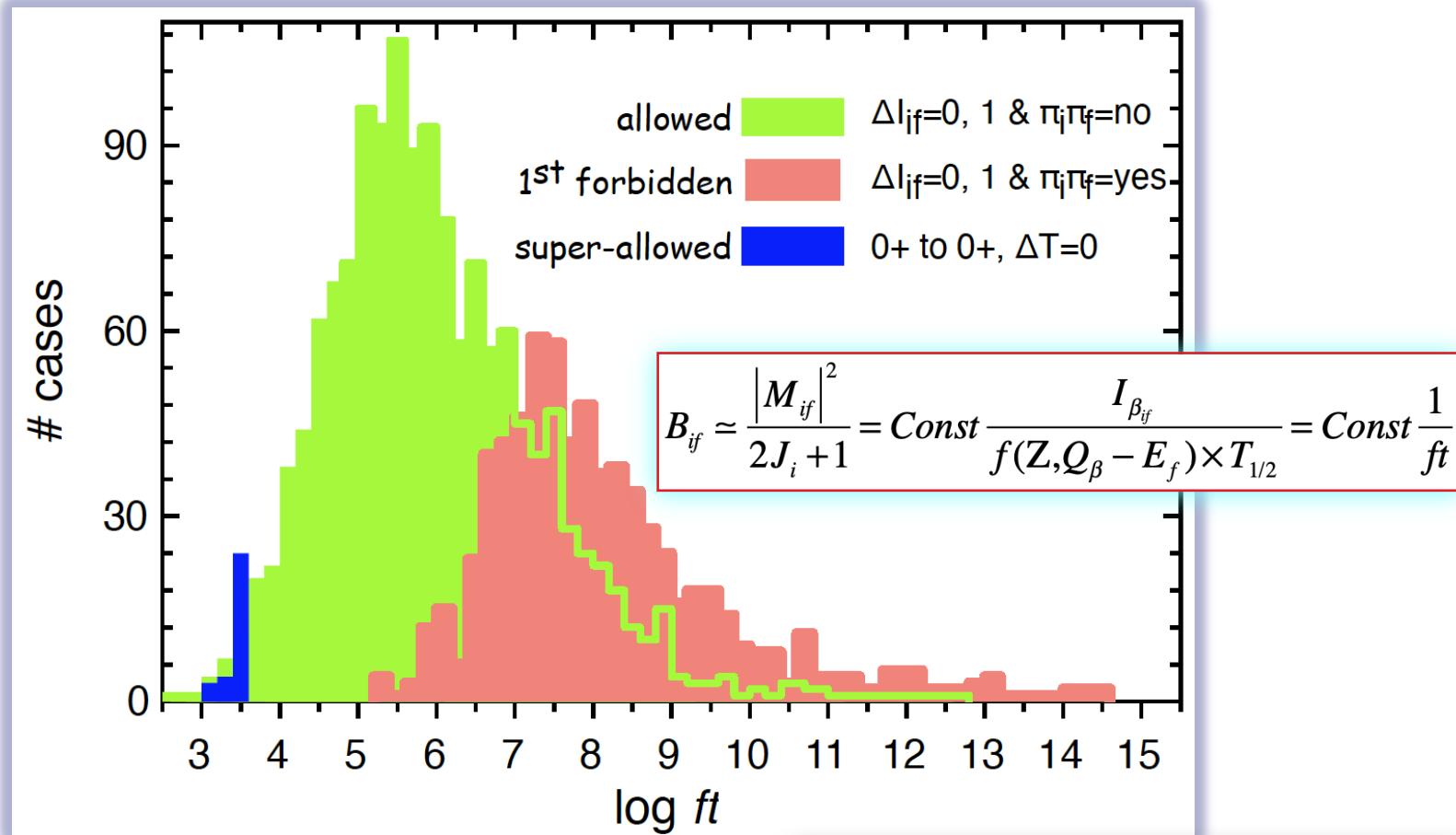


log ft values in well-deformed nuclei

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Systematics of log ft values for β^- , and EC/ β^+ transitions

Steffen Turkat ^{a,*}, Xavier Mougeot ^b, Balraj Singh ^c, Kai Zuber ^a



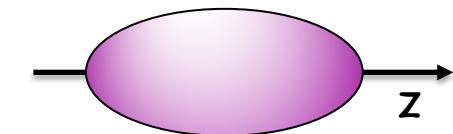
log ft (allowed) 3-13 \rightarrow hindrance of $\sim 10^{10}$

