Comments on BaF paper

BaF paper reading

- Very nice paper: the addition of discussion of MC models is really a major improvement.
- Some comments on the paper
  - Abstract:
    - The conclusion on the level of PG production that is too low to allow for monitoring applications seems to contradict a lot of efforts from iba and other papers… Maybe we want to review the statement, discussing the agreement with other papers.
  - Exp. setup
    - BaF is part of a DE-E telescope, while LYSO uses only E vs ToF, has to be clarified in the text.
  - Prompt gamma selection:
    - neutrons are everywhere (uncorrelated). for t>0 you have charged particles.

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- Monte Carlo validation:
  - It would be nice to have in the introduction a "one-line" description [focusing on main characteristics] of the model to avoid reading all the papers :)
  - Below 2 MeV: the worst agreement with MC is discussed in the text, blaming the bkg subtraction in this regione (problem with noise)… Why? in principle the noise is well subtracted: maybe the MC has some troubles covering this region? I would not blame the data unless we show that our fit are wrong in this region
- Figure 3,4:
  - FixY axis label (are the histog. normalized to 1? the unit should be specified correctly)
  - Discuss the large energy tail that does not seems to be present at "production level"(Figgs 8-11)

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- Table 1: Chi2 has no info, Prob(chi2) should be given as well (otherwise it is a meaningless info)
- 5.2 energy spectra
  - Correction factor: here we miss the unfolding. The procedure in the paper is completely incorrect because it does not account for the migration between energies. Since the impinging spectrum has narrow structures while the reconstructed one does not, the efficiency will present dips and their application will invent peaks in the same position as the generated ones. The efficiency must be determined from a flat generated spectrum.
- Fig. 5 BIC model: seems completely counter-intuitive…. any reason why you get a dip at forward angles? Having an axis starting a 0 will help evaluating the real impact of this asymmetry (seems too large otherwise)

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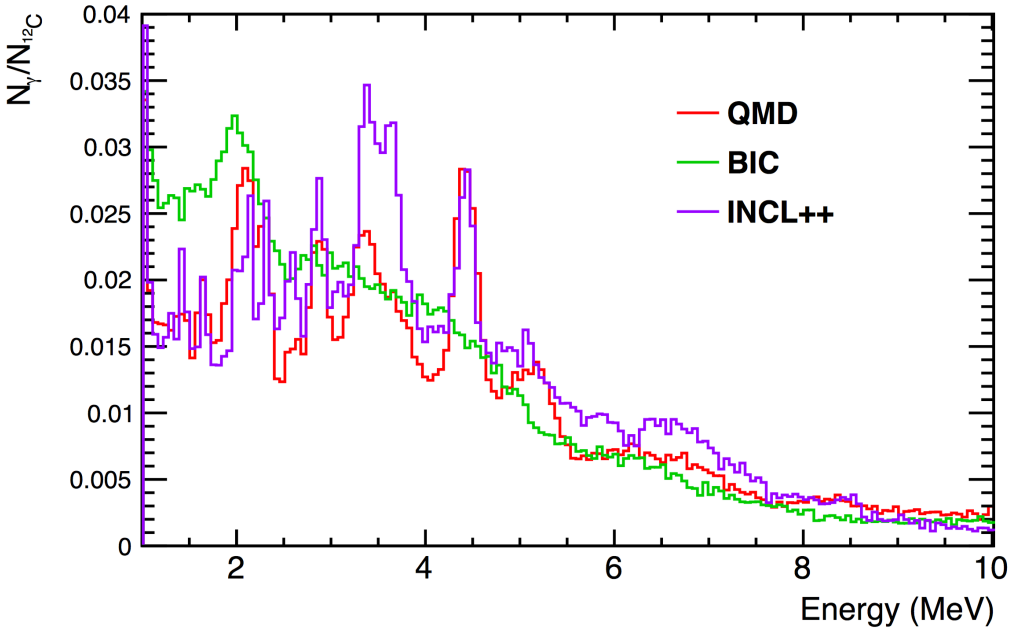
- Fig. 6: fix y axis label (units)
- 5.3: conclusions… **Those will have to be rewritten when we take into account the real dead time correction** (probably at some point the QMD model will be the best fitting one? let's see)
- Table 2: what is the explanation given to have a syst @ 60° that is 1/2 of 90°? BIC QMD and other models are much more different at 90° than at 60°?
- Fig 7: it would be better to compare uncorrected data with full data like MC to avoid creating "peaks" as artifacts.

Figure 8

- These comparisons should be done at generator level. it is in particular difficult to understand how can the BIC model reproduce the amount of inelastic scattering but not the spectrum. Since the C(C,C(*))C(*) reaction can occur only if the C* states are at quantized energies, once the rate is correct also the spectrum should be the same…



- We could not find a reaction that would yield a significant amount of photons above 6.1 MeV from these scattering processes. It would therefore be important to have the MC truth level information on what generates those events.
- Everything would be explained (including the difference with LYSO) if the full simulation accounted for the neutron pile-up, effect that is more significant in the BaF since it is more sensitive to neutrons and has a larger acceptance.