



# Report on progress of Es isotopes

**Group from**

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2024-7-2 Gangneung



# Contnets



## Outlines

- 1. Numerical Details**
- 2. Progress from IMP**
- 3. Determination of GS**
- 4. Summary and Outlook**

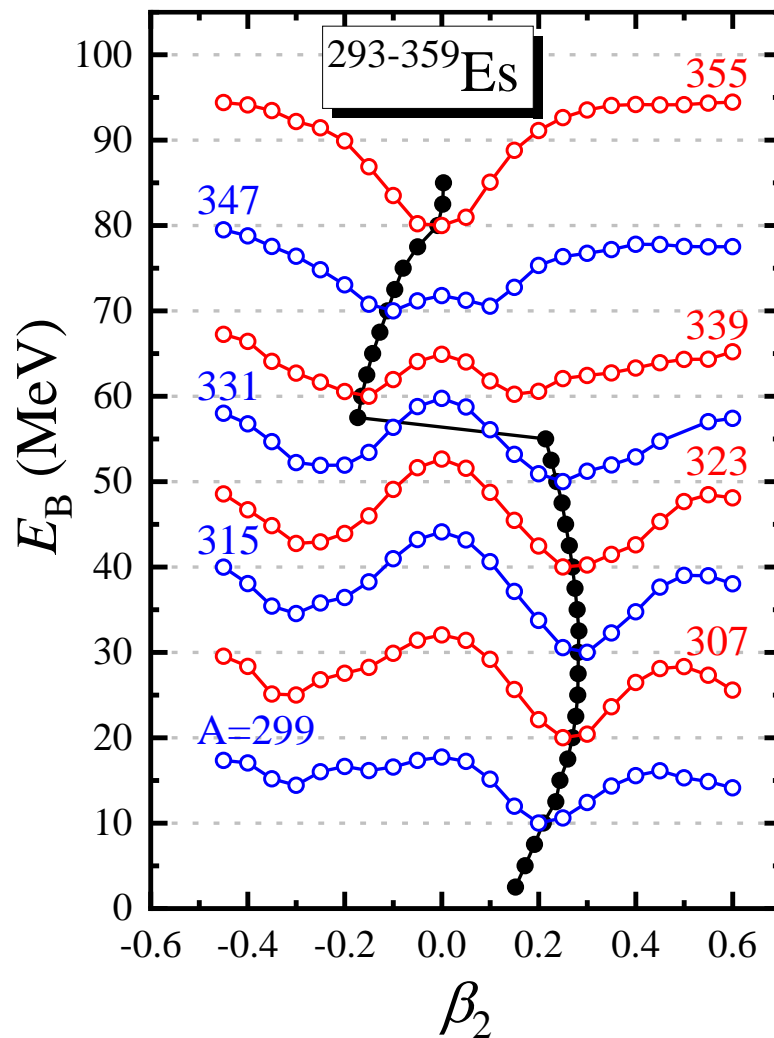
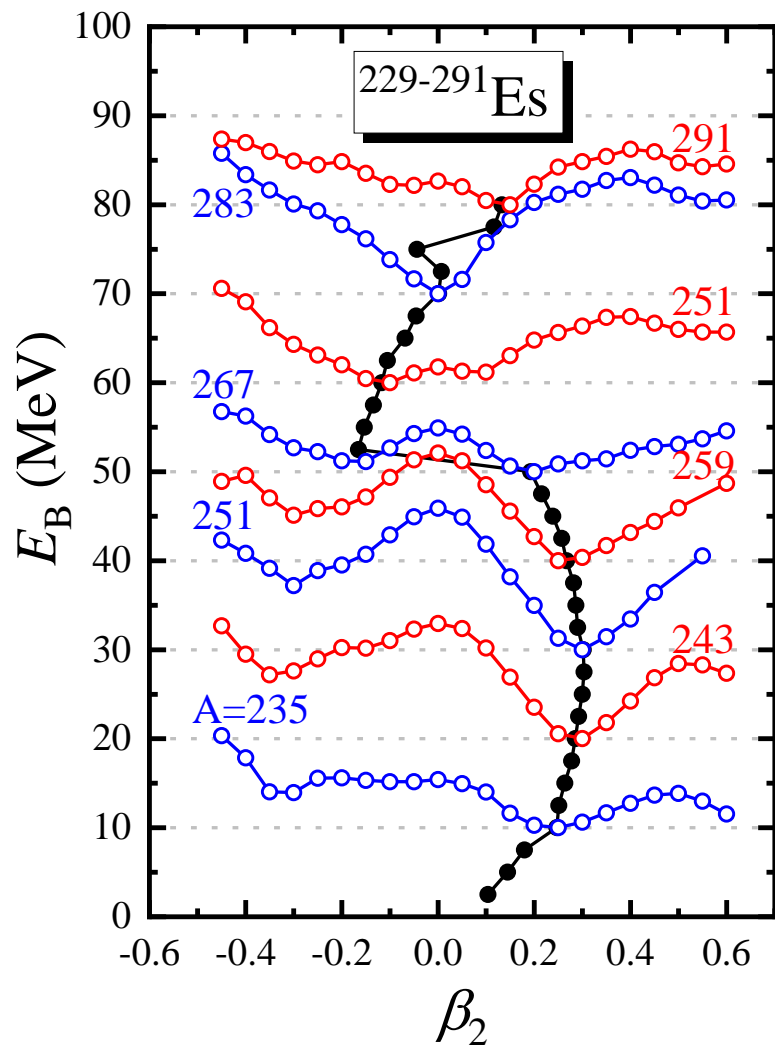