➡ l -, isospin- or K-forbidden,
or configuration hindered

Selection rules - deformed nuclei

deformed nuclei - Nilsson model: $\Omega^\pi[Nn_z\Lambda]$; $\Lambda = \Omega \pm 1/2$

S.G. Nilsson, Dan. Mat. Fys. Medd. 29 (16) (1955)



$\Delta I=0, +/-1; \pi_i, \pi_f = \text{NO (Allowed)}; \pi_i, \pi_f = \text{YES (1st Forbidden)}$

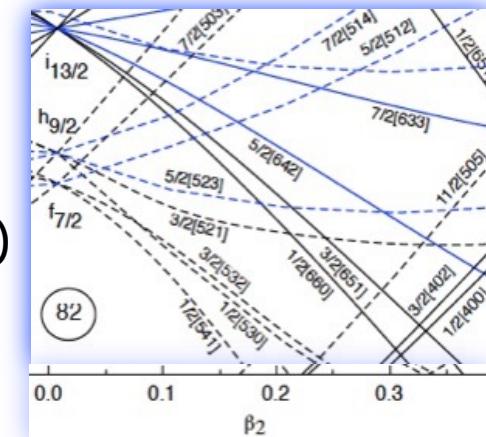
G. Alaga, Phys. Rev. 100 (1955) 432

$\Delta\Omega = 0, +/-1; \Delta N = 0 = \Delta n_z = \Delta \Lambda = 0$

$\Delta\Omega = 0, +/-1; \Delta N = 0 \Delta n_z = \Delta \Lambda = 0, +/-1$

J. Fujita et al., Phys. Rev. C1, (1970) 2060

Allowed Unhindered (AU)

