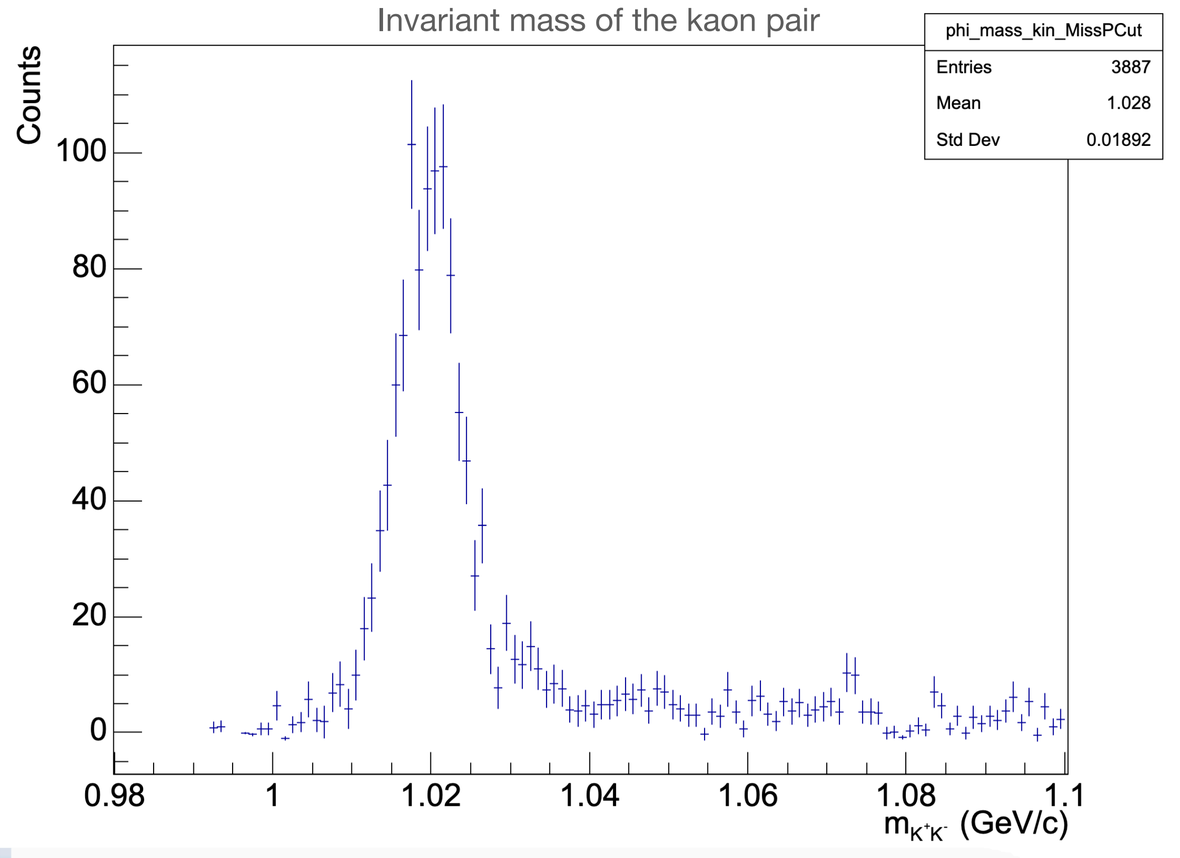
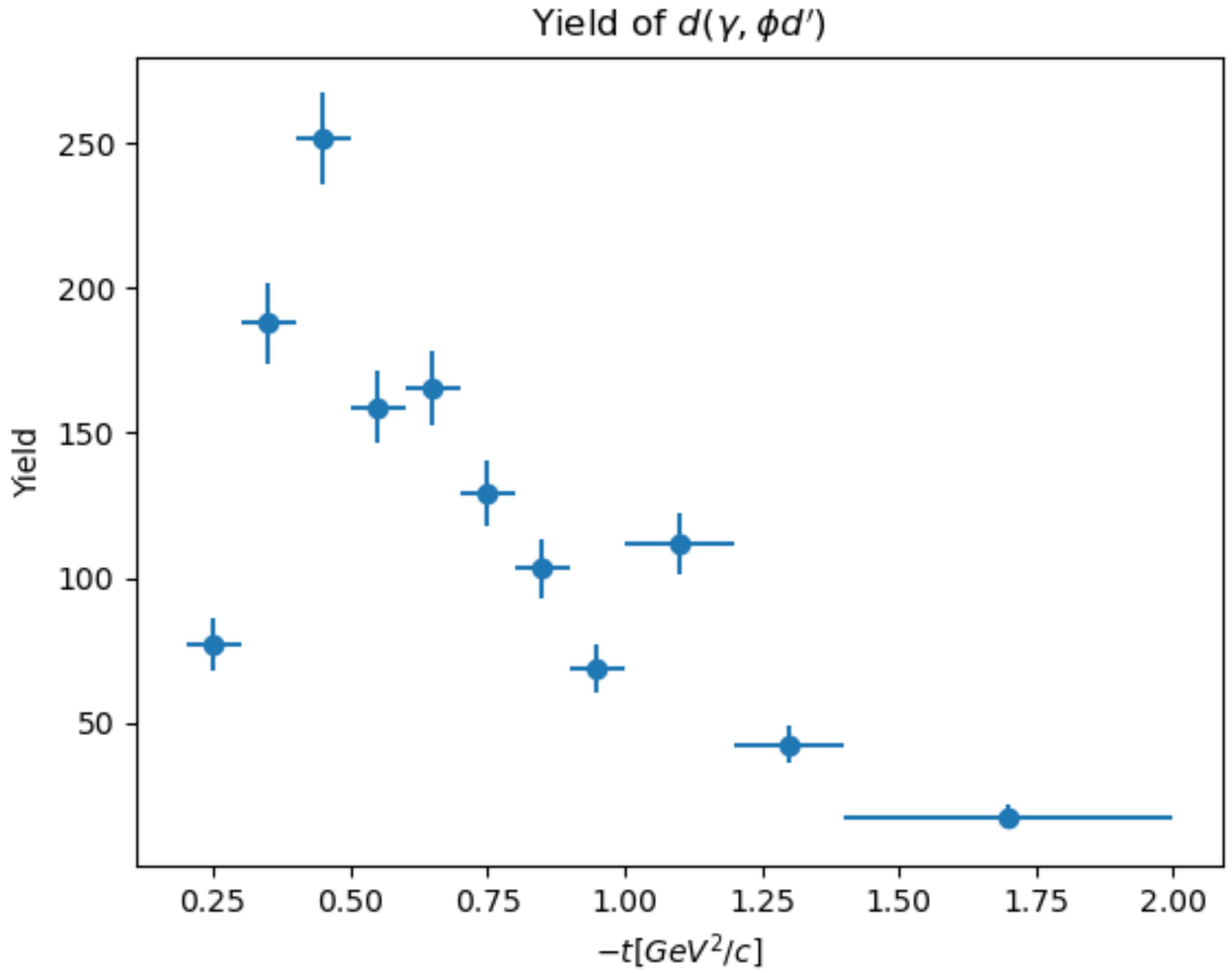
Cross section of coherent ϕ photoproduction

