



Physics List

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- ü Brief History
- ü Importance of Geant4 Physics & Cuts
- ü Ex: Hadronic Physics
- ü What to do ...



Brief History

Geant4 related publications

- v First release: 1998
- v Impact in science

Release

Simple Google Search (all publications)

1999

63,200

2007 (1st half)

205,000

→ About one order of magnitude by end of 2007!!



Importance of Physics and Cuts

- Which physics list?
- Which model?
- Which cuts?

Example in nuclear/high energy physics

- **>>10 analysis (students, postdocs, faculty ...)**
- **Need to use exactly the same tools**

Particle ID	Beam energy	Efficiencies	...
Detector cuts	Beam angle	Dead time	...
- **Importance of the analysis tool**
(i.e., ntuples - see Analysis talk @ 14:00)



Ex: Hadronic Physics in Geant4

http://geant4.web.cern.ch/geant4/physics_lists/

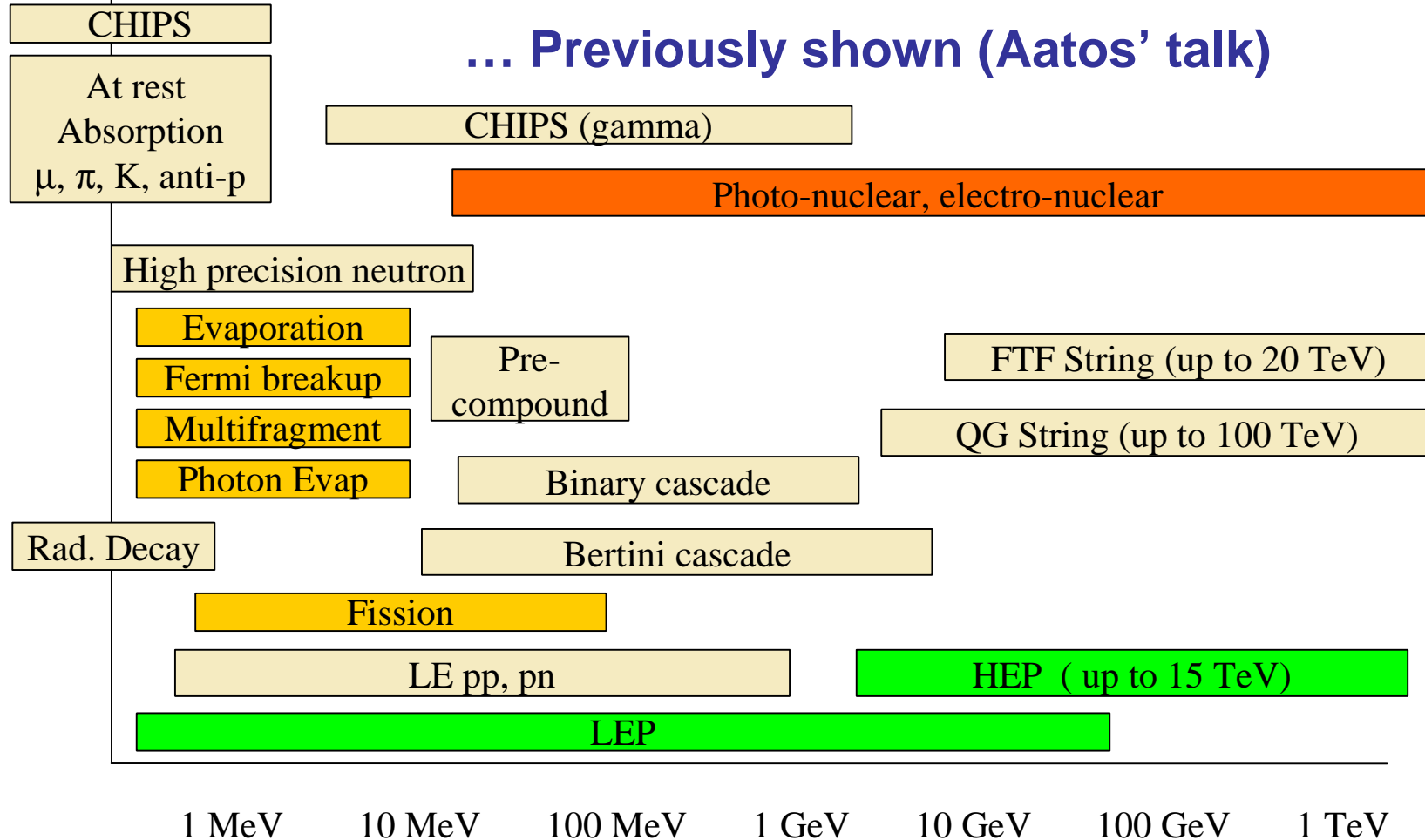
Previously mentioned (Gunter's talk) → *"Educated Guess" – not updated (in work ...)*

1. High energy physics calorimetry
2. High energy physics trackers
3. 'Average' HEP collider detector
4. Low energy dosimetric applications with neutrons
5. Low energy nucleon penetration shielding
6. Linear collider neutron fluxes
7. High energy penetration shielding
8. Medical and military neutron applications
9. Low energy dosimetric applications
10. High energy production targets (ex. 400 GeV p on C or Be)
11. Medium energy production targets (ex. 15-50GeV p on light targets)
12. LHC neutron fluxes
13. Air shower applications
14. Low background experiments