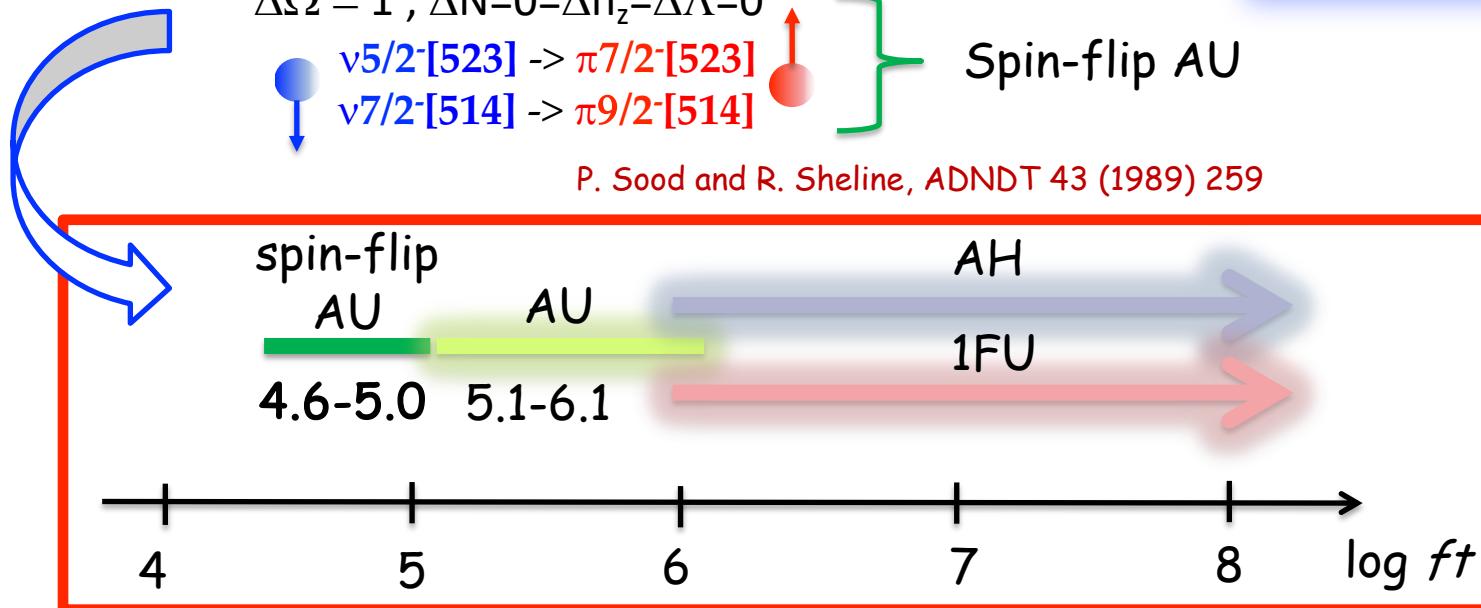


$\Delta\Omega = 1; \Delta N = 0 = \Delta n_z = \Delta \Lambda = 0$

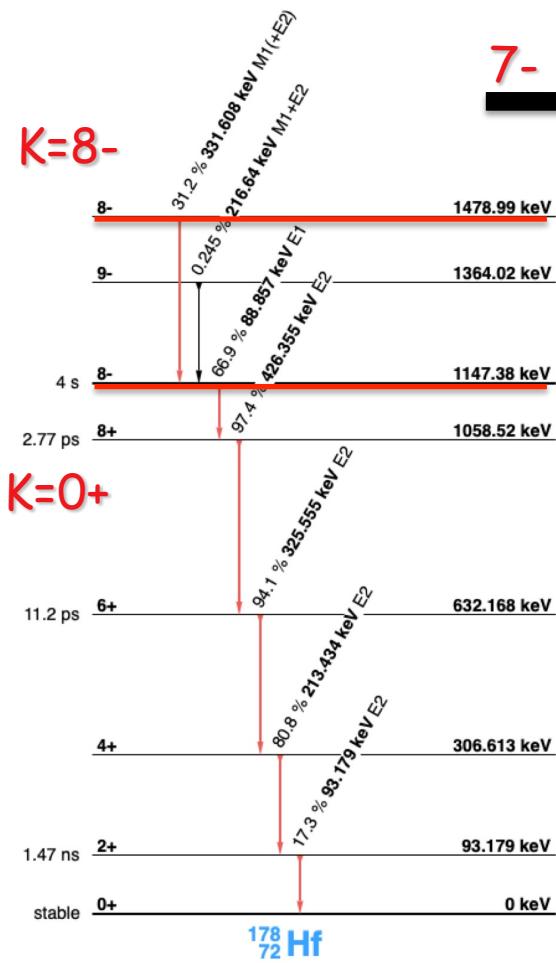
$v5/2^-[523] \rightarrow \pi7/2^-[523]$
 $v7/2^-[514] \rightarrow \pi9/2^-[514]$

