Small, Medium and Big Ideas on Nuclear Data

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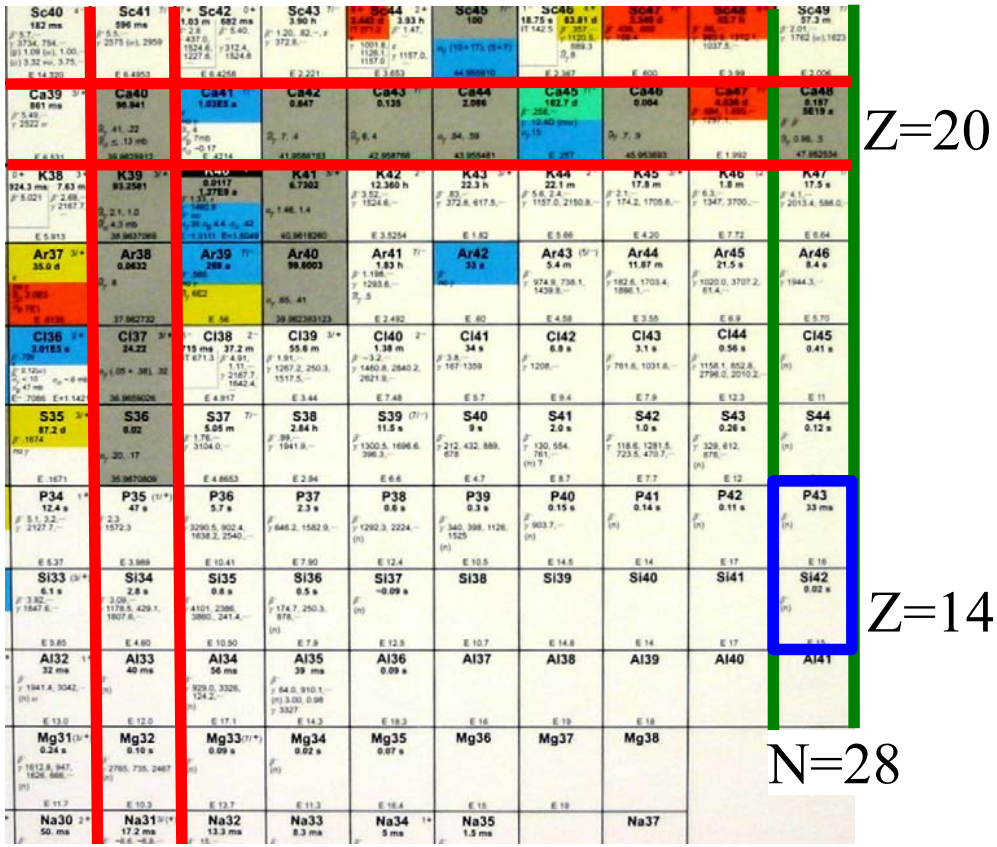
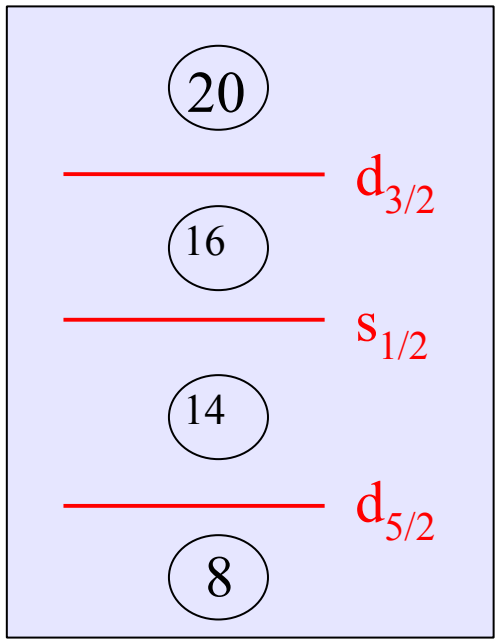
Two-proton knockout reactions as a way to reach neutron-rich isotopes

