Hi Igal,

Here are my initial answers to your three basic questions outlined in your recent text.

Question #1

Which process(es) can we measure?

My answer:

If one includes the BCAL in coincidence with the eta detected in the FCAL then the list of measurable processes is rather large, including some elastic and very many inelastic reactions.

However, we cannot measure the gamma + He4 -> eta + He4 elastic process at these small angles since recoil He4 (or alpha) can not reach to the BCAL sensitive area due to its small recoil energy. With that in mind, all Primakoff type experiments so far are designed to not attempt measuring the recoil nuclei since it is not possible at ~~1-degree angles. In particular, our current eta-proposal is designed/approved without measuring the recoil alpha particles in the elastic reaction. Rather we assume that at these angles (0-4 degrees) the events without the recoil alpha detection can be: (a) Primakoff coherent; (b) nuclear coherent; (c) interference between them; (d) all kind of incoherent and inelastic processes having an eta as a one of final states. We call the (d) as a background in our experiment(s).

The remaining question is how to identify them and fit out underneath of the Primakoff part but, this is a separate question.

Question #2

Can we rely on only one model and/or only one scenario for the radiative decay width extraction?

My answer:

It is always better to have more than one model to use in the extraction process (since any model is not a fundamental theory, also includes some limited information only). If we succeed to have at least two models, we need to use them both. If we do not have the second model, then we will rely on it and state it in the publication.

About the "…only one scenario…". Obviously, it is better to have two or more ways to extract the decay width. In pi0 PrimEx in Hall B we had 3. Here we are trying hard to have 2 at least.

Question #3

Can the built-in model interdependence between the Nuclear Incoherent term and the Primakoff and Nuclear Coherent terms be neglected?

My answer:

This question needs more clear wording to try answering it. However, I will guess the question and try to answer it. Two processes (mentioned above) (a) Primakoff (that is electromagnetic coherent exchange reaction) and (b) the "Nuclear coherent" (that is the same only with a hadronic exchange) kinematically (and quantum mechanically) are the same (if you want, similar) elastic and coherent processes. They can be simulated by theory very accurately. Small exception is some constants and parameters, mostly for the nuclear coherent part. In addition, since they are quantum mechanically similar, they have an interference term as a process, this is also a predictable thing with the phase angle.

The so-called "incoherent part" in reality is all processes other than first two. We call them as a "background" in the Proposal.

The short answer: If we have all these 4 processes simulated (predicted) by model(s) then we should not "… neglect…" or ignore any process, we simply include them in our extracted cross section for all forward angles. This is related to the good case when we are hoping to 1-3% extraction. Since (unfortunately) we are not there yet there are several variations in my previous statement. That is a separate subject, and we had discussed them in our meeting many-many times.

Ashot