Spin-flip AU

P. Sood and R. Sheline, ADNDT 43 (1989) 259



Example - 1



178_{73}^{Ta}

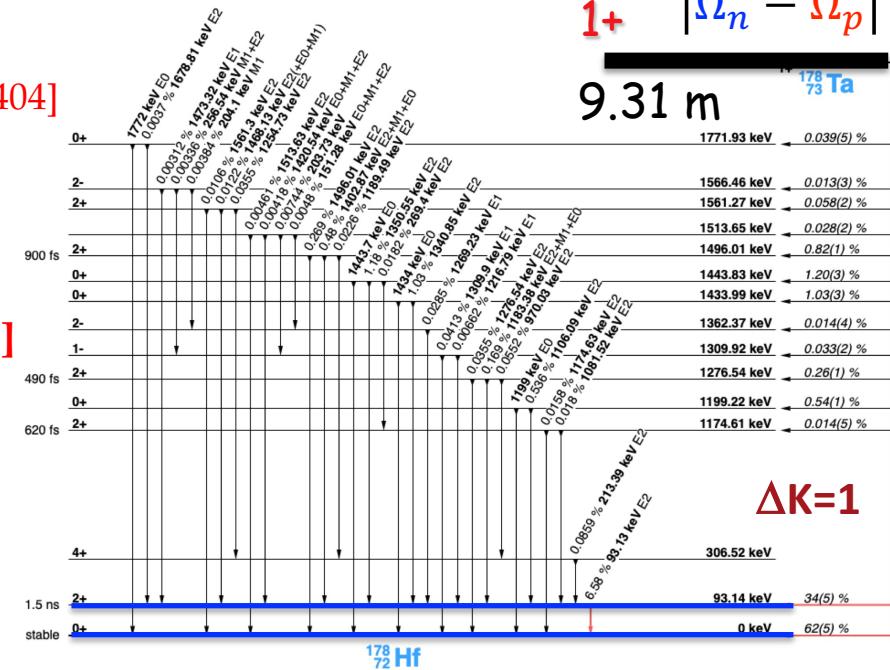
$$Q_{EC} = 1837 \text{ keV}$$

$$\pi 9/2^-[514] \nu 7/2^-[514]$$

$$Q_{EC}(\text{eff}) \sim 1800 \text{ keV}$$

$$1+ \quad |\Omega_n - \Omega_p|$$

$$9.31 \text{ m}$$

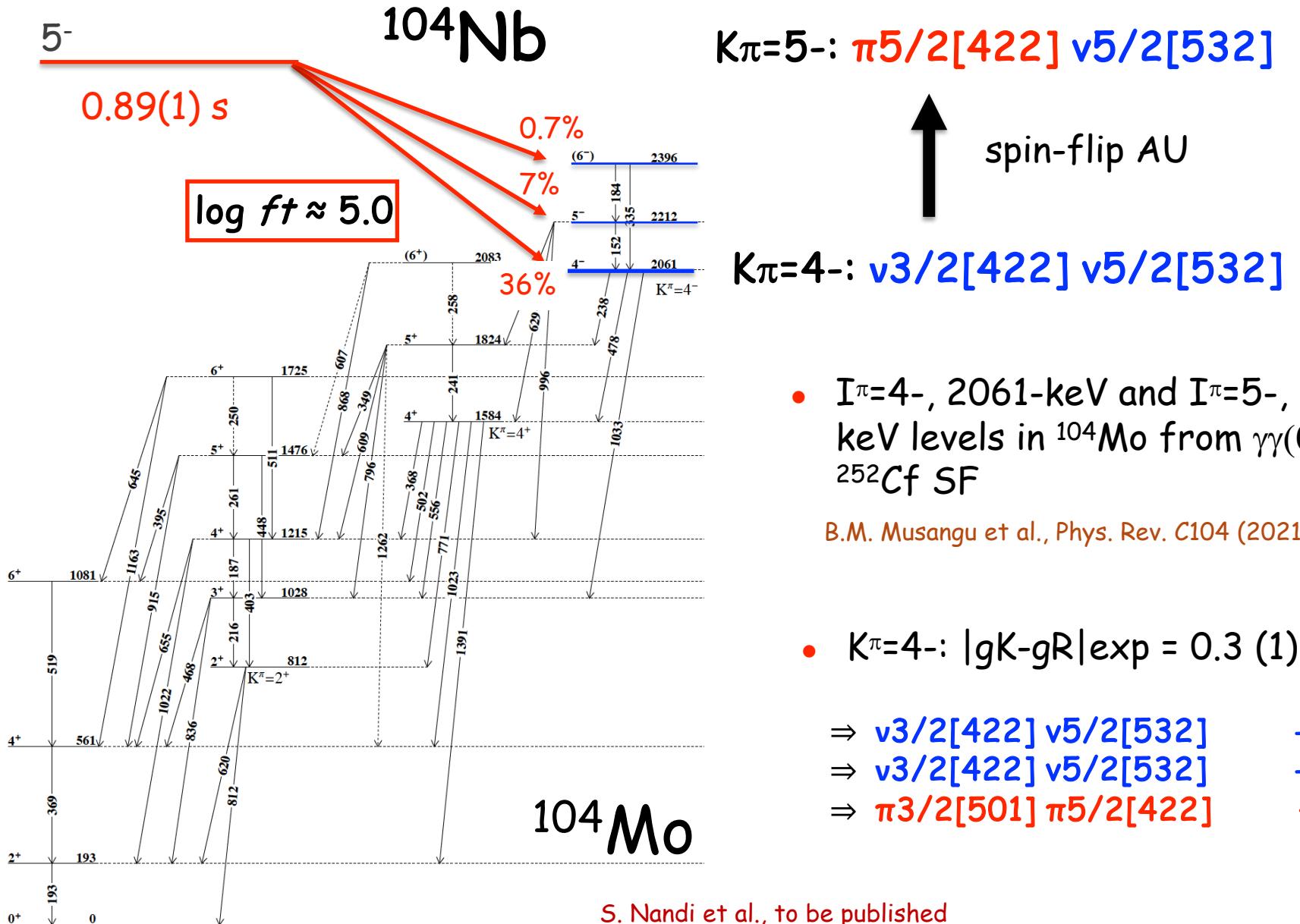


$$\nu 7/2^-[514] \rightarrow \pi 9/2^-[514]$$

$$\log ft = 4.7$$

spin-flip Au

Example - 2



- $I^\pi = 4-, 2061\text{-keV}$ and $I^\pi = 5-, 2212\text{-keV}$ levels in ^{104}Mo from $\gamma\gamma(\theta)$ in ^{252}Cf SF

