Shell model calculations for the mass around 100 region in a truncated SD space

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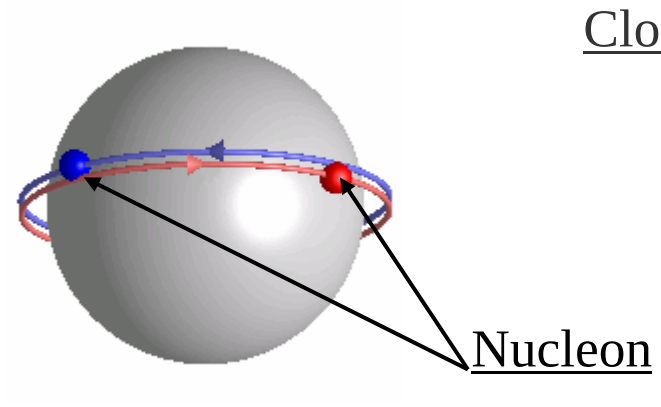
- **Motivation**
- **Pair truncated shell model**
- **Results of energy spectra**
- **Summary**

Introduction

- We perform systematic studies for the nuclei ^{96,98,100}Mo, ^{98,100,102}Ru, ^{100,102,104}Pd within the framework of a pair-truncated shell model.
- The interaction strengths are determined to reproduce experimental energy levels for each nucleus.
- The set of mean values of interaction strength adjusted for each nucleus is applied to all the nuclei.

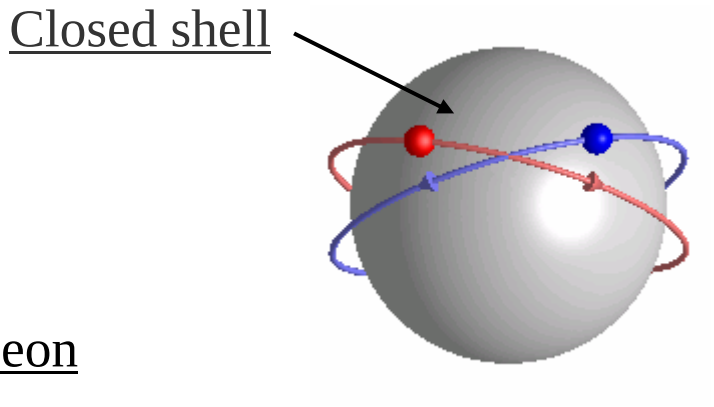
SD-pair states

S-pair



$$S^{\dagger} = \sum_{j} \alpha_{j} A_{0}^{\dagger(0)}(j\ j)$$

D-pair



$$D_{M}^{\dagger} = \sum_{j_1 j_2} \beta_{j_1 j_2} A_{M}^{\dagger(2)}(j_1 j_2)$$

$$\left(A_{M}^{\dagger(J)}(j_1 j_2) = \sum_{m_1 m_2} (j_1 m_1 j_2 m_2 | JM)\, c_{j_1 m_1}^{\dagger} c_{j_2 m_2}^{\dagger} = [c_{j_1}^{\dagger}\ c_{j_2}^{\dagger}]_{M}^{(J)} \right)$$

Hamiltonian

- Pairing+quadrupole interaction

$$H = \sum_{jm\tau=\nu,\pi} \varepsilon_{j\tau} c^{\dagger}_{jm\tau} c_{jm\tau}$$

$$- \sum_{\tau=\nu,\pi} \left[G_{0\tau} P^{\dagger(0)}_{\tau} P^{(0)}_{\tau} + G_{2\tau} P^{\dagger(2)}_{\tau} \cdot \tilde{P}^{(2)}_{\tau} + \kappa_{\tau} : Q_{\tau} \cdot Q_{\tau} : \right]$$

