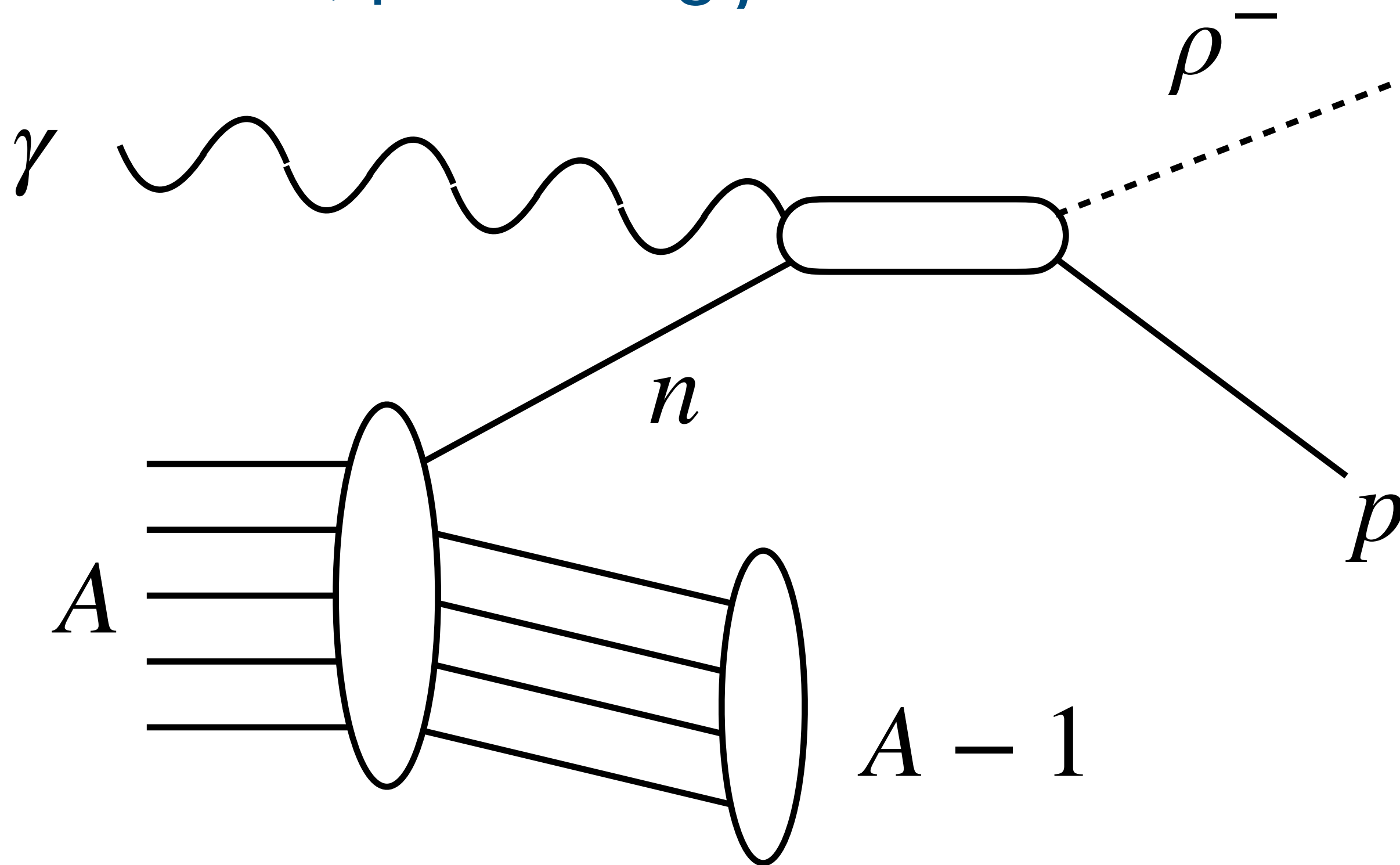


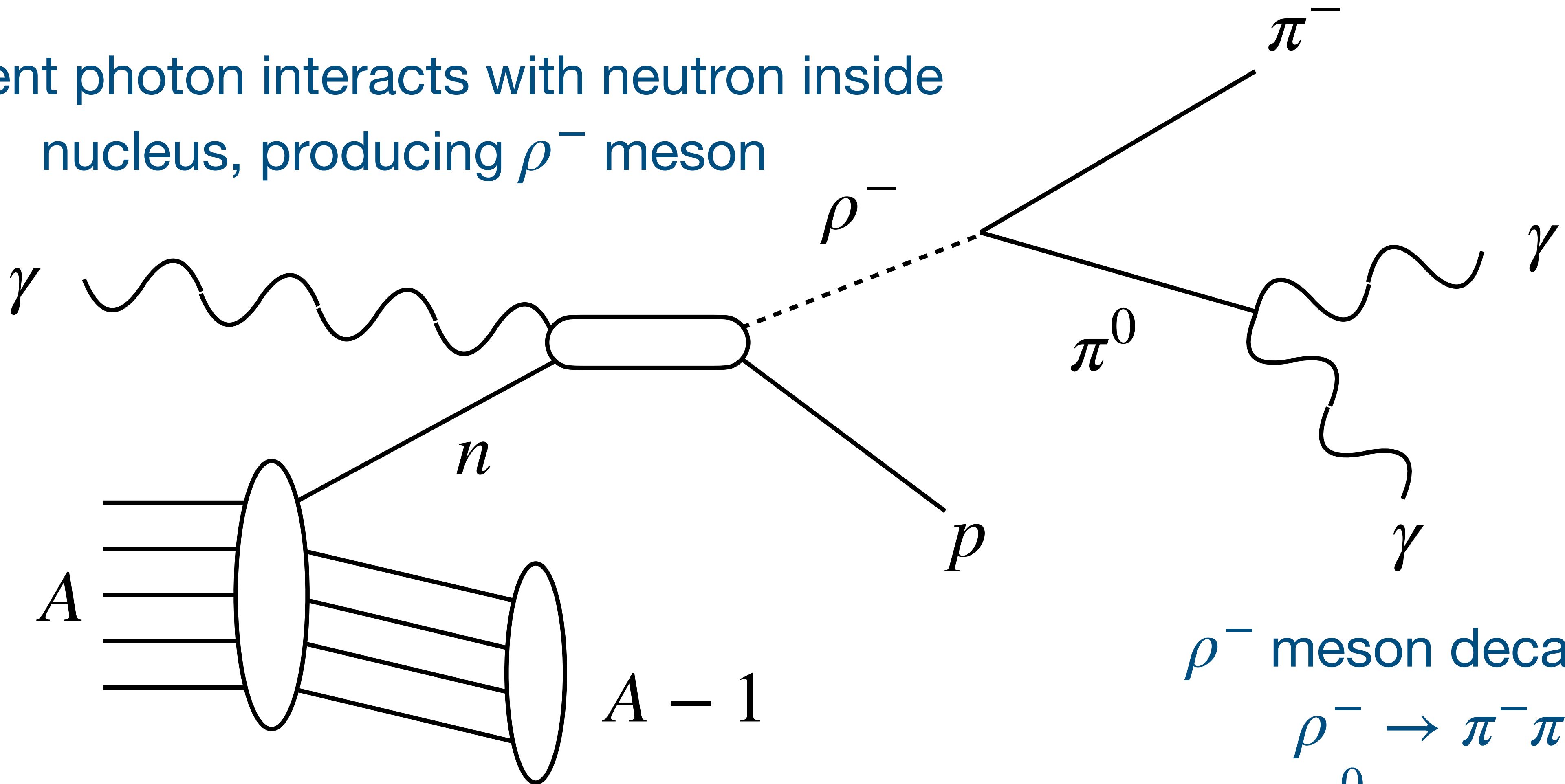
$\gamma(n, p\rho^-)$ Channel

