

# Large-scale shell model study of $\beta^-$ -decay properties of $N=126, 125$ nuclei along the $r$ -process path: Anil Kumar

## Introduction:

The origin of most atomic nuclei with masses heavier than the iron group elements is attributed to neutron capture nucleosynthesis

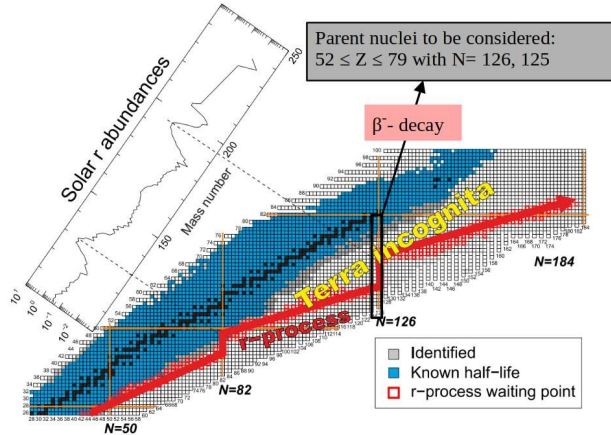
Competition b/w neutron capture process & beta-decay

Slow neutron capture process (s-process)

$neutron\ capture \ll beta\ decay$

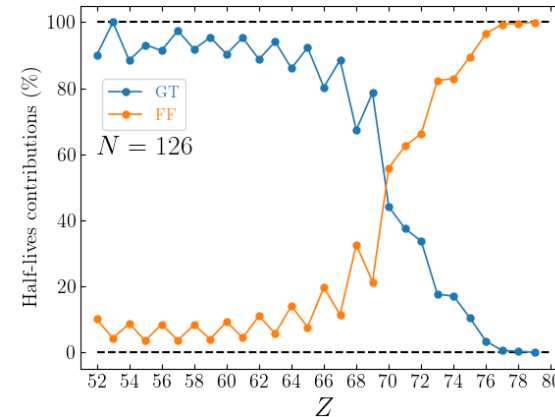
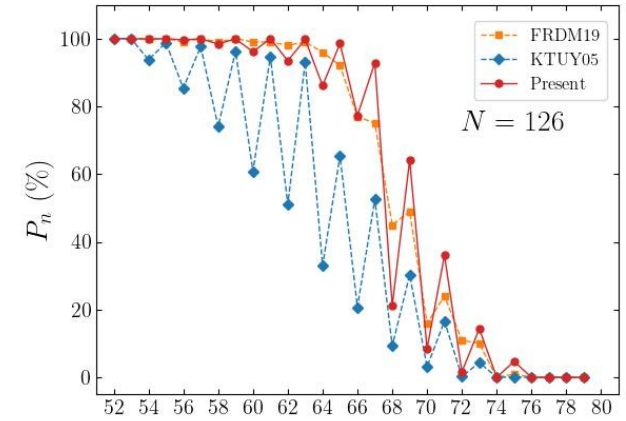
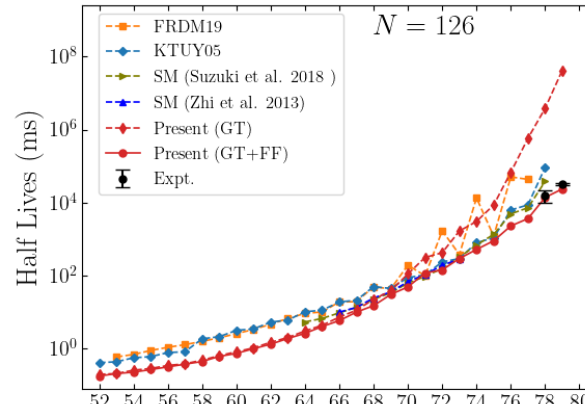
Rapid neutron capture process (r-process)

$neutron\ capture \gg beta\ decay$



- Lots of neutron-rich nuclei involved around  $A \sim 195$ .
- Poor experimental information about the beta decay around  $A \approx 195$

## Results: half-lives and beta-delayed neutron emission probability of $N=126$ isotones



## Summary and conclusions:

- The contribution from first-forbidden transitions are important, especially for nuclei around  $N = 126$  region.
- The present study of  $\beta$ -decay properties of waiting point nuclei around  $A \approx 195$  will be add more information in the third  $r$ -process abundance peak distributions.

A. Kumar, N. Shimizu et al., Phys. Rev. C 109, 064319 (2024)

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Thank you