Photoproduction of ϕ meson at the EIC and afterburner

Kong Tu
BNL
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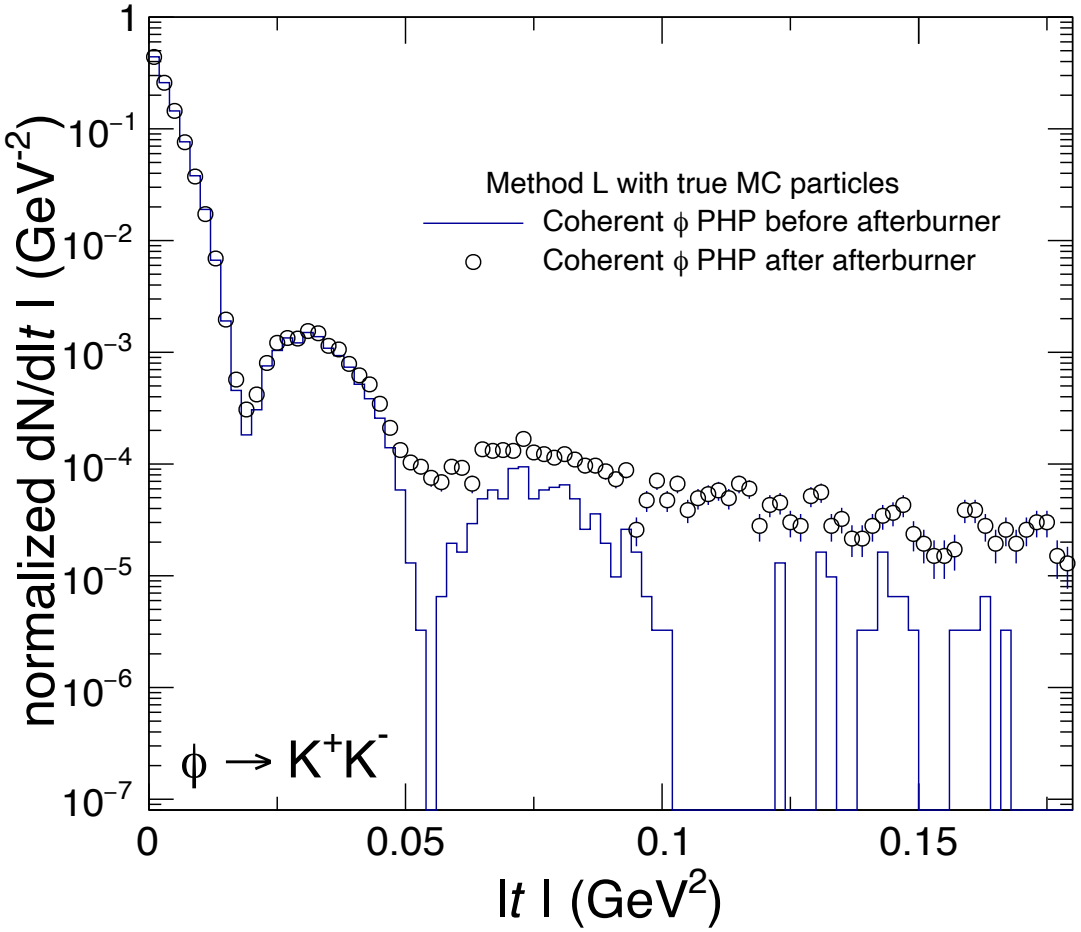
Sample

- Sartre files on gpfs02 (Oct, 2021 produced by T. Ullrich)
- /gpfs02/eic/DATA/sartre/data/bnonsat/sartre_bnonsat_Au_phi_photo_1
- **Q^2 range within (0.002,0.003)**
- Run the hepmc conversion
- Run the afterburner (compare before and after `afterburner`)
- Run thru epic full simulations (compare MC vs REC)

These samples are being prepared for uploading to s3 to be officially run every month.