# 1. Numerical Details



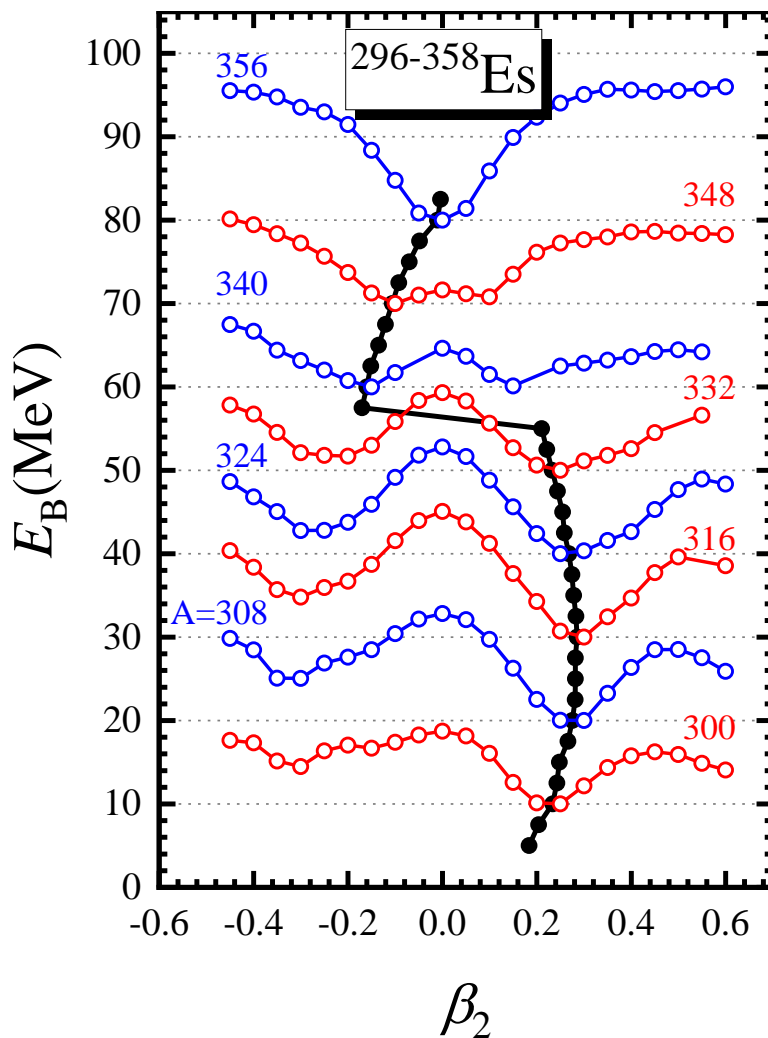
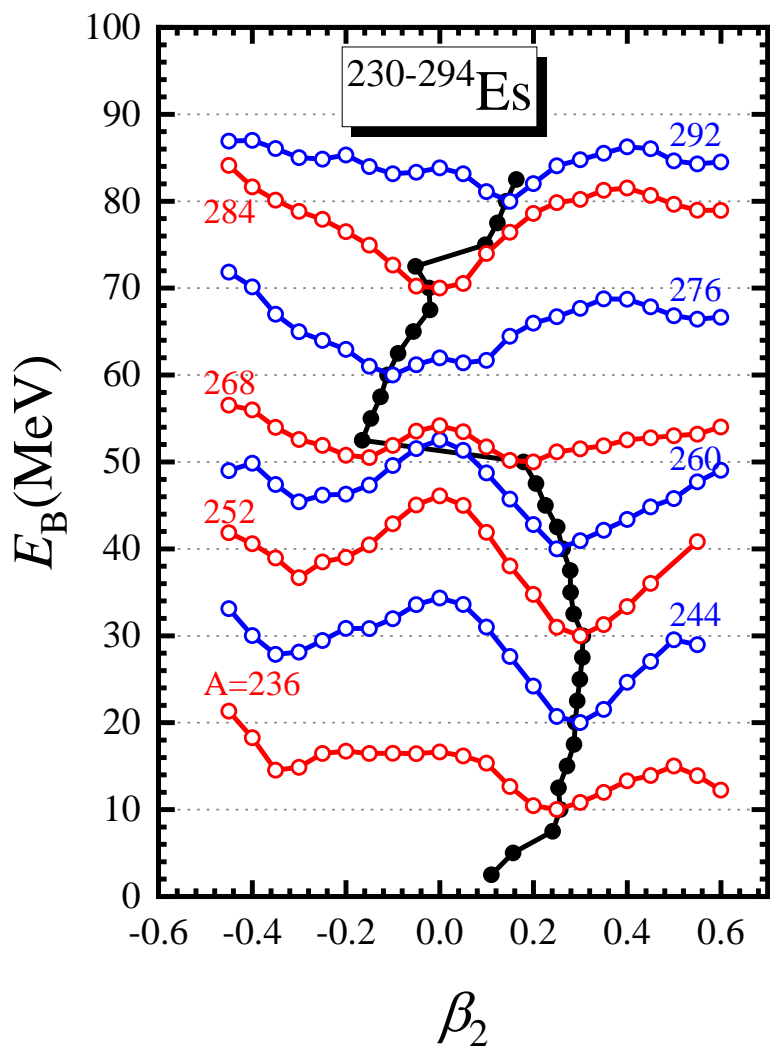
- **Nuclei:**  $^{229-359}_{99}\text{Es}$
- **Version:** `Code_DRHBc_202401`
- **Box size:**  $R_{\text{box}}=20$  fm
- **Mesh size:**  $\Delta r=0.1$  fm
- **Energy cutoff:**  $E_{\text{cut}}=300$  MeV
- **Angular momentum cut off:**  $J_{\text{max}}=23/2$   $\hbar$
- **Legendre expansion order:**  $\lambda_{\text{max}}=8$
- **Density functional:** PC-PK1
- **Pairing strength:**  $E_{\text{cut}}=325$  MeV