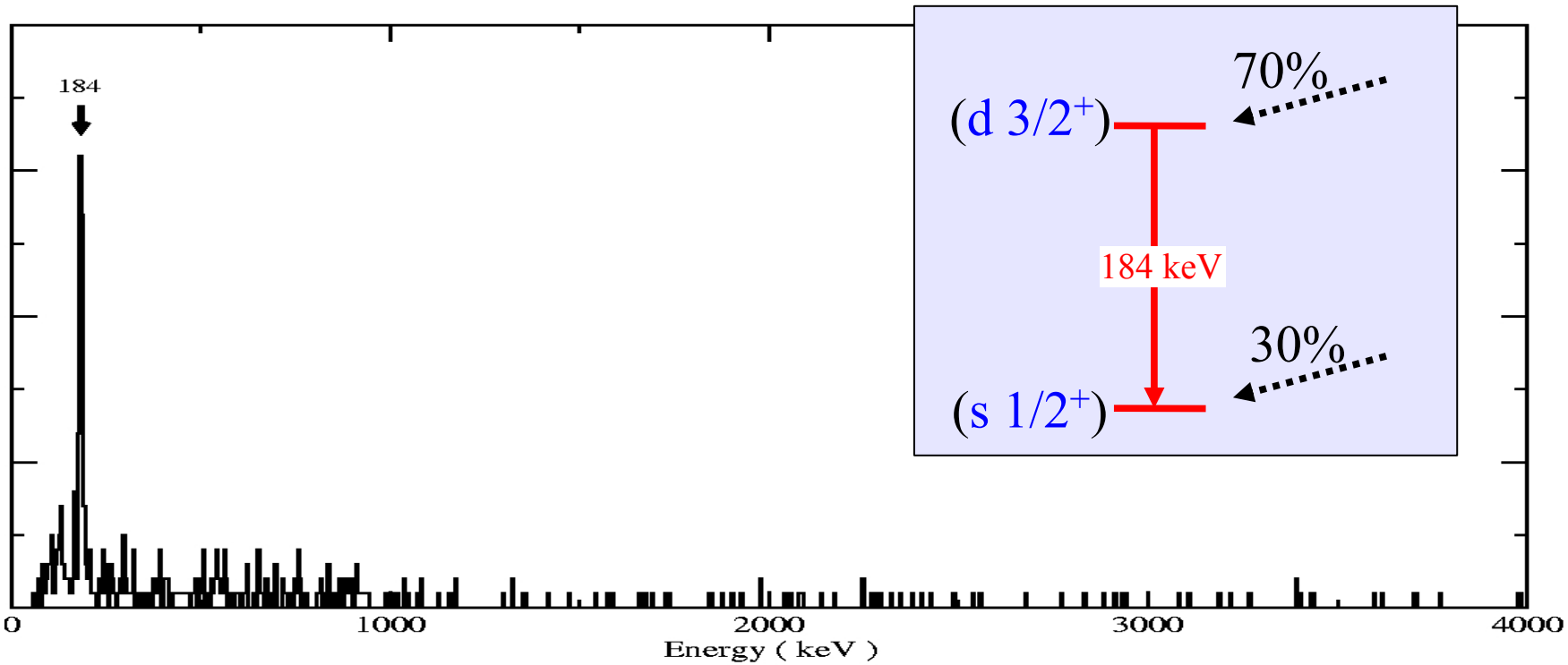




- Investigate N=28 magic number
- Investigate Proton-shell structure for extremely Neutron-rich isotopes