- Reaction: $\gamma d \rightarrow \phi d$
- Yield extraction
- Observable: 2-kaon mass
- Background is minimal around phi mass
- Simple counting to get the yield
- Only bin in t, due to limited statistics



Cross section of coherent ϕ photoproduction

- Yield extraction

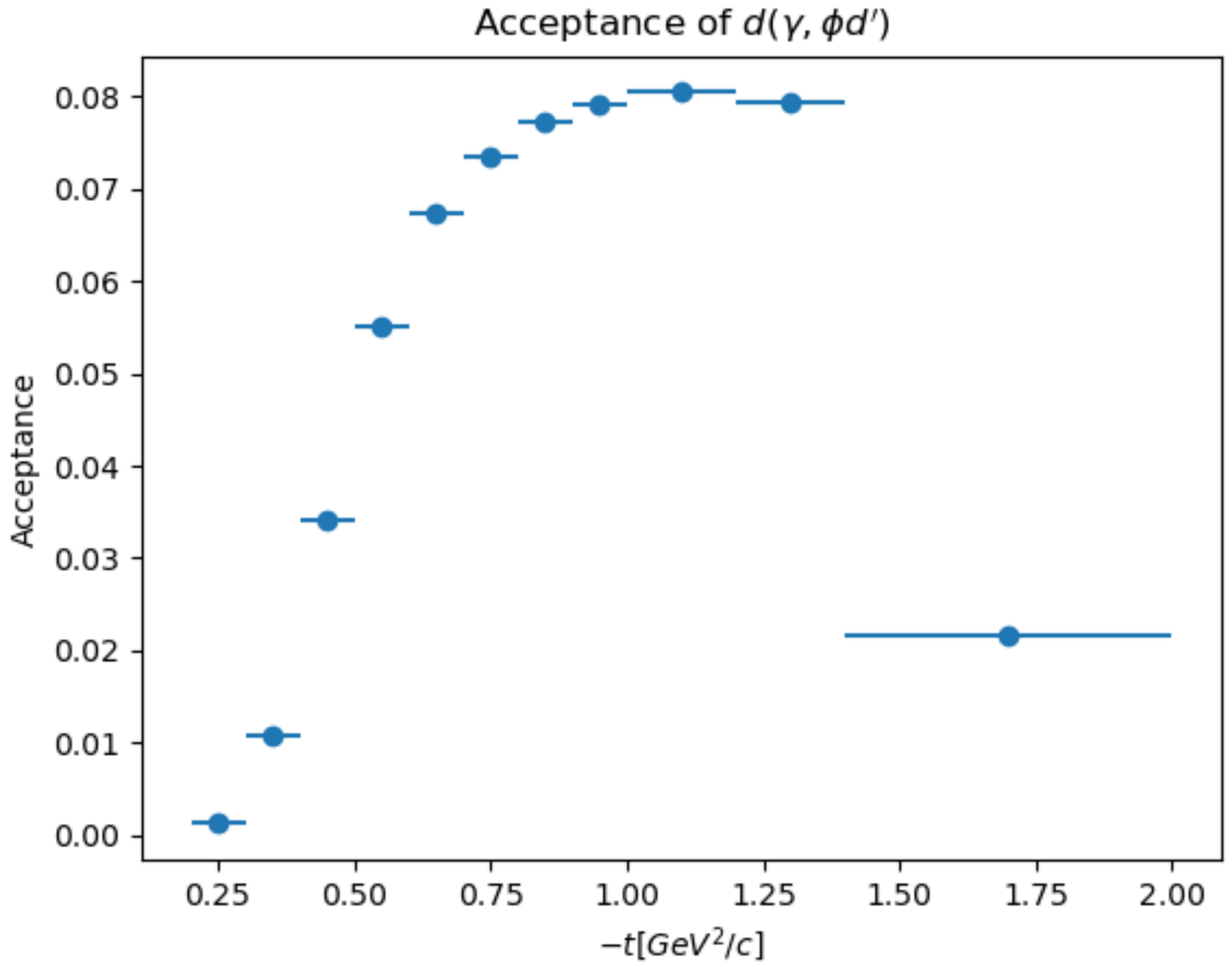


Cross section of coherent ϕ photoproduction

- Acceptance
- New generator gen_coherent, based on gen_MF
- Specify deuteron as PID=45, PDG_ID=1000010020
- Cross section: flat, $d\sigma/dt(\gamma d \to \phi d) = 1$
- Deuteron efficiency: use whatever in hdgeant4 for now