## 2. PECs of Es ( $Z = 99$ ) isotopes (even-odd)



1. the anomalous deformation near 288
2. Shape coexistence appears near  $A \sim 266, 336$

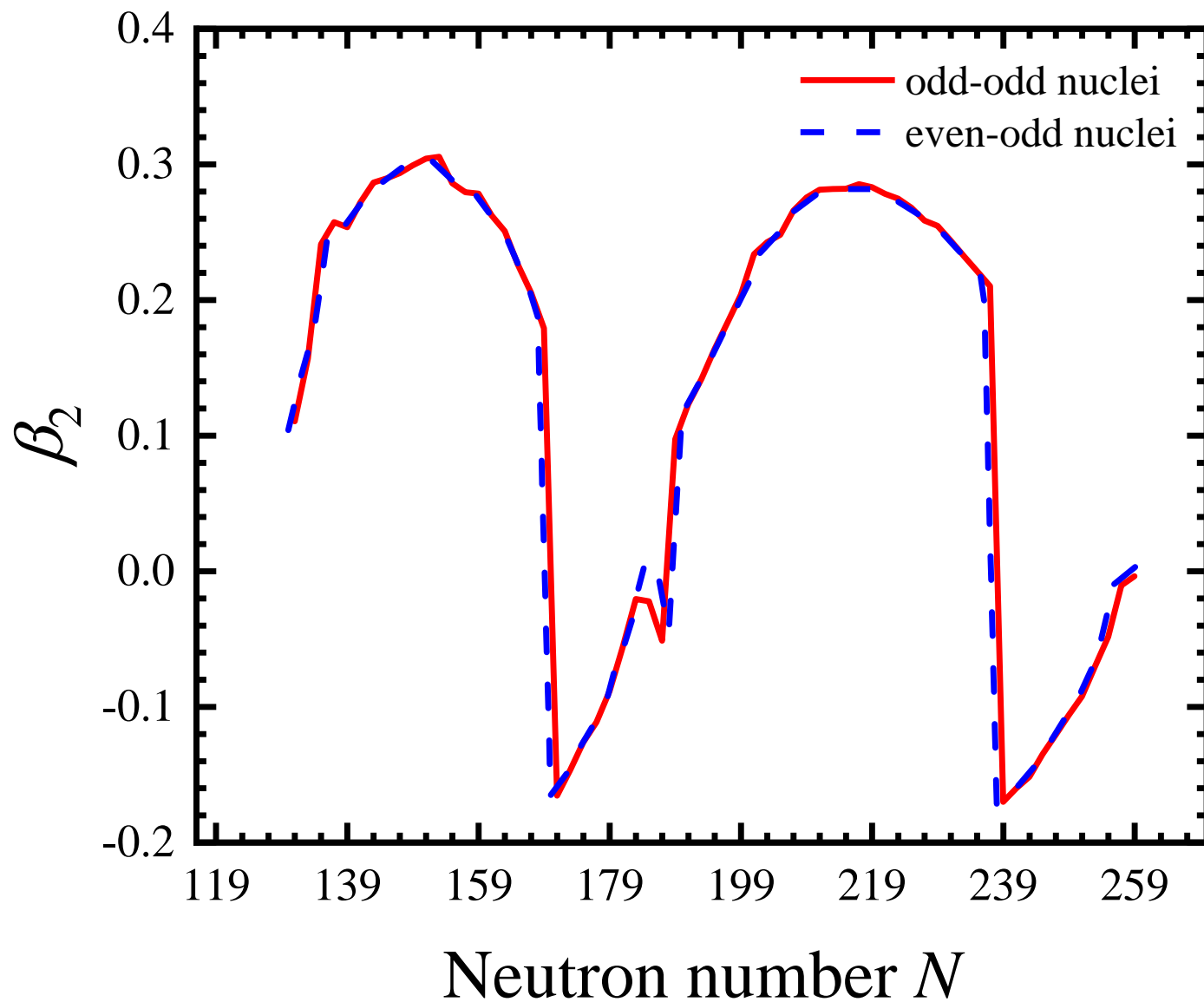
## 2. PECs of Es ( $Z = 99$ ) isotopes (odd-odd)



