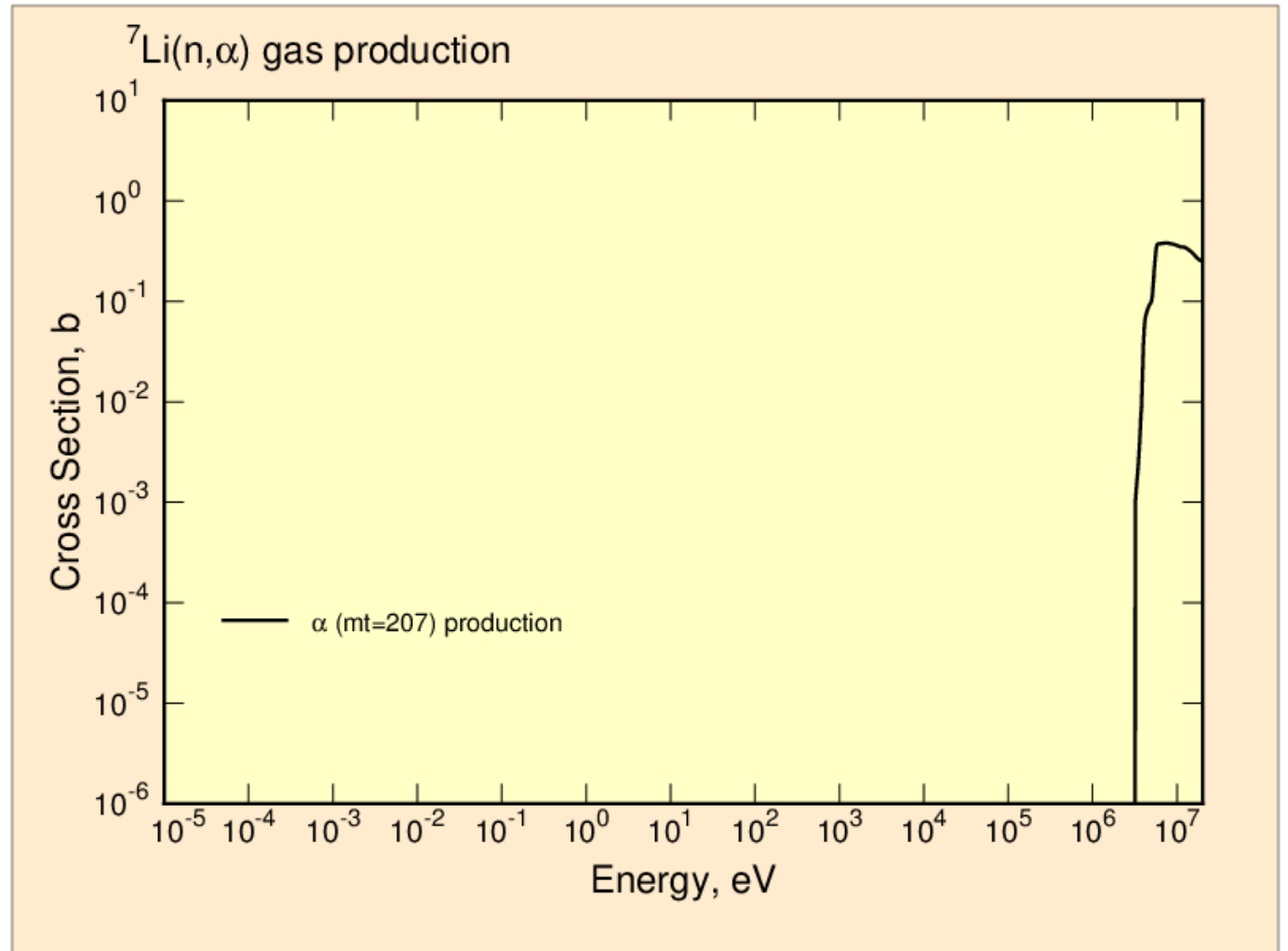


${}^7\text{Li}$  and  $\alpha$  Production – do we  
need an LR flag for MT=102?