$$- \kappa_{\nu\pi} Q_{\nu} \cdot Q_{\pi}$$

- Strengths of two-body interactions

$G_{0\nu} = 0.1156$ $\quad$ $G_{0\pi} = 0.1153$

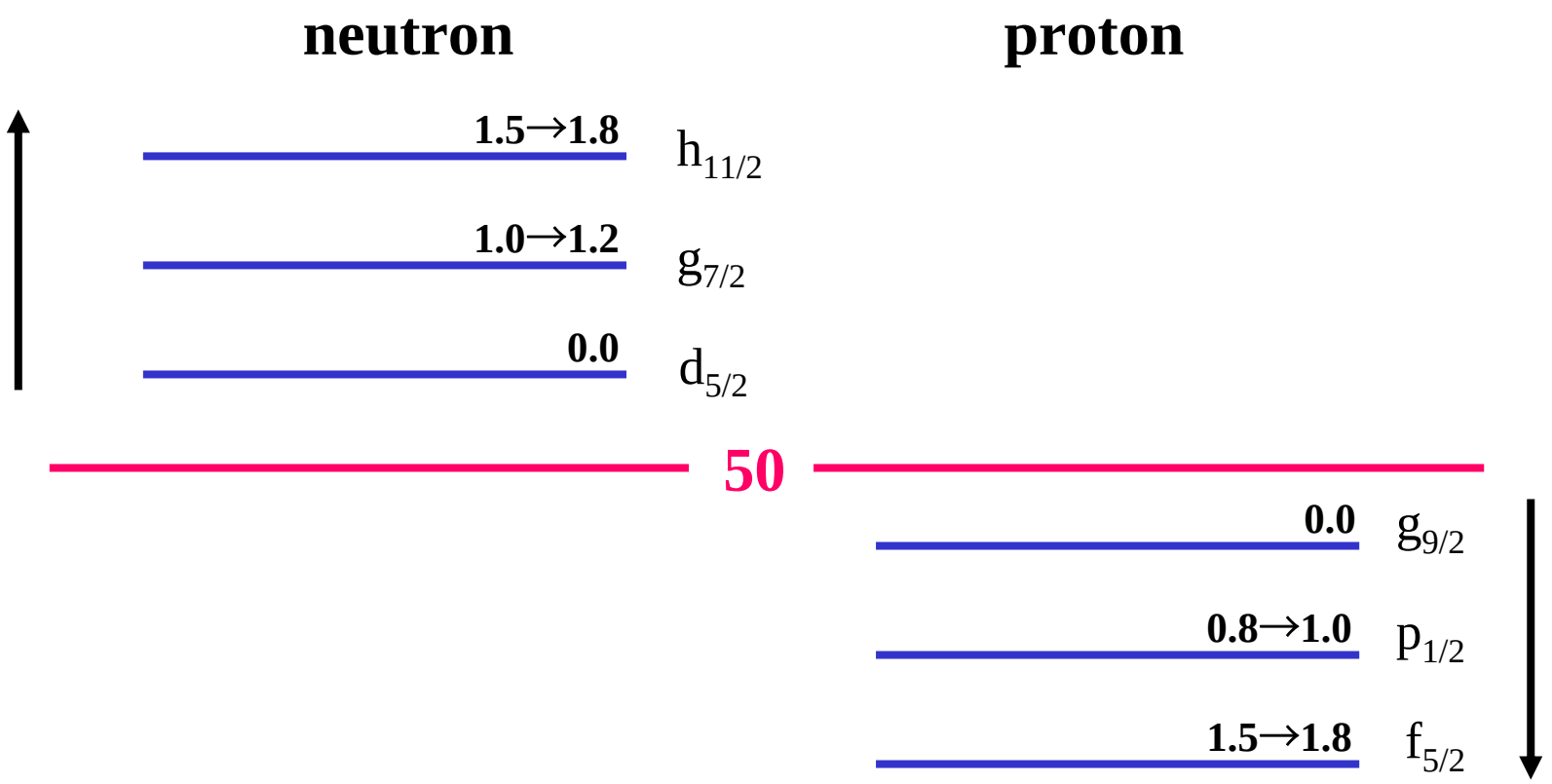
$G_{2\nu} = 0.0236$ $\quad$ $G_{2\nu} = 0.0217$

