

Cascade models' updates for 10.2 Release



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Cascade Models Summary

Bertini-inspired (BERT), Binary Cascade (BIC), Liège (INCL++)

Not much development in 2015

- All migrated to use G4Pow, G4Log, G4Exp
- All have comments “certifying” loop termination
- Migration from TLS buffers to G4AutoDelete
- BIC improved four-momentum conservation for fragmented nuclei
- Some new physics deployed in BERT, discussed here

BERT: Giant dipole resonance

Bug #1680: Neutron production from low energy photons too small by $\sim 1/3$

Giant dipole resonance enhances neutron evaporation

BERT does not model GDR directly (or any other collective nuclear behaviour)

- Total cross section in appropriate bins is correct
- Energy absorbed into nucleus, released via pre-equilibrium

Approach taken to “patch up” results

- Compare initial vs. final states for $E < 50$ MeV
- Reject events with unchanged nucleus
- Improves comparison with data in appropriate regime

BERT: Extend $K - N$ energy range

Final state tables for $\pi - N$ and $N - N$ binned up to 32 GeV, 9-body

For $K - N$, hyperon- N , binned up to 15 GeV, 7-body

Extend K^+p and K^+n tables to full 32 GeV, 9-body range, binning chosen so major resonances are included in single bins

BERT: Nuclear model parameters

Working with Julia Yarba to systematically explore “adjustable parameters”

Possibly identify way to move to “physically meaningful” dimensions (radius, density, cross-sections in fm)

Successfully reproduced (observed) past confusing results: some improvements, some neutral, some worse

See Julia Yarba’s talk, coming up next!