Cross section of coherent ϕ photoproduction

- Acceptance

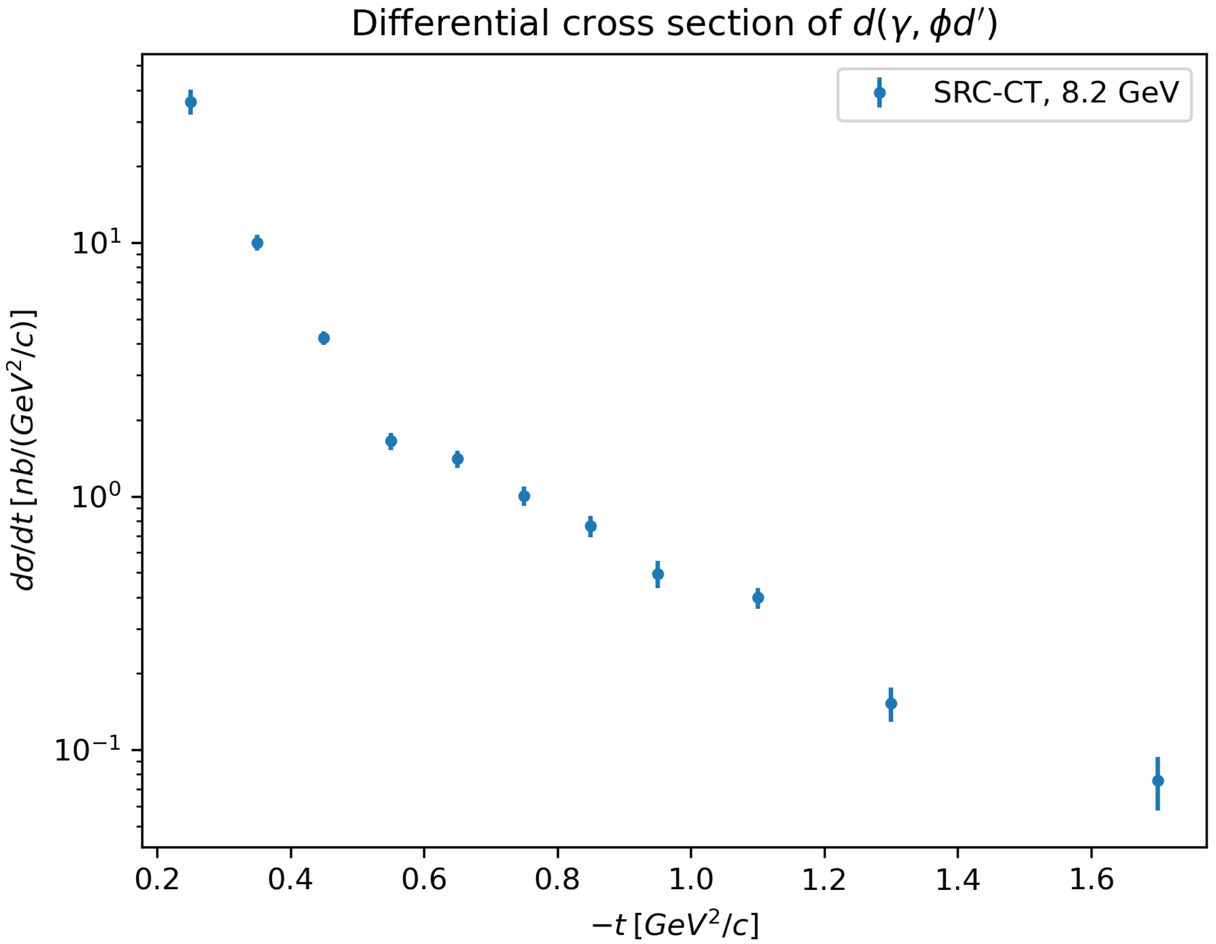


Cross section of coherent ϕ photoproduction

- Differential cross section
- $$\frac{d\sigma}{dt}(\gamma d \to \phi d) = \frac{Y}{A \times L \times \Delta t}$$
- Y: yield
- A: acceptance
- L: luminosity
- Δt: bin size of t