Hadronic Model Inventory

... Previously shown (Aatos' talk)



... plus G4BinaryLightIonCascade, G4WilsonAbrasion, G4EmDissociation

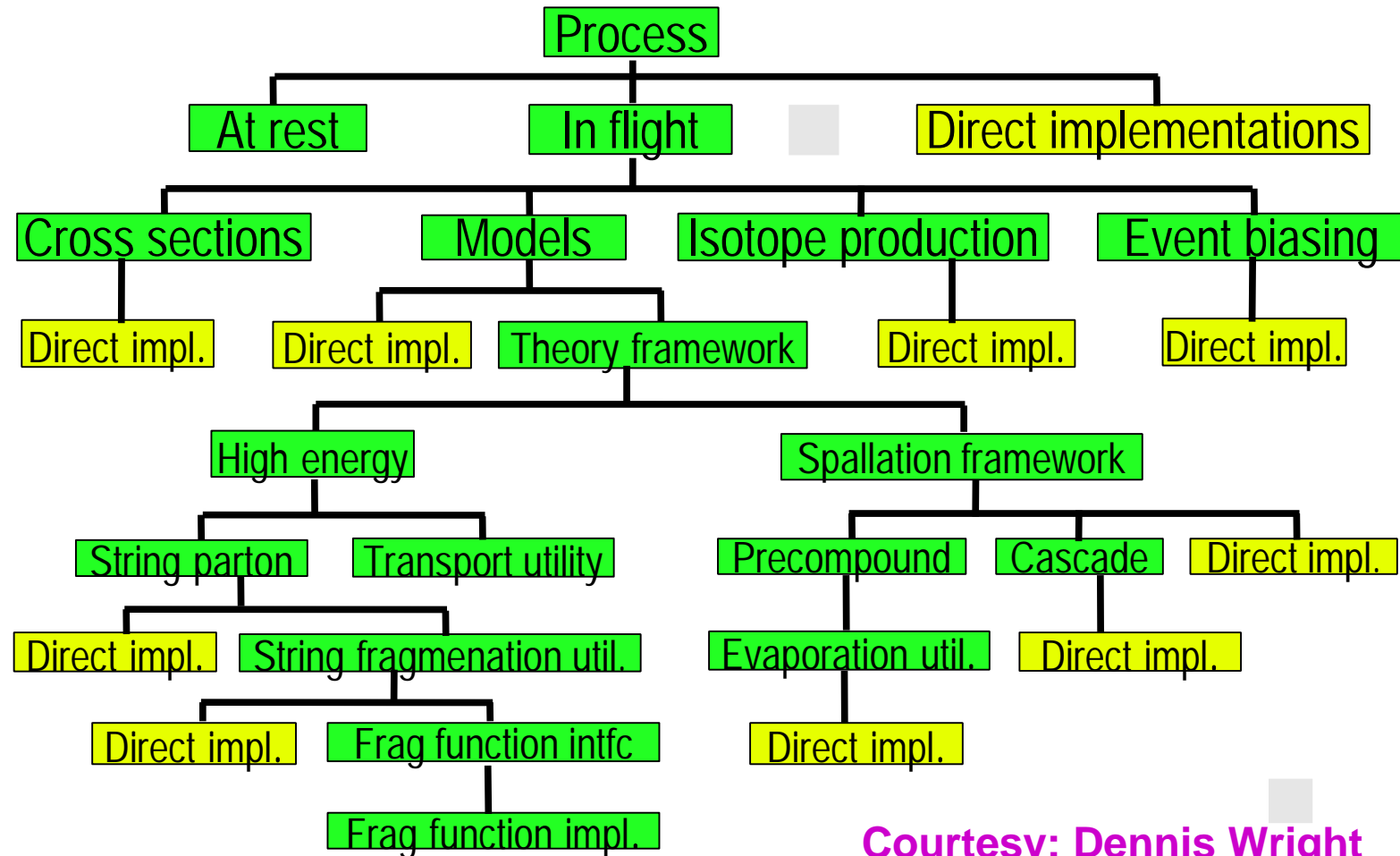
Courtesy: Dennis Wright

→ Gunter Folger Talk



Hadronic Model Organization

... Previously shown (Aatos' talk)



Courtesy: Dennis Wright



... and Primary Generator ...

Case for energy distribution of radioactive materials

- Ø **“Standard”**: sampling from favorite function
(i.e., Fermi, Poisson ...)
- Ø **General Particle Source**: handles radioactive decay

→ Over or under-estimation of data?



What to Do ...

Consequences when different tools are used

- Comparison between published results is difficult
Sometimes impossible!
- Accuracy and robustness of results
- Geant4 collaboration effort
 - Coherent approach lost
 - User support is difficult

Resources

- Geant4 website
- G4NAMU
<http://geant4.slac.stanford.edu/g4namu/>
- Working groups
http://geant4.cern.ch/collaboration/working_groups.shtml