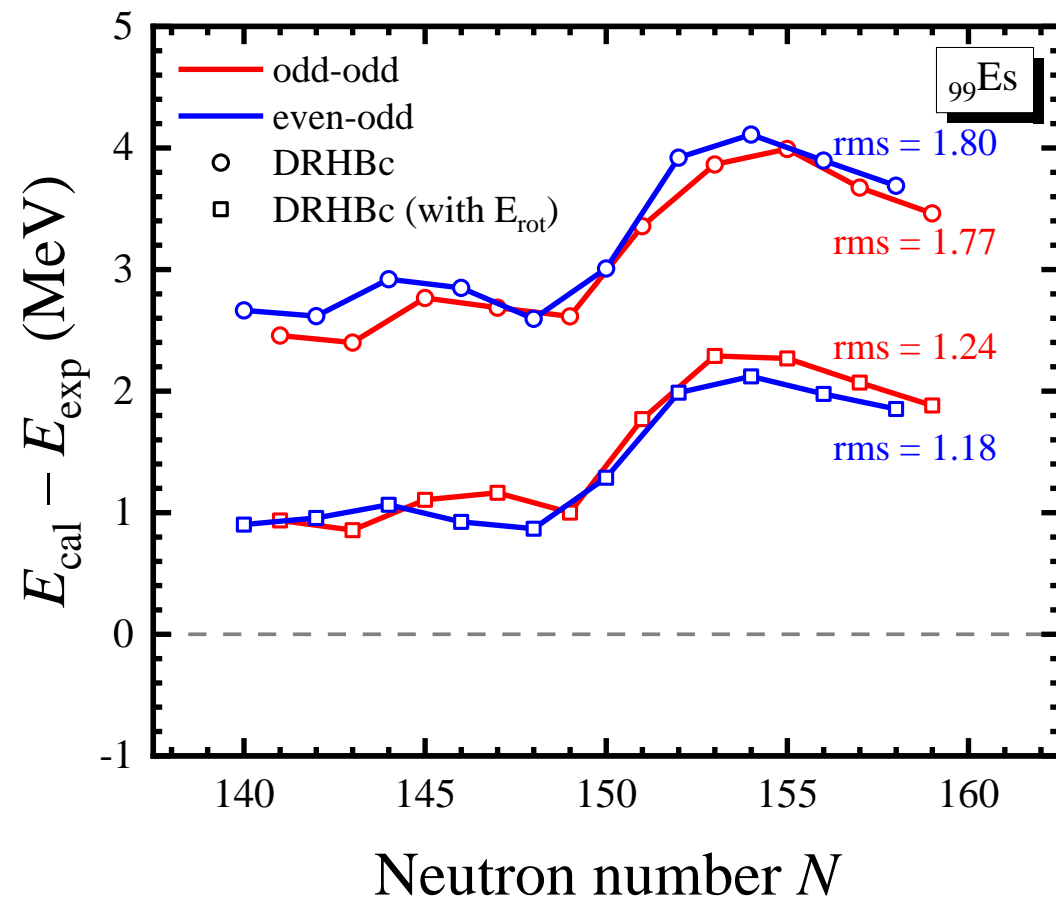
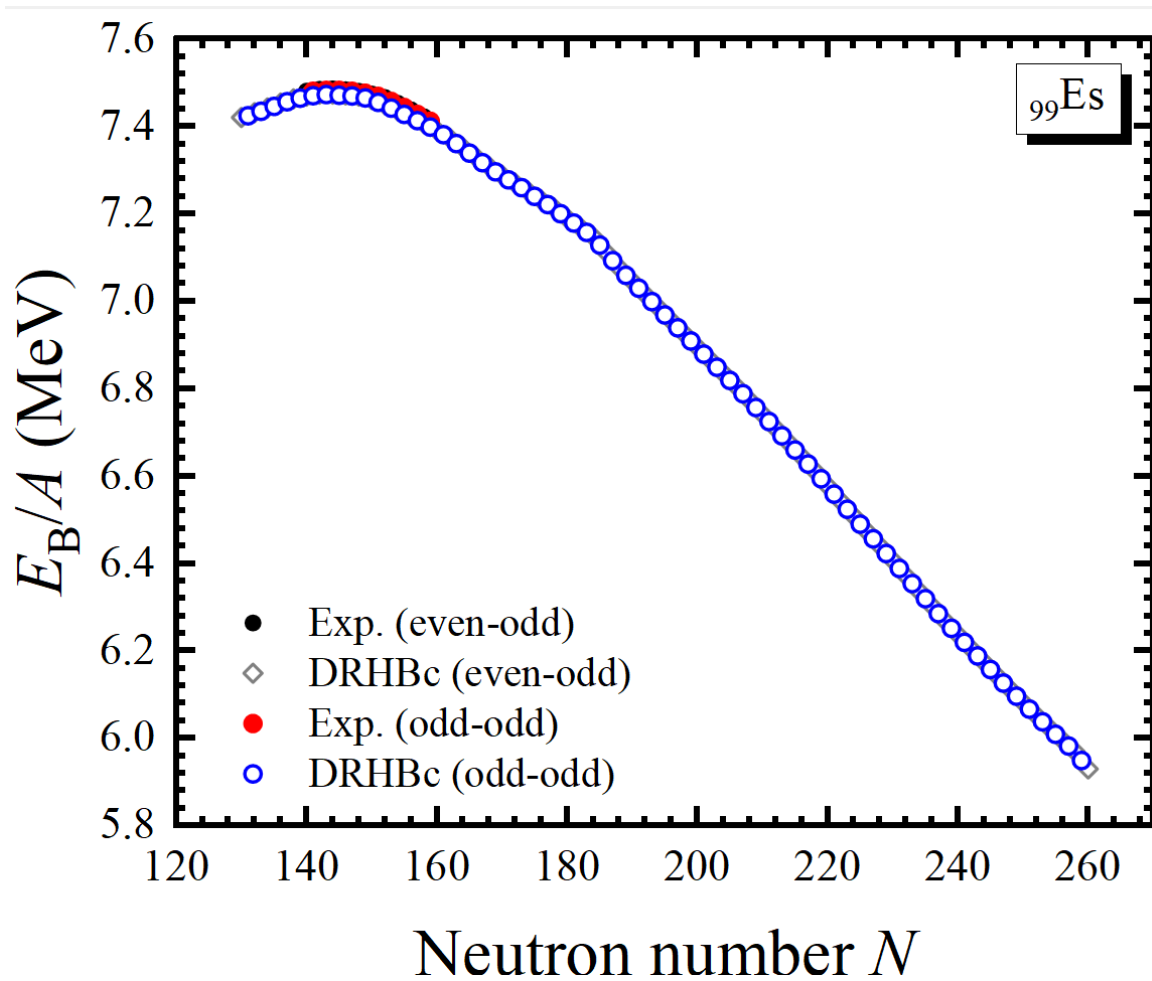
1. the anomalous deformation near 288
2. Shape coexistence appears near  $A \sim 266, 336$