Incident photon interacts with neutron inside nucleus, producing ρ^- meson



$\gamma(n, p\rho^-)$ Channel

Incident photon interacts with neutron inside nucleus, producing ρ^- meson

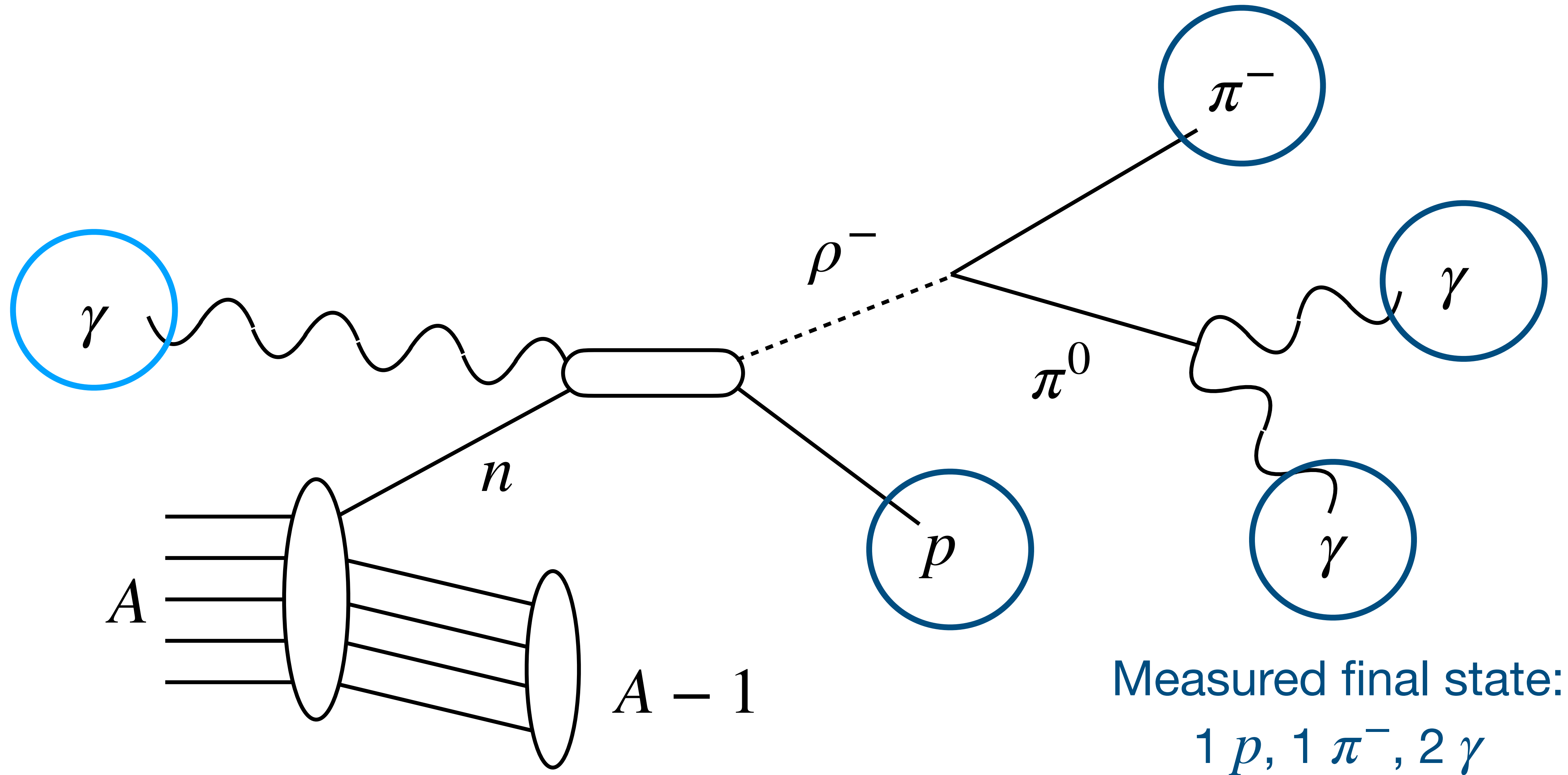


ρ^- meson decays:

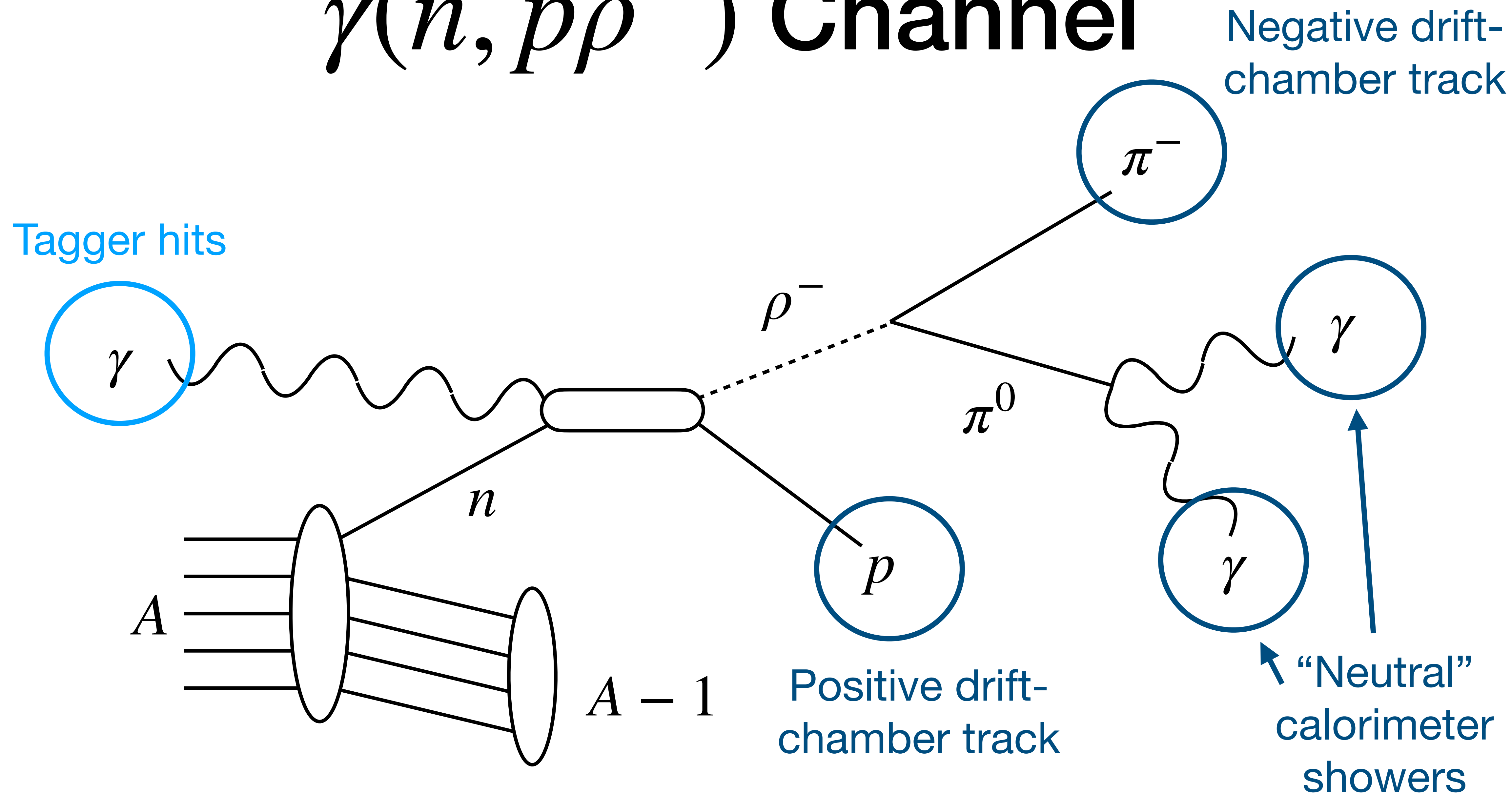
$$\rho^- \rightarrow \pi^- \pi^0$$

$$\pi^0 \rightarrow \gamma\gamma$$

$\gamma(n, p\rho^-)$ Channel