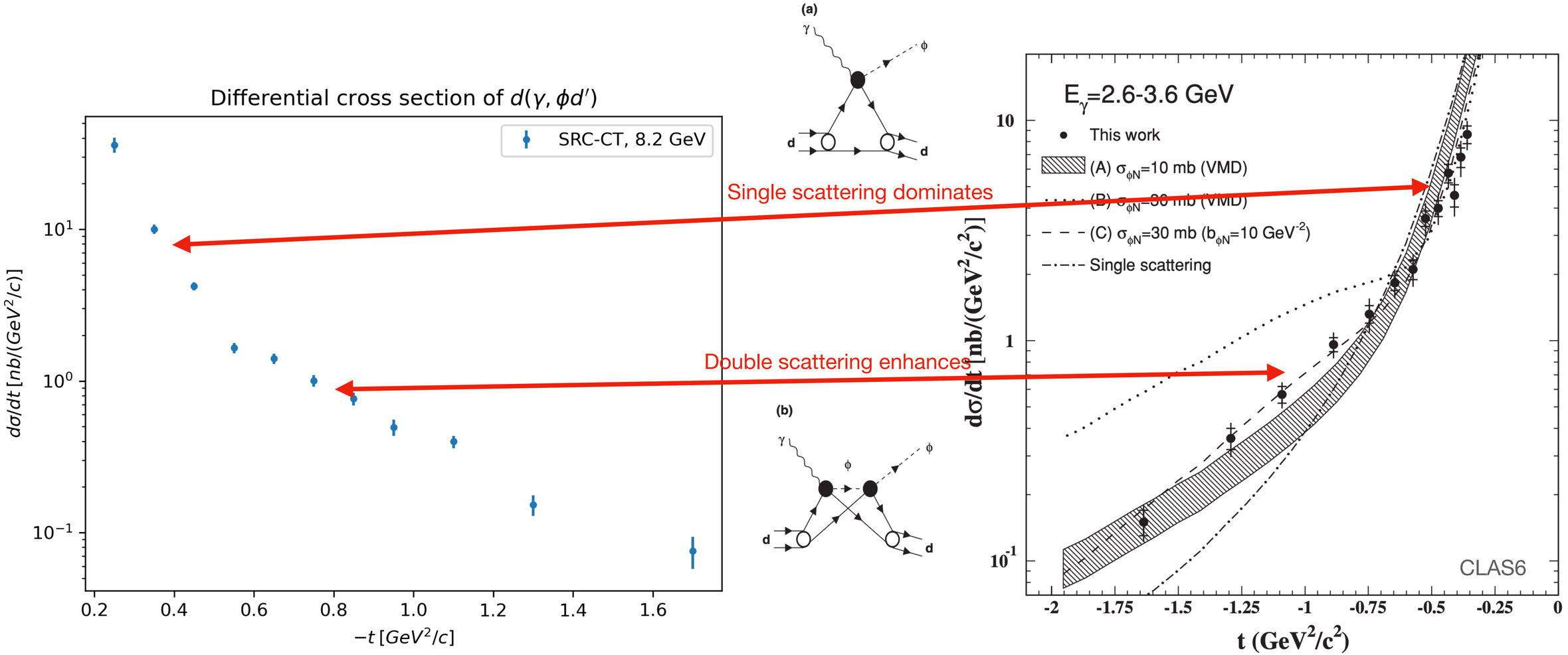
Cross section of coherent ϕ photoproduction