Before and after afterburner



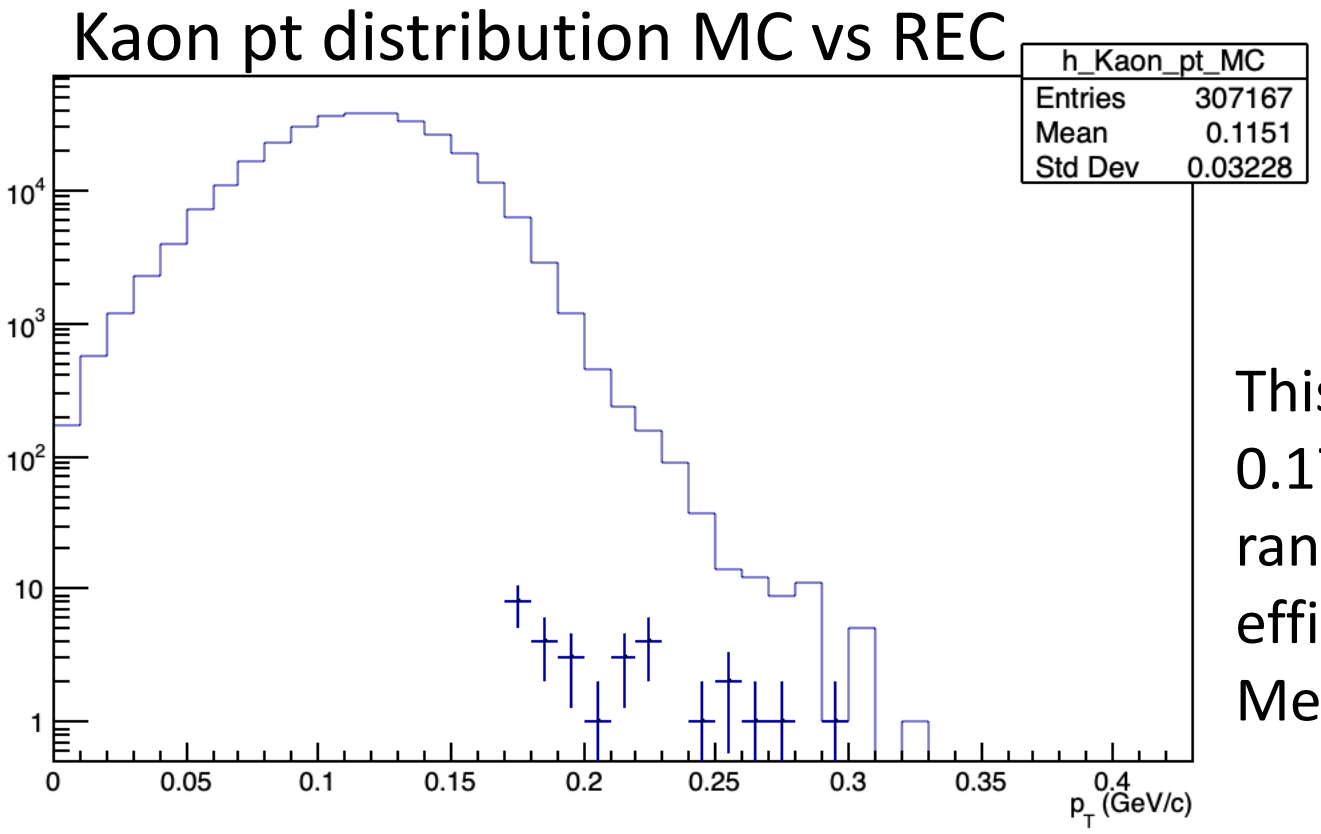
Previously, I thought *t* is Lorentz invariant such that if **the incoming and outgoing particles are both after-burned**, the beam effect should not affect the TRUTH level t distribution.

Now it seems to prove me wrong.

I suspect its because the angular divergence and the quantity *t* is not rotational invariant?

Also, it is a bit surprising that low-t agrees better than higher t.

With an explicit cut on pt > 0.17 GeV/c



This requires both Kaon pt > 0.17, and within phi mass range, that's why the efficiency is also low after 200 MeV/c

Acceptance, again, is not feasible to do phi photoproduction.

Next steps

- Need to understand better what the afterburner does to photoproduction events or to correct our (at least mine) expectation. For electroproduction, it seems fine.
- Jpsi photoproduction should be a better probe without low pt tracking issue or acceptance loss.
- Will be doing this study with low-Q2 tagger in ePIC. The result will be also informative to what we should do for the EIC 2nd detector.

- **Suggestion: everyone tries the afterburner and compare before and after with a clean sample of your own interest.**