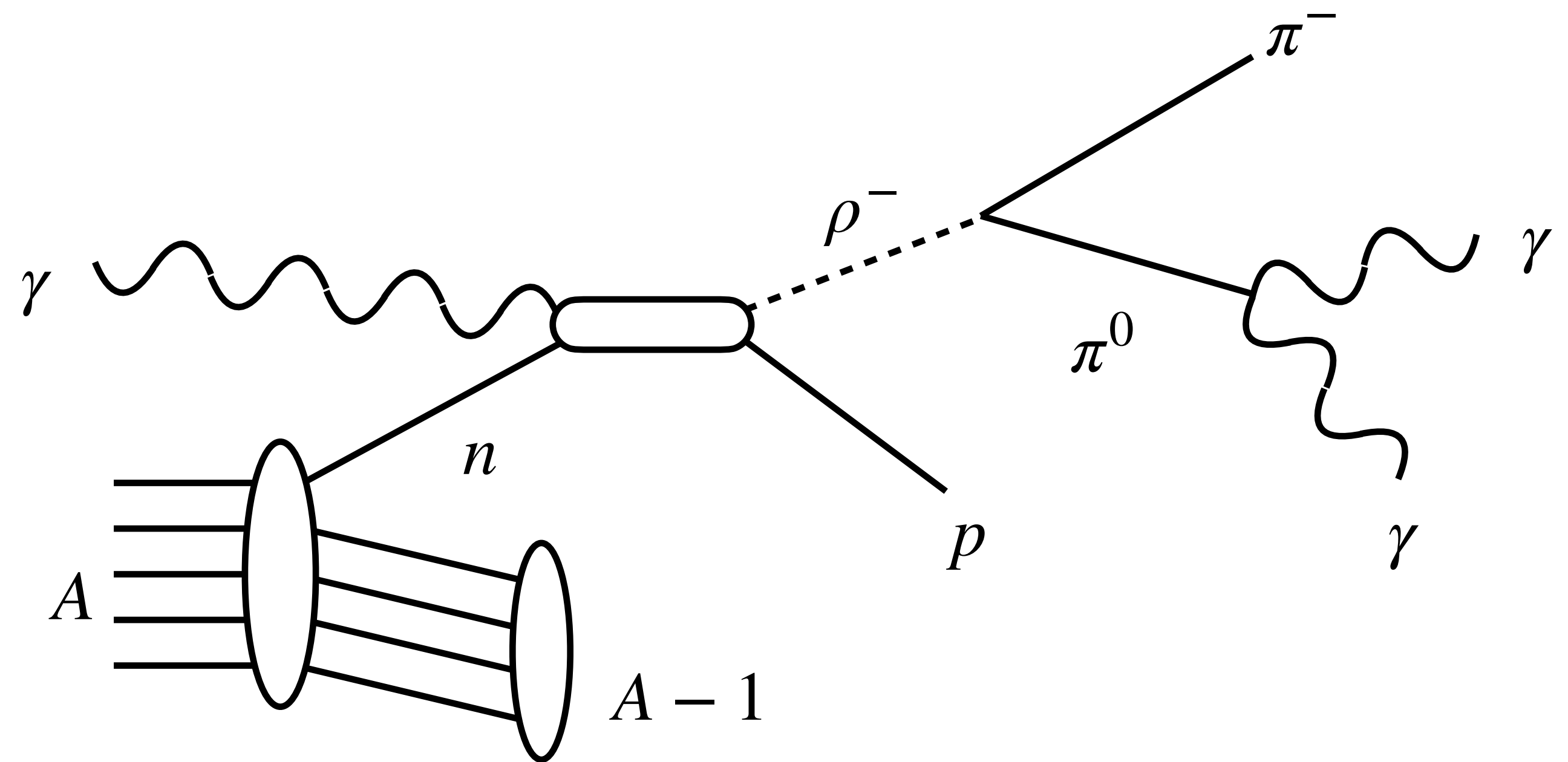
$\gamma(n, p\rho^-)$ Channel



$\gamma(n, p\rho^-)$ Channel

1p1pi1pi0 Plugin:

- Looks at events with:
 - 1 positive charged track
 - 1 negative charged track
 - 2 neutral showers
- Performs kinematic fitting under hypothesis of $1p, 1\pi^-, 2\gamma$
- Uses two constraints:
 - Common vertex position
 - $(p_{\gamma 1} + p_{\gamma 2})^2 = m_{\pi^0}^2$
- Returns best-fit particle momentum and total Confidence Level



Plugin Output

- Plugin automatically run in ~20% of data; not responsibility of physics analyzers

- Example output location:

```
[jrpybus@ifarm1802 ~]$ cd /cache/halld/offline_monitoring/RunPeriod-2021-08/ver01/  
tree_1p1pi1pi0  
[jrpybus@ifarm1802 tree_1p1pi1pi0]$ ls  
081393 081405 081418 [...]  
[jrpybus@ifarm1802 tree_1p1pi1pi0]$ ls 081393  
tree_1p1pi1pi0_081393_002.root
```

- Output ROOT trees are accessed by physics monitoring scripts

Physics Monitoring Scripts

- Navigate to “common” proton-rhoMinus channel analysis directory

```
[jrpybus@ifarm1802 ~]$ cd /work/halld2/home/src-ct/  
[jrpybus@ifarm1802 src-ct]$ cd HallD_SRC-CT_Analysis/analysis_scripts/  
[jrpybus@ifarm1802 analysis_scripts]$ cd proton_rhoMinus/
```

- Directory contains analysis scripts and plotting scripts

```
[jrpybus@ifarm1802 proton_rhoMinus]$ ls  
cuts.hh      histograms      offline_monitoring  rhoMinusAnalyzer.cpp  
dataFiles   ifarm_scripts  plotting             rhoMinusRecAnalyzer.cpp  
figs        makePlots.py   README.md
```

- These are all packaged in the “offline_monitoring” executable:

Physics Monitoring Scripts

- Executable “offline_monitoring” should be given input run number:

```
[jrpybus@ifarm1802 proton_rhoMinus]$ ./offline_monitoring 081474
Processing /work/halld2/home/src-ct/Halld_SRC-CT_Analysis/analysis_scripts/proton_rhoMinus/
rhoMinusAnalyzer.cpp("/cache/halld/offline_monitoring/RunPeriod-2021-08/ver01/
tree_1p1pi1pi0/081474/", "/work/halld2/home/src-ct/offline_monitoring/RunPeriod-2021-08/ver01/
proton_rhoMinus/histograms_081474.root", 0)...
/cache/halld/offline_monitoring/RunPeriod-2021-08/ver01/tree_1p1pi1pi0/081474/
tree_1p1pi1pi0_081474_001.root
/cache/halld/offline_monitoring/RunPeriod-2021-08/ver01/tree_1p1pi1pi0/081474/
tree_1p1pi1pi0_081474_002.root
/cache/halld/offline_monitoring/RunPeriod-2021-08/ver01/tree_1p1pi1pi0/081474/
tree_1p1pi1pi0_081474_003.root
```

Run 081474 analyzed

Output found in: /work/halld2/home/src-ct/offline_monitoring/RunPeriod-2021-08/ver01/
proton_rhoMinus/

- This script will need to be updated as monitoring versions change; if run is “not found” when it should be present notify Jackson or Nathaly

Physics Monitoring Scripts

- Navigate to output directory:

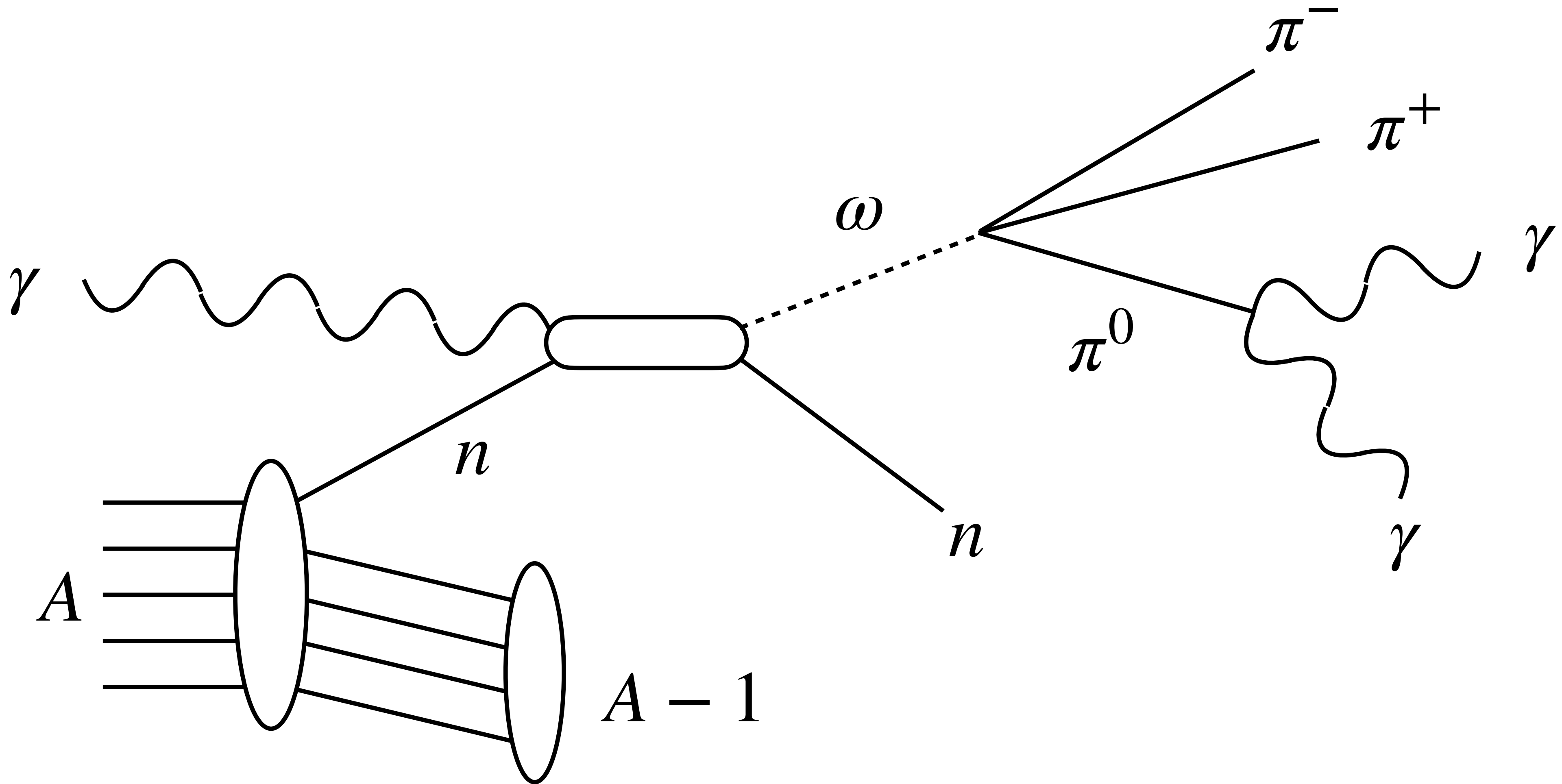
```
[jrpybus@ifarm1802 ~]$ cd /work/halld2/home/src-ct/offline_monitoring/RunPeriod-2021-08/ver01/proton_rhoMinus/  
[jrpybus@ifarm1802 proton_rhoMinus]$ ls  
counts_081474.txt  figures_081474.pdf  histograms_081474.root
```

- Output includes ROOT file of all output histograms, PDF file of important figures, and TXT file of event counts
- Counts should be manually recorded for each run by analysis shift-taker:

```
[jrpybus@ifarm1802 proton_rhoMinus]$ cat counts_081474.txt  
t cut      Total      SRC  
-1         0.875      0.0  
-1.5       0.0        0.0  
-2         0.0        0.0
```

- Figures should be examined by analysis shift-taker

Background Source: $\gamma(n, \omega)n$



Background Source: $\gamma(n, 3\pi)n$