- Differential cross section



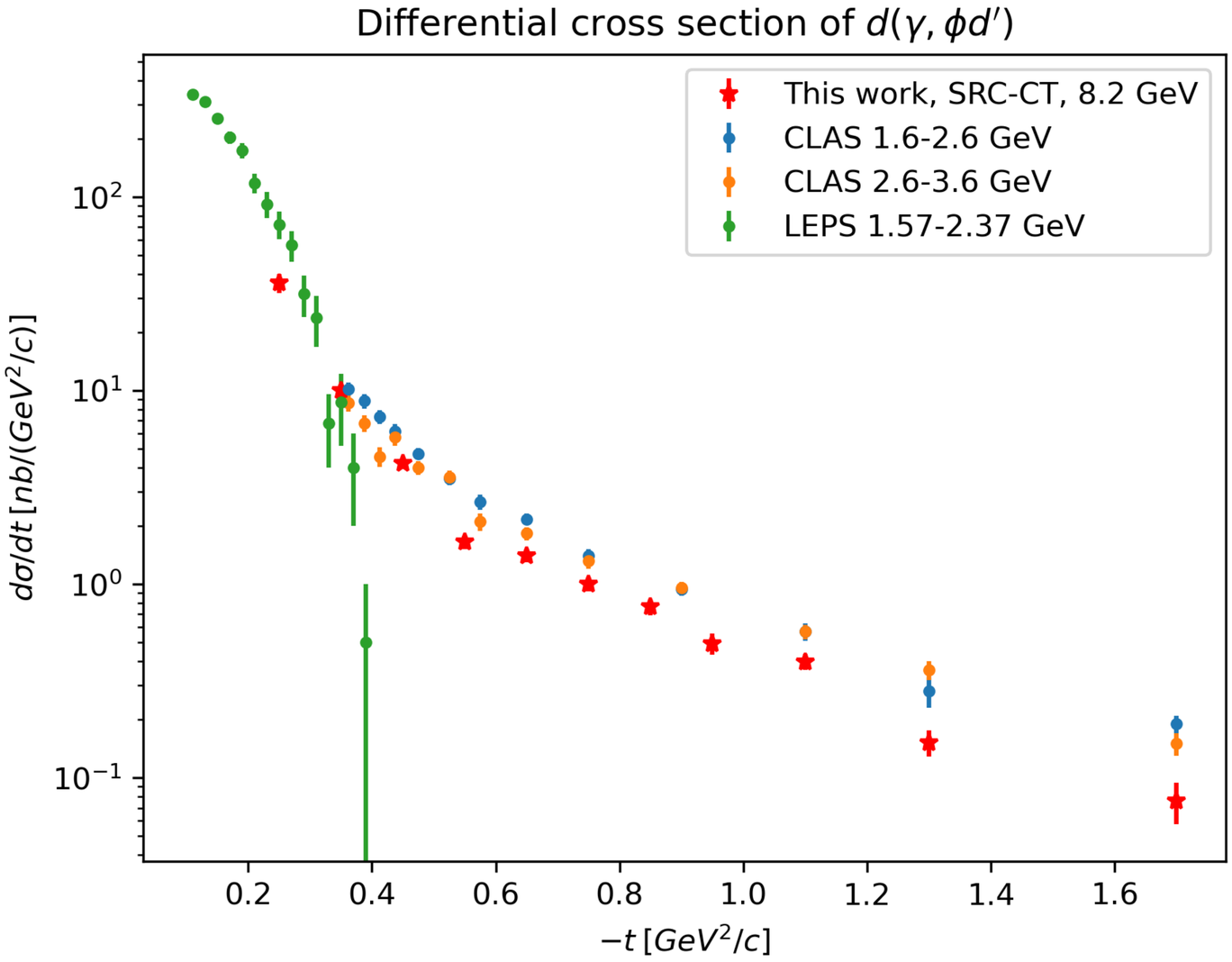
Cross section of coherent ϕ photoproduction

- Single and double scattering mechanisms



Cross section of coherent ϕ photoproduction

- Compare with world data



Cross section of coherent ϕ photoproduction

- Next step
- Get observables for $^{4}He(\gamma, \phi d)X$ and $^{12}C(\gamma, \phi d)X$
- Two more variables: P_{miss}, E_{miss}