

# Rate Measurement of the Nuclear Excitation by Electron Capture process

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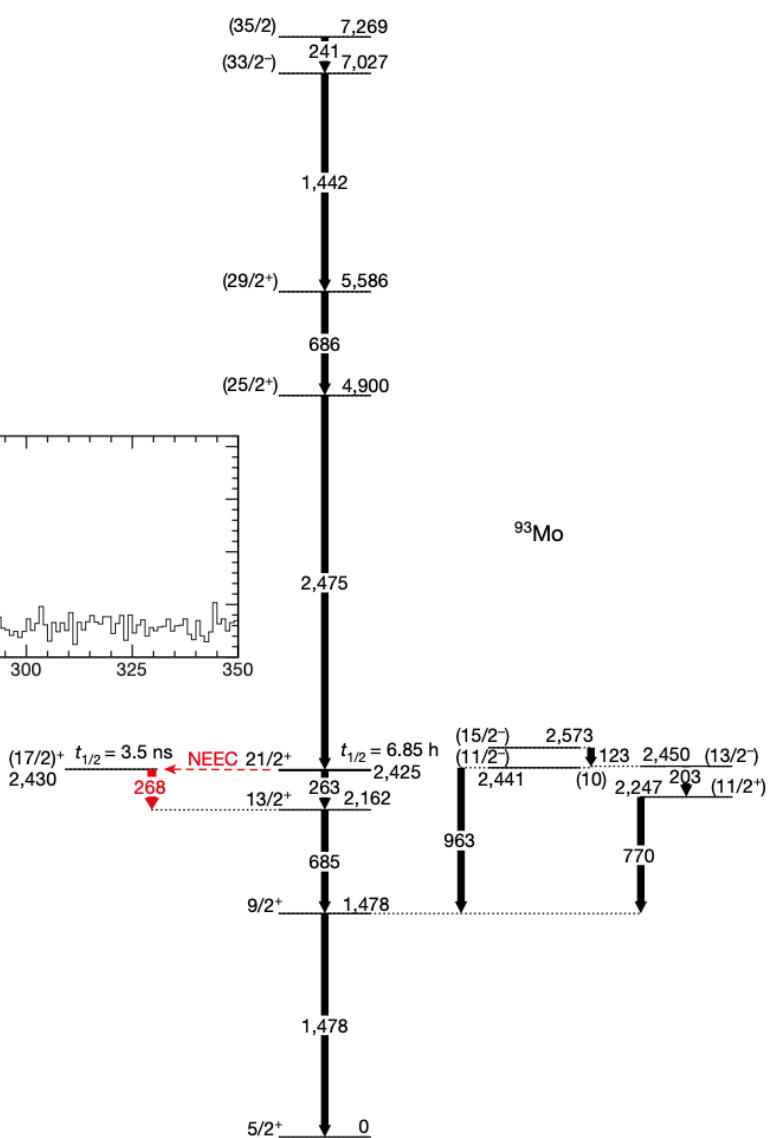
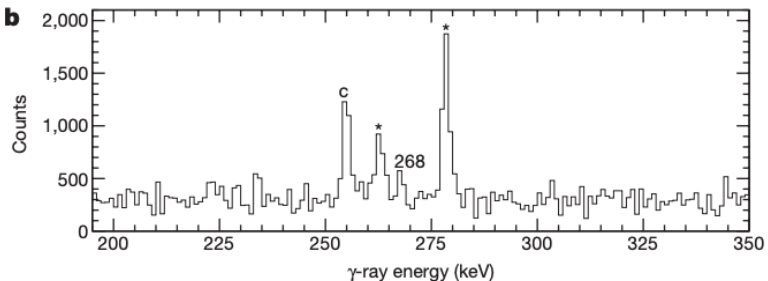
SPARC collaboration meeting  
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# There is significant debate in the literature about a recent claimed observation of NEEC:

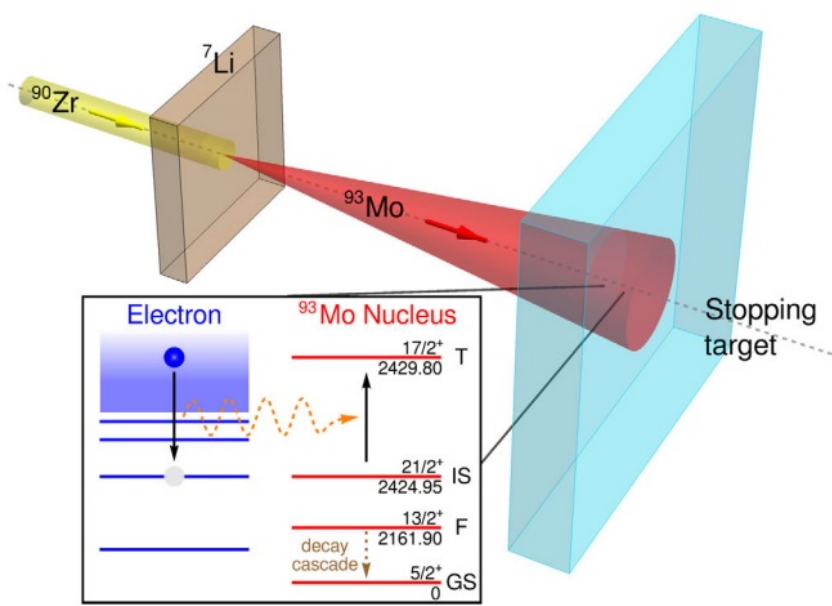
C. Chiara et al., *Nature* 554, 216 (2018)