$\kappa_{\nu} = 0.0931$ $\quad$ $\kappa_{\pi} = 0.1354$

$\kappa_{\nu\pi} = -0.0694$

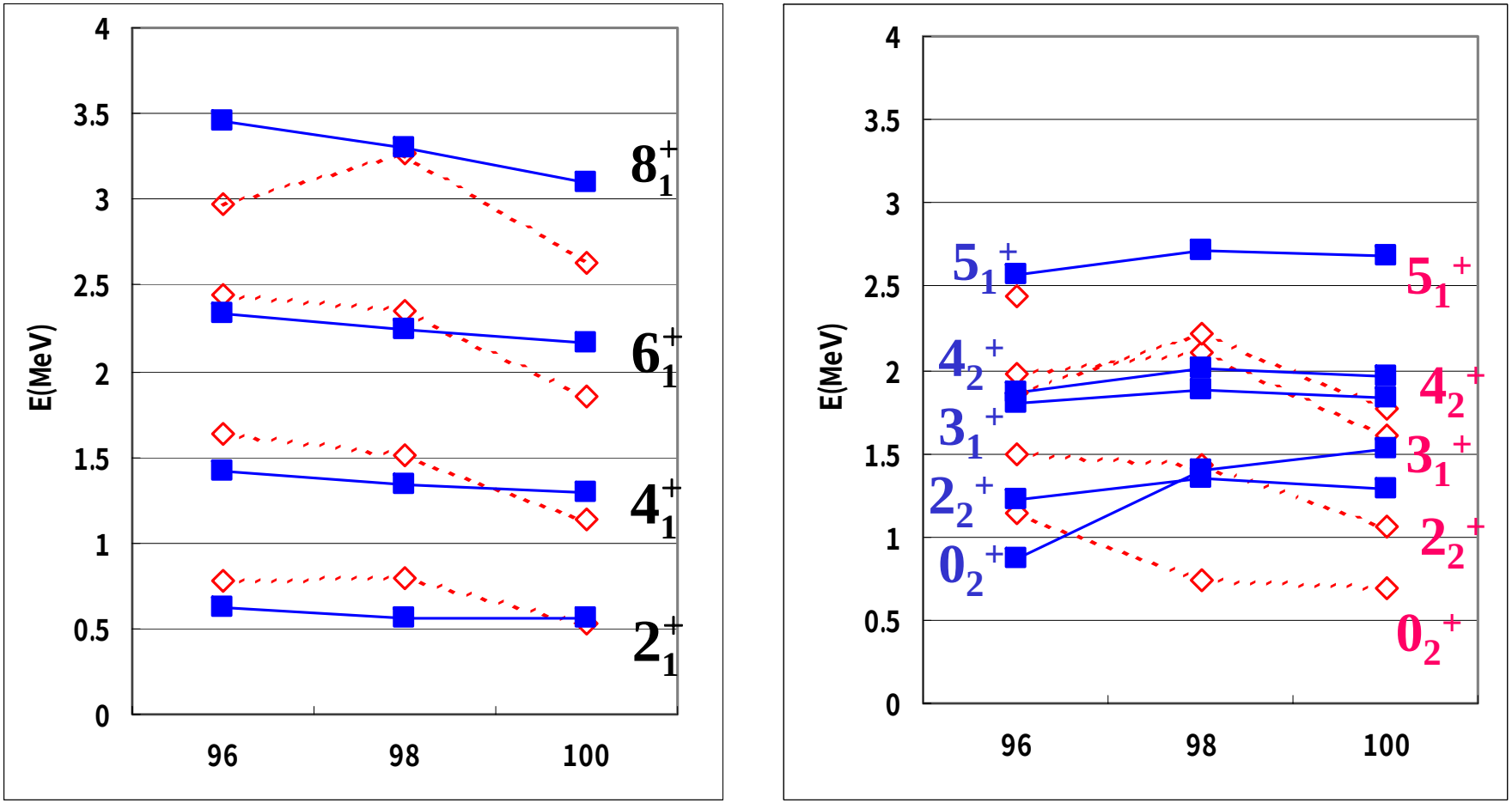
Single particle orbitals

The single particle (hole) energies for proton (neutron)