## 2. Deformation



1. Shape coexistence appears  
near  $A \sim 266, 336$

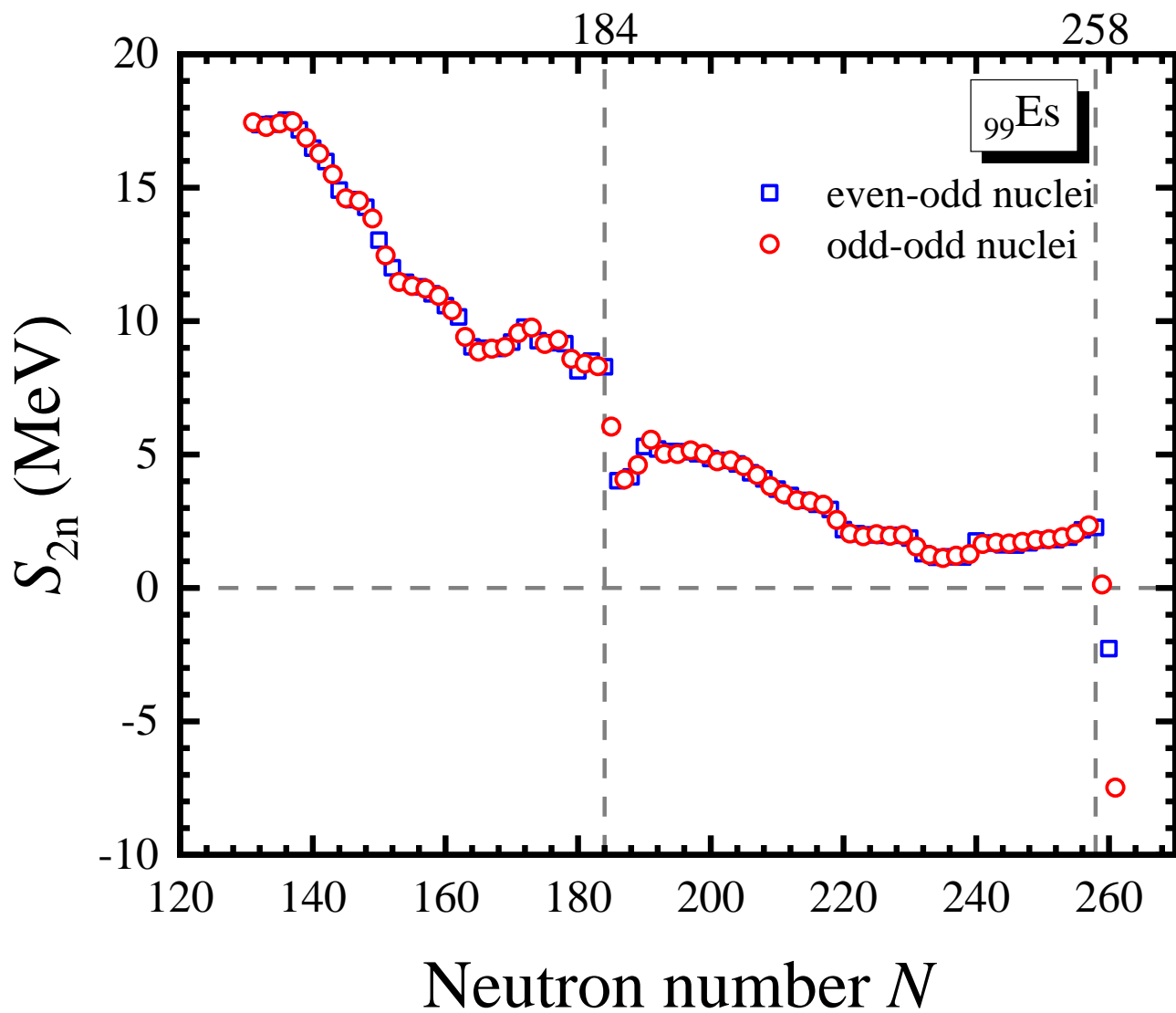


Experimental data from Wang M *et al.* Chin. Phys. C 45, 030003 (2021)