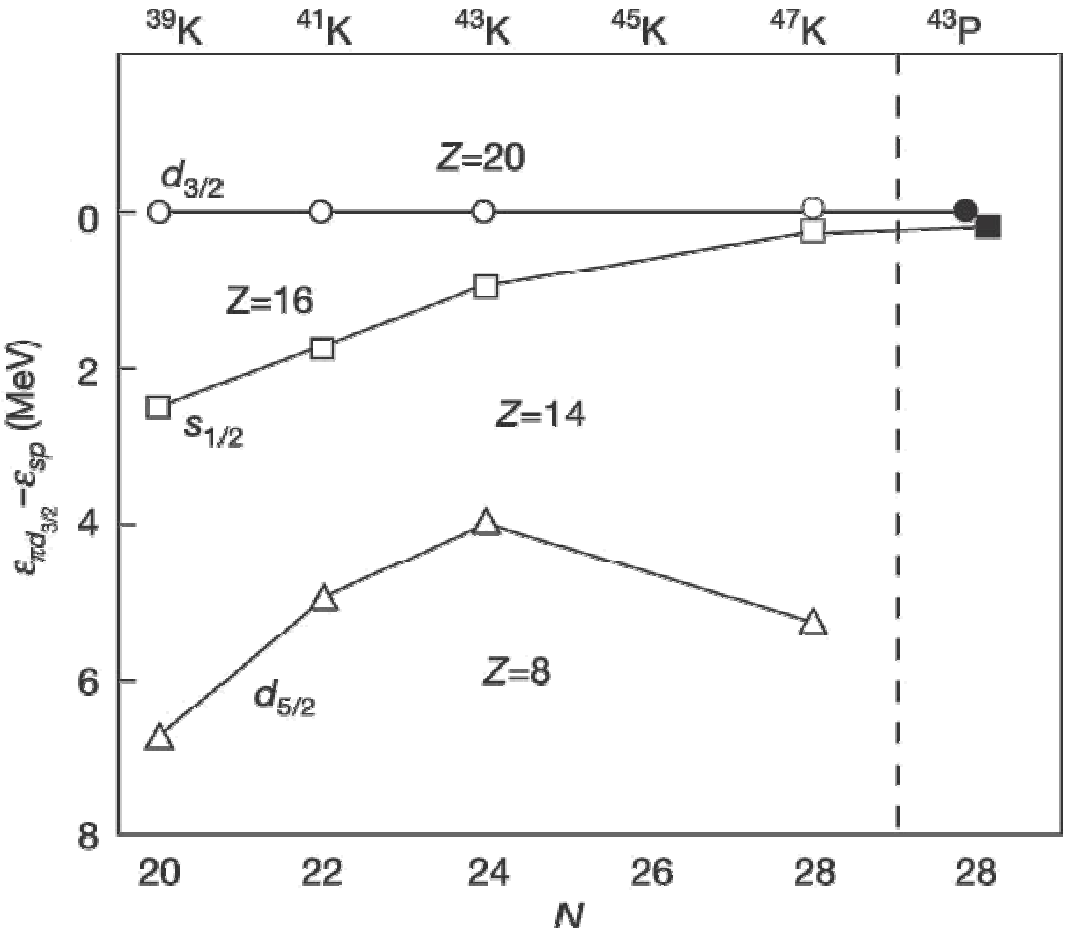
Single-p knockout: $^{44}S \rightarrow {}^{43}P$

Fridmann *et al.*, Nature 435, 922 (2005).



- Total production cross section: 7.6(11) mb,
- 70/30 % population of excited and ground state
- Only two final states are populated at large cross sections

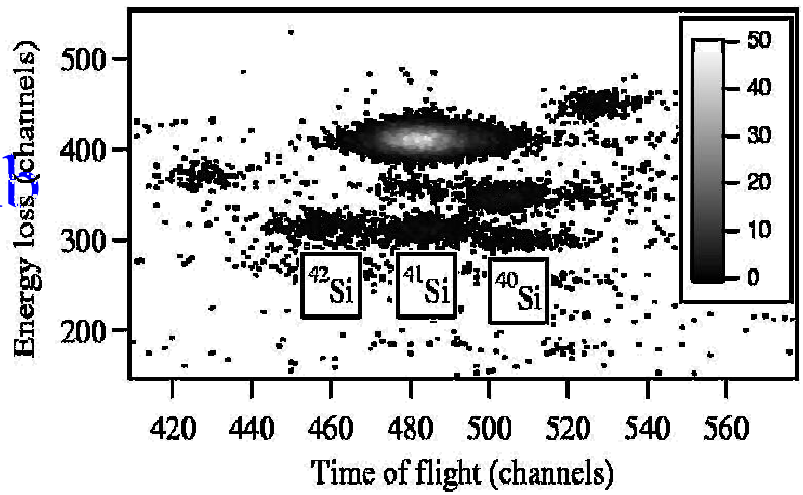
Two-nucleon knockout and the number of valence nucleons



2p-Knockout in $N=28$ nuclei

Fridmann *et al.*, Nature 435, 922 (2005).