Skip Kahler, Andrej Trkov & the IRDFF-II community

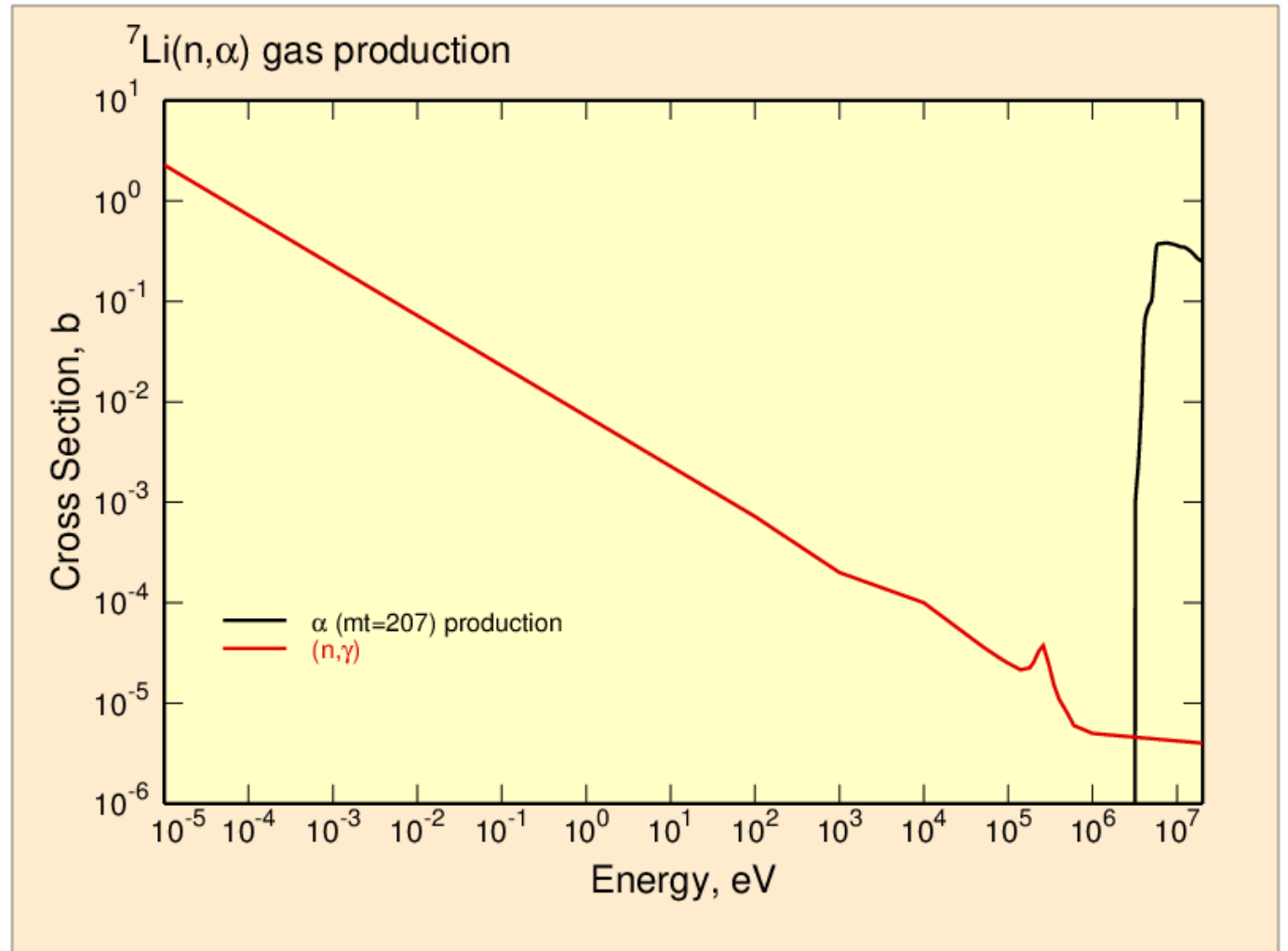
# $^7\text{Li}$ and $\alpha$ Production

- An NJOY/GASPR job for  $\alpha$  production (MT=207) from ENDF/B-VIII.0  $^7\text{Li}$  yields  $\rightarrow$ 
  - Contributing MT sections include
    - 24 (n,2n $\alpha$ d)
    - 25 (n,2n $\alpha$ t)
    - 52 – 82 (n,n' $\alpha$ t)



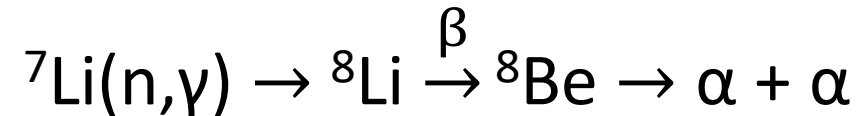
# $^7\text{Li}$ and $\alpha$ Production

- ... including the capture,  $^7\text{Li}(n,\gamma)$  or  $\text{MT}=102$ , cross section on this plot yields  $\rightarrow$
- Why consider this?



# ${}^7\text{Li}$ and $\alpha$ Production

The  ${}^7\text{Li}$  capture reaction's decay path is:



where the  ${}^8\text{Li}$  half-life is less than 1 second and the subsequent  ${}^8\text{Be}$  break-up is essentially instantaneous.

Although  ${}^8\text{Li}$  decay is not a “break-up” reaction, given its relatively short  $t_{1/2}$ , **should an LR=29 flag be set for the  ${}^7\text{Li}$  MT=102 reaction?**

LR=29 =  $2\alpha$  emitted (plus residual, if any) ... CSEWG Manual, Table 9

# $^7\text{Li}$ and $\alpha$ Production

Regardless of the current decision, the ENDF/B and IRDFF-II user communities should know ...

- The forthcoming IRDFF-II  $^7\text{Li}$  file **DOES** include  $\alpha$  production originating from MT=102 in its MT=207 section.

- Current and legacy NJOY/GASPR **DOES NOT** consider MT=102 when examining the various MT sections and LR flags for p, d, t,  $^3\text{He}$  and  $\alpha$  production ...

  - ... but a Github branch for NJOY2016/NJOY21 is available – and has been tested locally – that upgrades NJOY/GASPR to check MT=102 for an LR flag, and include that production.