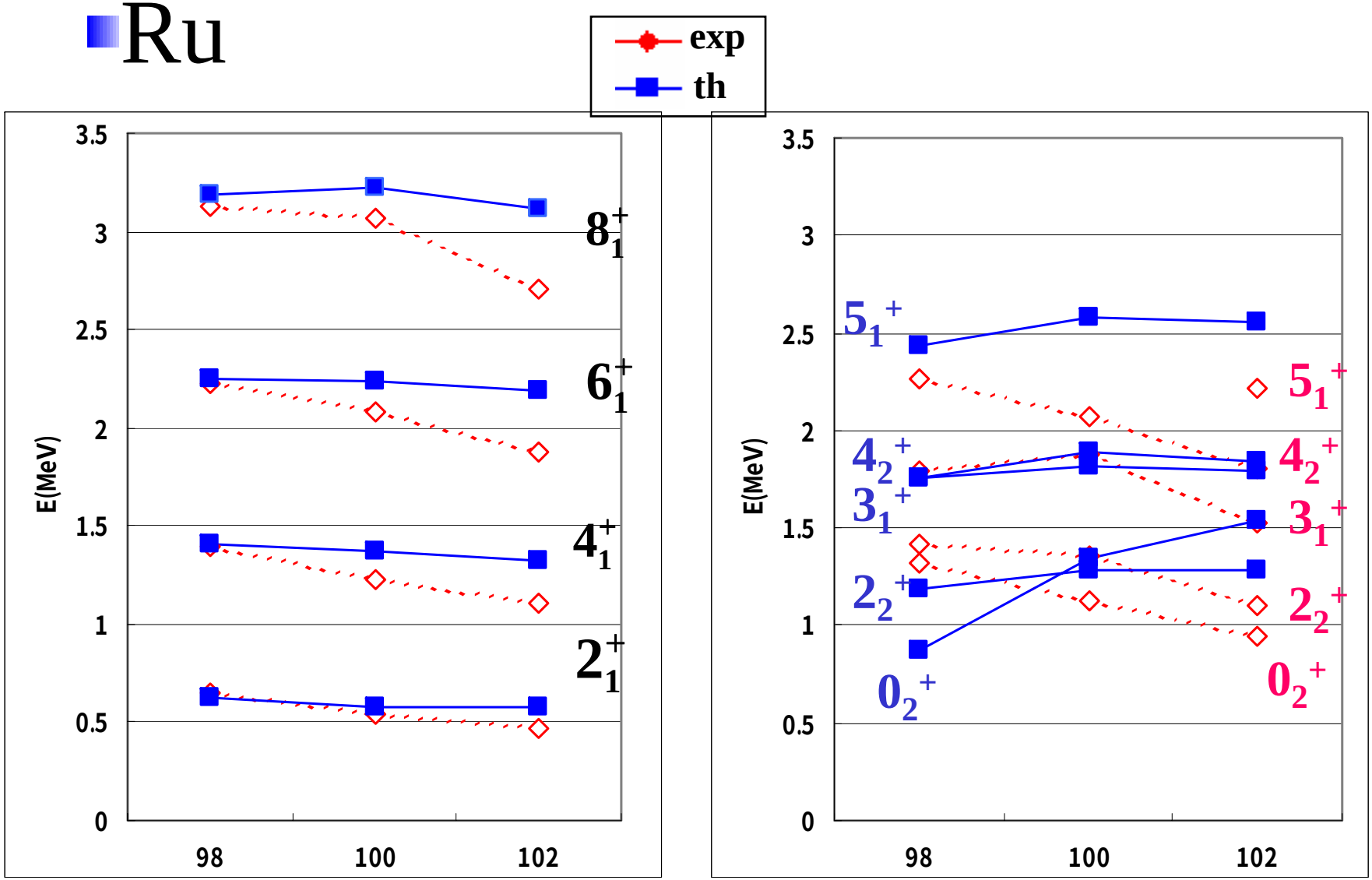


N=Z=50 is taken as a core

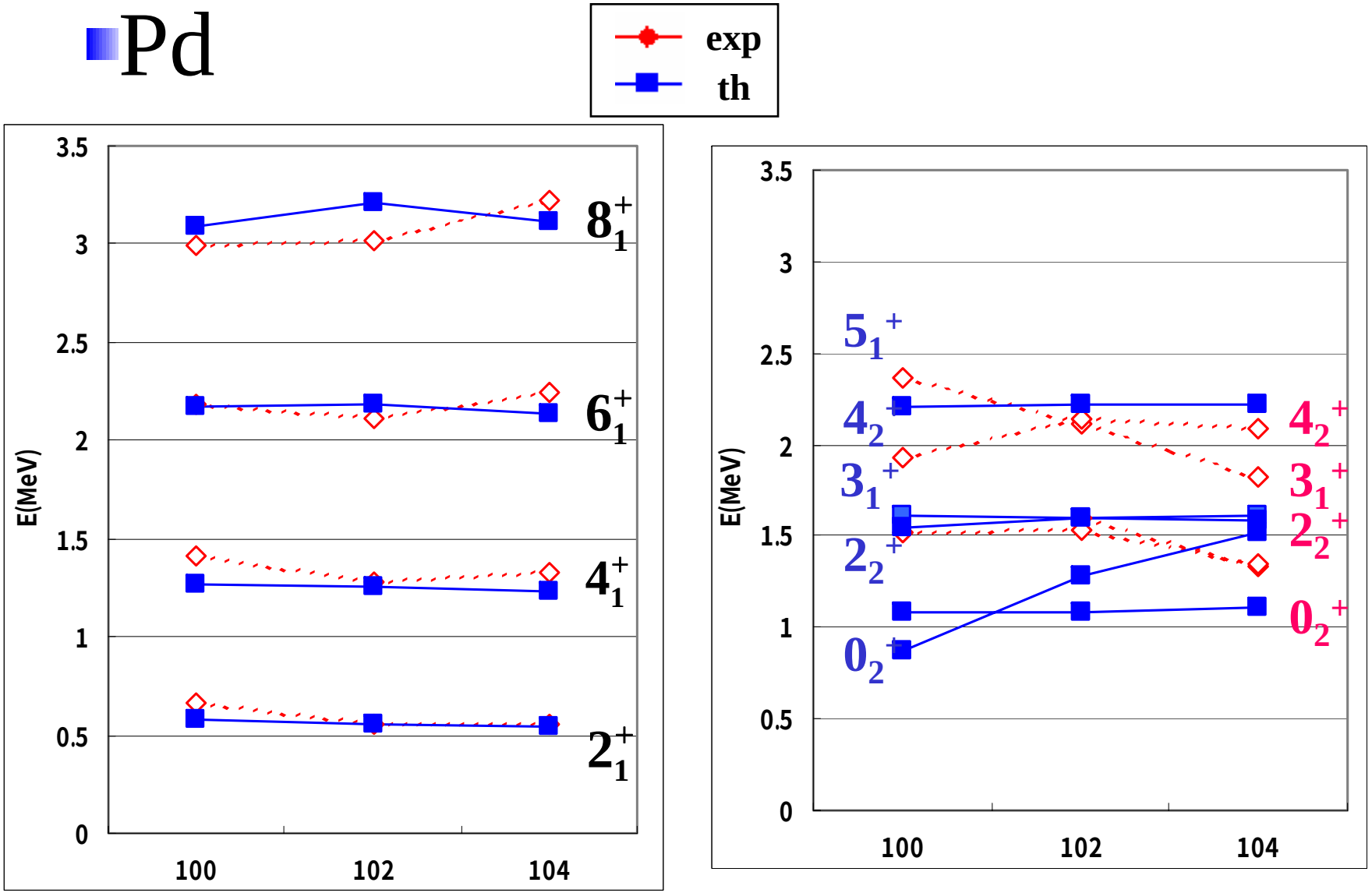
Mo



Ru



Pd



Summary

- PTSM calculations are carried out for nuclei with mass around 100.
- The PTSM reproduces well experimental energy levels for the yrast states.
- The interaction strengths should be further improved in future.
- As a future task we need to take into account the 28~50 configuration space for protons and the 50~82 configuration space for neutrons.