## Measurement of AP\&CT probabilities

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## Electronics Simulation \& Vinogradov

1 PE at t0 can induce:

- Direct Cross Talks (DiCT): at t0 with mean number = mu
- $\{0,1\}$ After Pulse (AP) at $\dagger 1++0$

DiCT and AP can induce in turn DiCT and AP
Since AP are delayed, we can study the statistics of all hits at t0 only, and then repeating the procedure for all hits at $\dagger 1+\dagger 0$, and so on.


We can treat hits at different times as independent events

## Electronics Simulation \& Vinogradov

If the mean number of CTs for each PE is mu, we expect an effective mean value due to the CTs induced by CTs themselves as mu_eff = mu / (1-mu)

Up to now, we have treated the statistics of CTs as Poisson(mu/(1-mu)), but this is wrong.

We have tested it with a toy MC


The mean number doesn't change but the RMS increases

Procedure
(1) Fit of laser spectra
(2) Integral of each peak
(3) Fill pe spectra

Since we trigger on laser, no possibility to induce AP/CT when no laser photon is detected
npe $=0$ is a direct measurement of laser occupancy:
$=>f=\# 0$ hits $/ \#$ all hits $=\operatorname{Exp}(-m u)$
$=>\mathrm{mu}=\log (1 / \mathrm{f})$



## Laser Runs

Laser Poisson statistics is fixed by bin in 0 pe
The difference between data and simulation is due to AP and CT

Fit of CT mean number and AP probability with toy MC (scan + minimization)



## Laser Runs






## ${ }^{241}$ Am Source Runs

## Resolutions suffer from geometrical effects



We need field-on runs for different Vbias

## ${ }^{241}$ Am Source Runs

Matching the energy scale


Matching the resolution



## ${ }^{241}$ Am Source Runs

## Sum of all channels corrected for TBA






## xy response

${ }^{241} \mathrm{Am}$ at different phi angles


## Conclusions

- Direct measurement of AP, CT, and PDE
- PDE increases with Vbias but slower than AP and CT
- 241 Am resolution not yet fully understood
- Likely, there is an xy geometrical effect to account for

