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Sensitivity of r-process simulation  
to choice of the mass model

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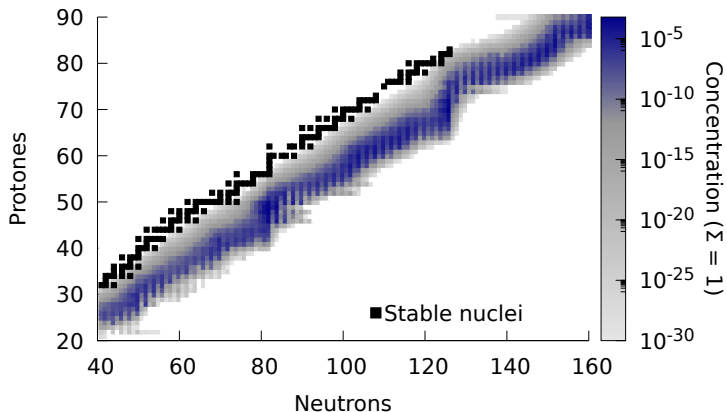


## r-process simulation

Nucleosynthesis simulations depend on theoretical values of **reaction rates**:

$$\frac{dy_i}{dt} = \sum_{k \in K_i} \pm \lambda_k \prod_{l \in L_k} y_l$$

Results of simplified r-process simulation with REACLIB  $\lambda_k$  values

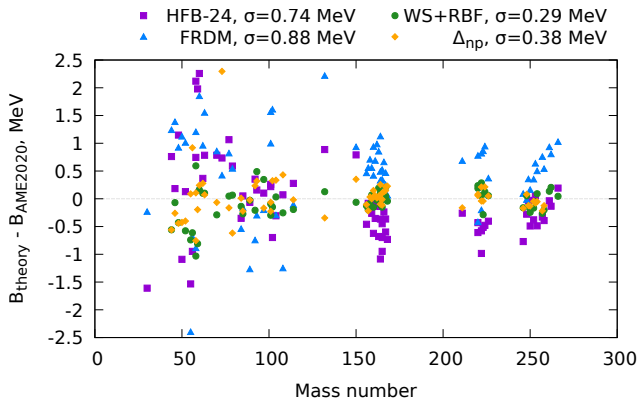


# Nuclear mass models

In this research four mass models were used to calculate  $\lambda_k$  and to determine r-process model sensitivity to mass model selection:

- ▶ HFB-24 *Goriely S. et al., 2017*
- ▶ FRDM2012 *Moller et al., 1995*
- ▶ WS+RBF *Ma et al., 2019*
- ▶ Local relations method ( $\Delta_{np}$ ) *Vladimirova et al., AYSS-2020*

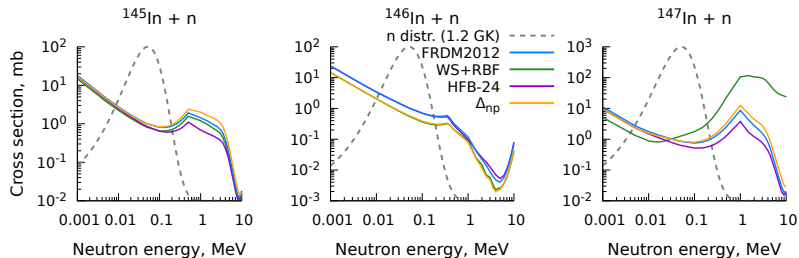
Accuracy test for four theoretical mass models, used in our research



# Neutron capture cross sections calculation

**Binding energies** are essential values for statistical model of nuclear reactions.

Neutron-rich In nuclei ( $n, \gamma$ ) cross sections with different mass models

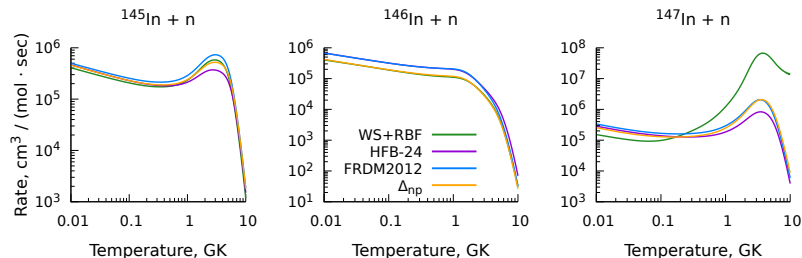


# Neutron capture rates calculation

Reaction rate calculation through cross sections:

$$\lambda(T) = \sqrt{\frac{8}{\pi m}} \frac{N_A}{(kT)^{3/2} G(T)} \int_0^\infty \sum_\mu \frac{(2I^\mu + 1)}{(2I^0 + 1)} \sigma^\mu(E) E \exp\left(-\frac{E + E_x^\mu}{kT}\right) dE$$

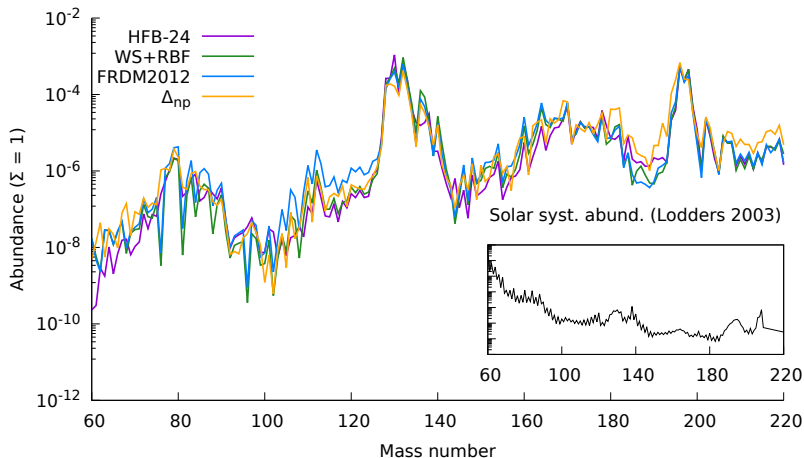
Neutron-rich In nuclei ( $n, \gamma$ ) rates with different mass models



# r-process yields depending on a mass model



## Results of r-process calculation with four mass models



Thank you for your attention!