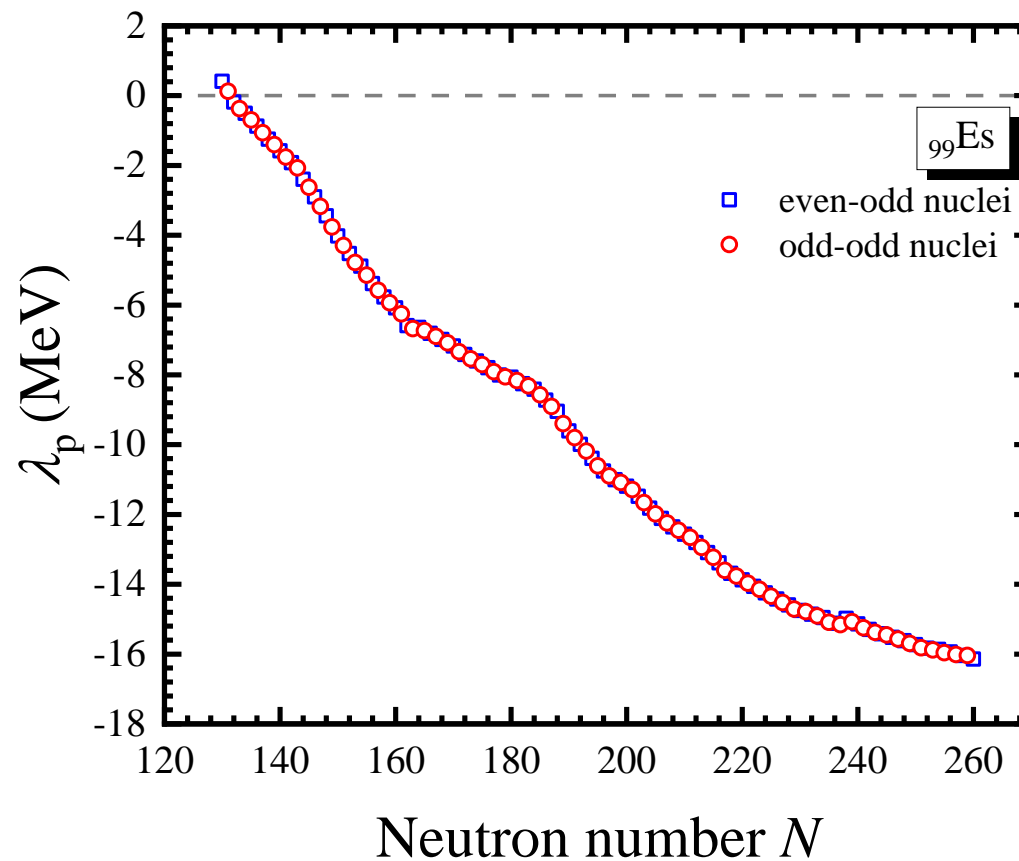
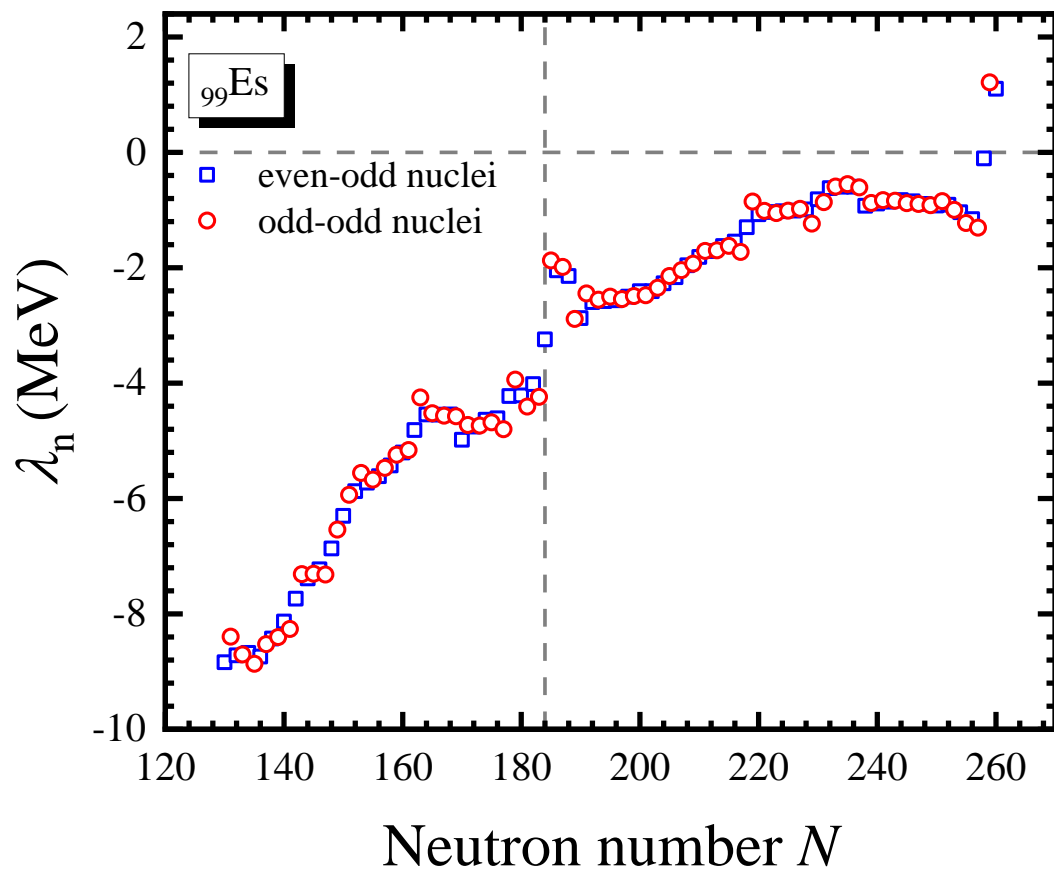
## 2.

