Why study neutrons from reactions?

- We can study (d,n) as an analogue for (p,\gamma) for stellar nucleosynthesis in novae and x-ray bursts.

- Non-proliferation needs accurate cross sections for reactions involving neutrons.

- Can be used to study nuclear structure of nuclei such as $^8,^{11}\text{B}$.
$^{19}\text{F}(\alpha, n)$

- NNSA put out call to study cross section for applications to in-field detection systems and assay of UF$_6$
- Measurement performed at Notre Dame
Preliminary Results

This experiment will be continued at HRIBF

Courtsey W. A. Peters

Time of Flight
$^{56}\text{Ni}(d,n)$

- Important waiting point nucleus in rp-process
- Measurement performed at NSCL
- Merged VANDLE with MONA/LISA array
$^{56}\text{Ni} - \text{setup}$
$^{56}\text{Ni} - \text{Preliminary Results}$

![Graph showing preliminary results for $^{56}\text{Ni}$ with energy and time-of-flight (TOF) axes.](attachment:image.png)
Summary

- VANDLE can be used to study a variety of reactions involving neutrons.
- Because it is a versatile (ha) array it can be molded to fit nearly any physical situation.
- The fully digital acquisition system works stand alone but can be coupled to existing systems.
- VANDLE provides potentially simple augmentation to other established detection systems.