- Cross sections in previous examples:
  Bazin et al:
  $^{28}Mg \rightarrow ^{26}Si$, $\sigma = 1.5$ mb
  $^{34}Si \rightarrow ^{32}Mg$, $\sigma = 0.76(10)$ mb



- Our experiments:
  $^{46}Ar \rightarrow ^{44}S$, $\sigma = 0.23(2)$ mb
  $^{44}S \rightarrow ^{42}Si$, $\sigma = 0.12(2)$ mb

- Calculations: (Brown / Tostevin)
  $^{46}Ar \rightarrow ^{44}S$, $\sigma = 0.19$ mb
  $^{44}S \rightarrow ^{42}Si$, $\sigma = 0.16$ mb

Strawman-calculation:
without Z=14-gap
$^{46}Ar \rightarrow ^{44}S$, $\sigma = 2.796$ mb
$^{44}S \rightarrow ^{42}Si$, $\sigma = 1.698$ mb

- Reduced cross sections are result of Z=14 shell closure:
  Few valence nucleons available for reaction.

“Small” Ideas – small modifications to Nuclear Structure References

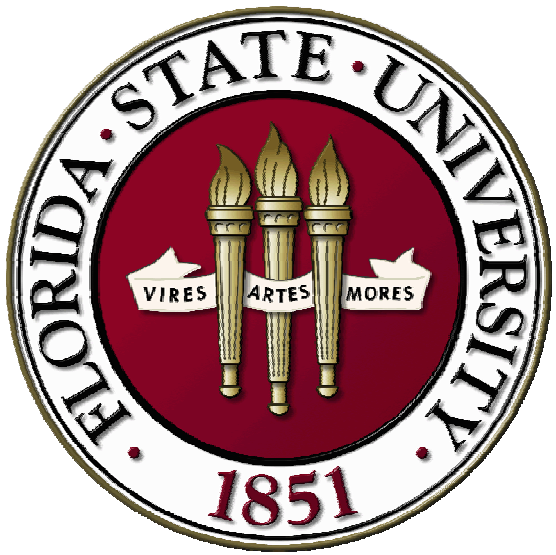
- Energy range search for reactions

  Example: 135 MeV (p,p’) vs. 25 MeV (p,p’)

- Polarized beam studies

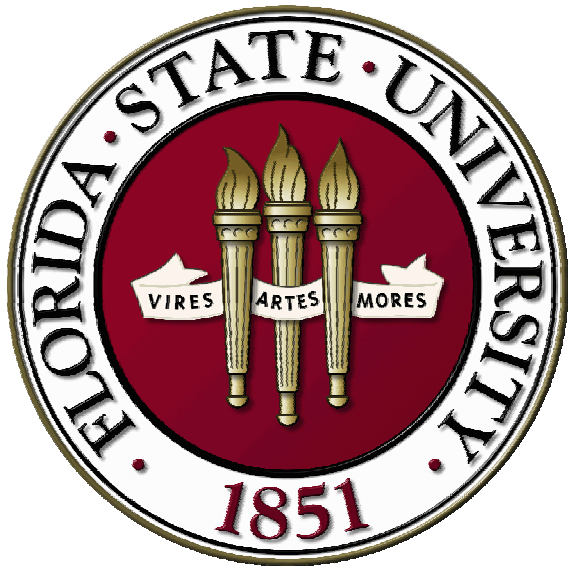
  should be able to search for polarized ^{6}Li separately from unpolarized ^{6}Li

- Default output year order should be descending instead of ascending



A “Medium” Idea for ENSDF

Coverage of A<40 isotopes equivalent to that for heavier isotopes – do not rely on Endt compilations.



A “Big” Idea – A Pub Med revolution for nuclear structure physics

- NIH “Policy on Enhancing Public Access to Archived Publications Resulting from NIH-Funded Research” – effective May 2, 2005

- DCRPrinciples – 57 publishers approach PubMed on October 29, 2005 with offer of free access for all PubMed users