# Two-neutron separation energy

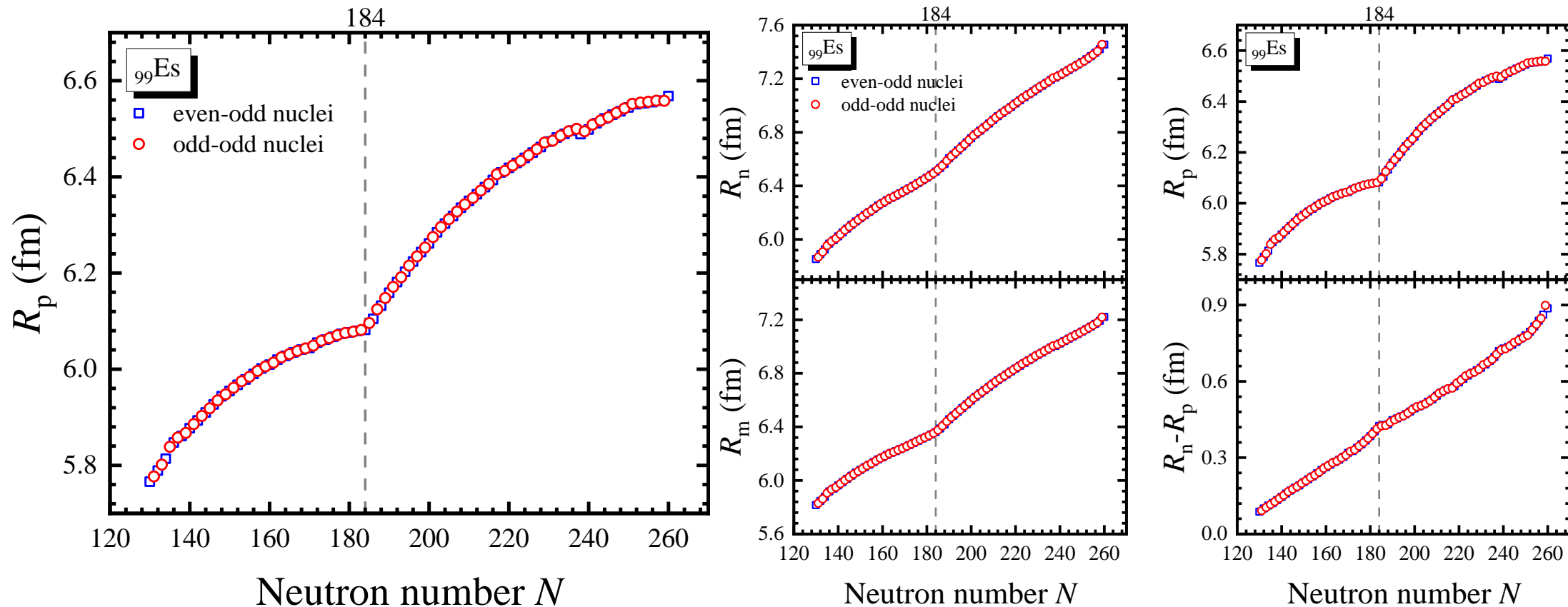


There are sudden change at  $N = 184$  and  $N = 258$ , which corresponds to the shell closures.