B.M. Musangu et al., Phys. Rev. C104 (2021) 064318

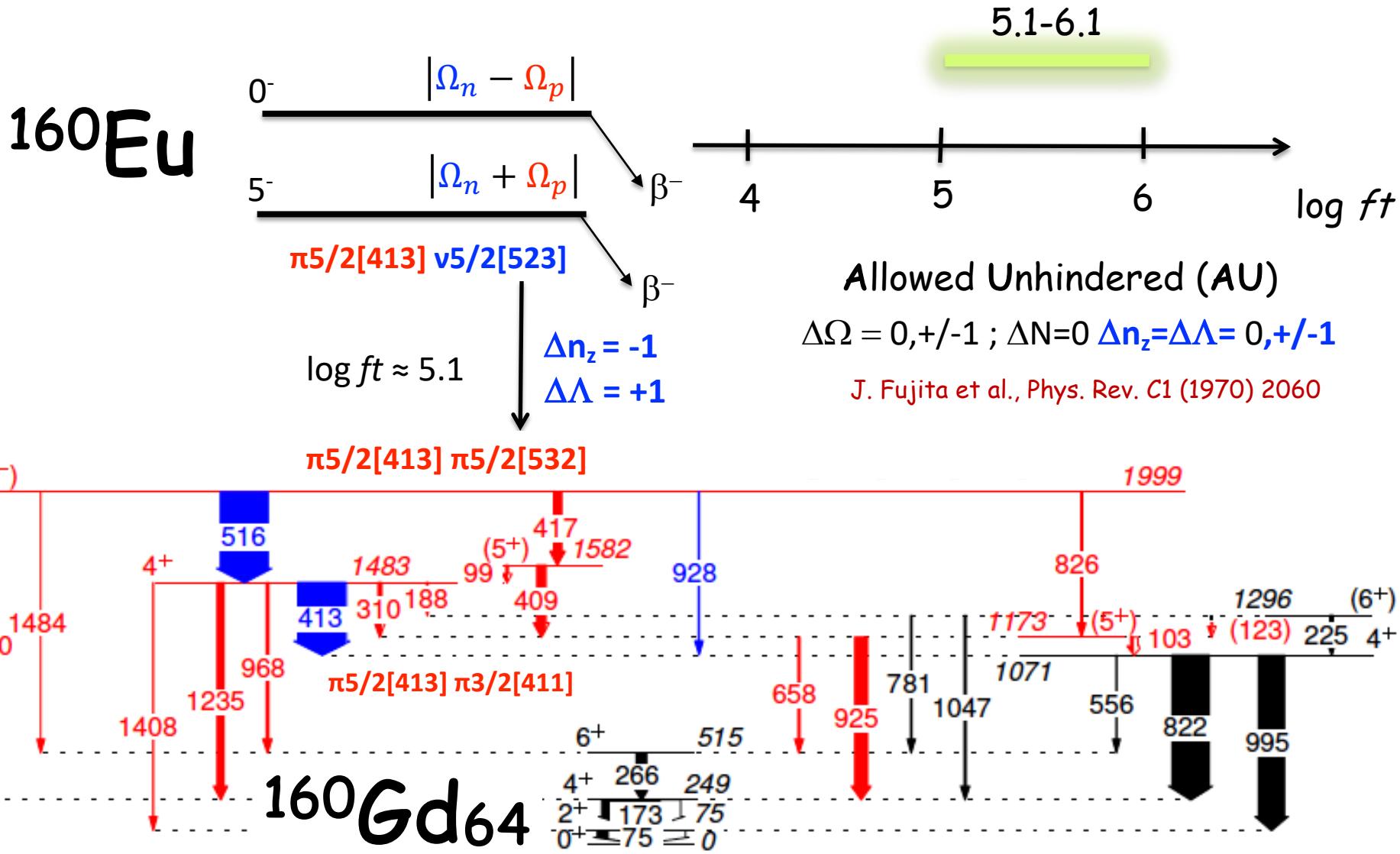
- $K^\pi=4-$: $|g_{K-gR}|_{\text{exp}} = 0.3$ (1)

$\Rightarrow \nu 3/2[422] \nu 5/2[532]$ -0.4

⇒ v3/2[422] v5/2[532] -0.8

$$\Rightarrow \pi 3/2[5011] \pi 5/2[4221] \quad +1.4$$

Example - 3



Example - 4

$$\begin{array}{c} 0+ \quad ^{156}\text{Eu} \\ \hline 15.19 \text{ (8) d} \end{array} \quad Q(\beta^-) = 2452(3) \text{ keV}$$

π 5/2[413] v5/2[642]

$$|\Omega_n - \Omega_p| \text{ state, } K^\pi=0+$$

$$9 < \log ft < 11$$

$i_{13/2}$ to $g_{9/2}$

- 0+ to 0+ allowed (spin) transition
 - BUT ... $\log ft = 9.83$!!!!

$v5/2[642] \rightarrow \pi5/2[413]$ $\Delta N=2$ & $\Delta n_z=3$ hindered

log ft =9.83 32%

