimental data is going to be created for all energies, projectiles (get data from other DB's)
- The universal test49 tool can be as well used for validation and development of other G4 models



Backup slides following