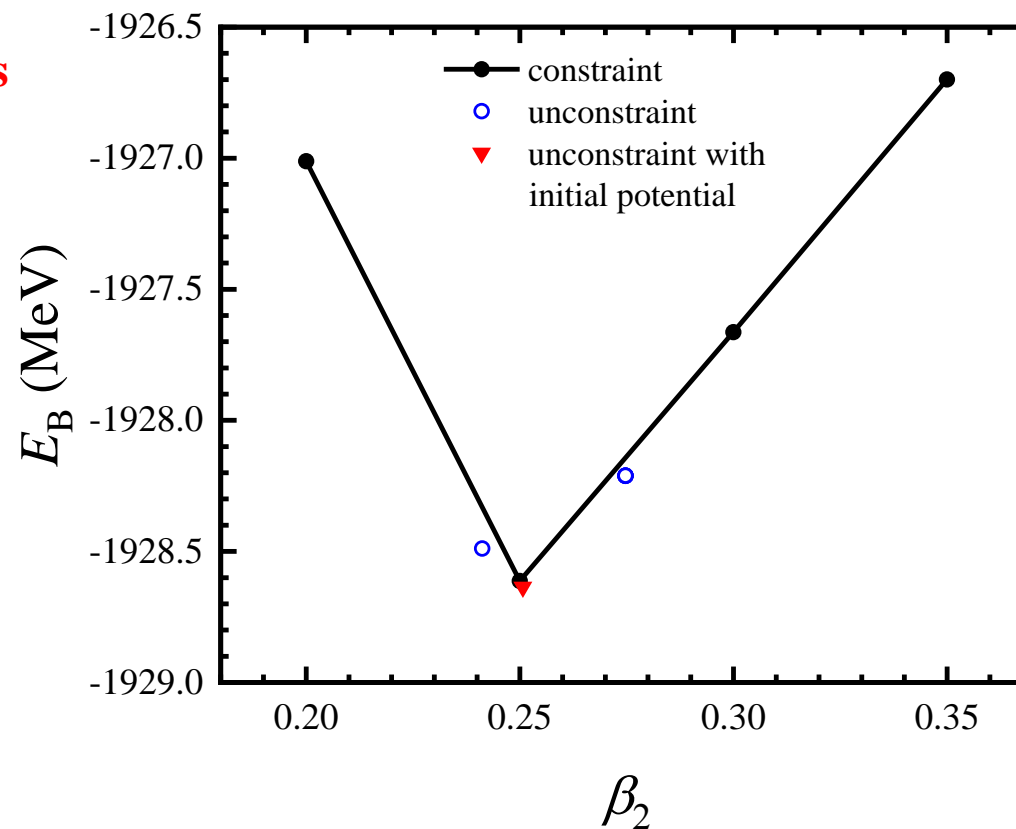
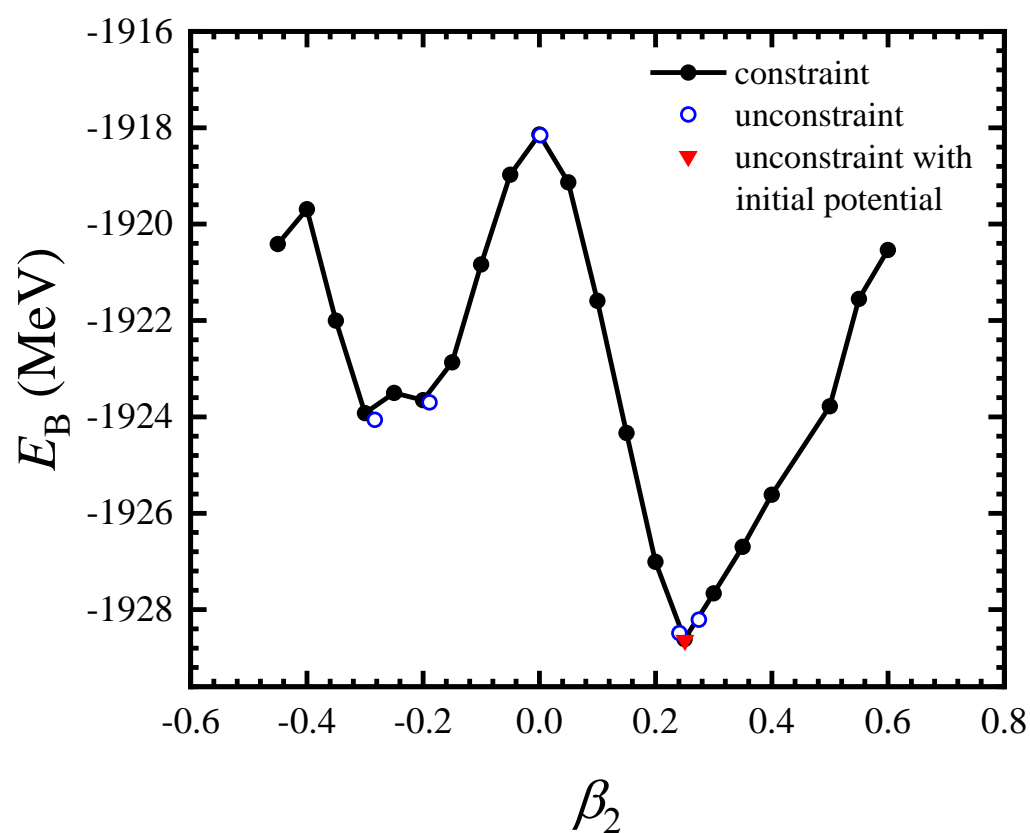


The neutron and proton driplines are determined by the Fermi energy.



A kink at  $N = 184$  which also related to the shell closure effect.

### 3. Determination of the ground state



The result of the unconstraint calculation doesn't always consistent with the constrained results.

One should adopt the potential from the constrained ones as an initial input. Following this, the unconstraint results consistent with the constrained ones.



## 4. Summary and outlook



- ❑ Calculations for Cf, Es, and Fm isotopes are finished
- ❑ Excellent training of the students has been performed
- ❑ Strong cooperative relationship have been established
- ❑ Continue DRHBc collaboration with new opportunities



## 4. IMP Group



**Kangda Duan**



**Jianmin Dong**



**Xinle Shang**



**Thanks for your attention**

**2024.7.2**