Decay data



Attributed observed rate to NEEC

Figure from Wu et al, *PRL* 122, 212501 (2019)  
9 orders of magnitude discrepancy with theory



More recent theory papers also unsuccessful at explaining this data [Rzadkiewicz et al., *PRL* 127, 042501 (2021)]

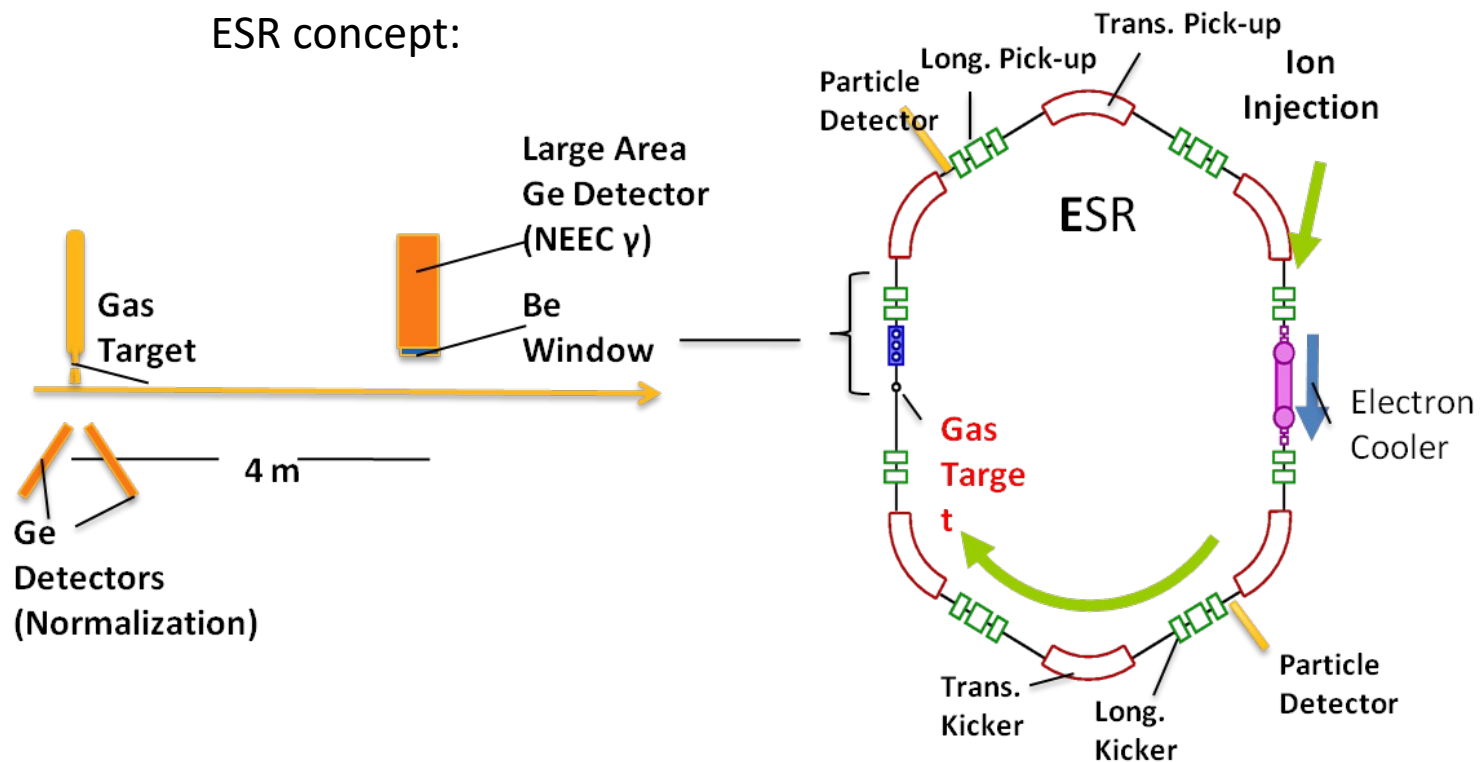
Can we get more unambiguous NEEC data, or at least an upper limit on the rate?

# ESR measurement concept

- Capture electron in gas target in L shell
- NEEC excites 44.9keV state in  $^{238}\text{U}$
- Electron decays quickly to K shell
- Detect  $\gamma$  emission from decay downstream
- Coincidence with charge state change

Initial estimates suggested up to  $\sim 100$  counts per day are potentially possible

ESR concept:



This data will provide an important contribution to the discussion around the NEEC rate



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