



Masayuki MATSUO, Dr. Sci.

Professor

Program: Fundamental Sciences

Area: Physics

Undergraduate: Dept. of Physics

Professional Expertise

His professional expertise is theoretical nuclear physics with emphasis on structure of rapidly rotating nuclei, neutron- and proton-rich nuclei and symmetric and neutron matter. Collective phenomena such as surface vibrations and superfluidity emerging in nuclear structure have been investigated using modern methodologies of quantum many-body theories. His recent work on the “continuum quasiparticle random phase approximation” based on the nuclear density functional theory is one of the major achievements in the nuclear structure theory.

Research Fields of Interest

Structure of exotic nuclei

- Hartree-Fock-Bogoliubov mean-field theory
- Nuclear density functional theory
- Di-neutron correlation and strong-coupling pairing
- Exotic deformation
- Continuum QRPA and continuum HFB
- Soft dipole resonances
- Pair transfer
- Pair correlation in nuclear matter

Large amplitude collective motion

- Shape co-existence phenomena
- Anharmonic quadrupole vibrations
- Adiabatic Selfconsistent-Collective-Coordinate method

Structure of rapidly rotating nuclei

- Damping of rotational motion
- Cranked shell model for warm rotating nuclei
- Fluctuation analysis of gamma-ray spectra
- Superdeformed states

Statistical properties in nuclei

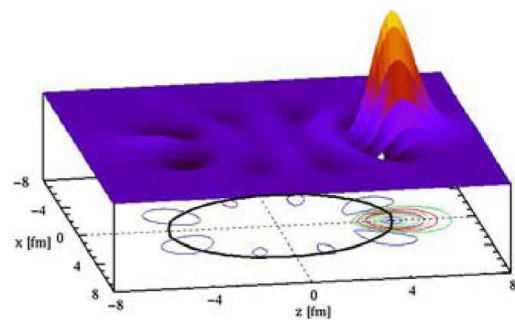
- Quantum chaos in highly excited nuclei
- Fluctuation analysis of spectra
- Wavelet anal

Education

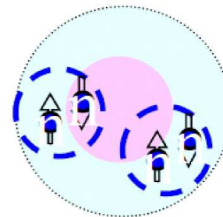
1982: Bachelor Sci. degree, Graduated from Department of Physics, Kyoto University, Japan

1984: Master Sci. degree, Graduated from Department of Physics, Kyoto University, Japan

1987: Doctoral Sci. degree, Graduated from Department of Physics, Kyoto University, Japan



Di-neutron correlations
in neutron-rich isotope
 ^{84}Ni



Professional Societies and Activities

Japan Physical Society

Major Publications

Structure of exotic nuclei

- [1] *Continuum Hartree-Fock-Bogoliubov theory for weakly bound deformed nuclei using coordinate-space Green's function method*, H. Oba and M. Matsuo, Phys. Rev. C 80, 024301, 14 pages, 2009
- [2] *Continuum quasiparticle linear response theory using the Skyrme functional for multipole responses of exotic nuclei*, Kazuhito Mizuyama, Masayuki Matsuo, Yasuyoshi Serizawa, Phys. Rev. C 79, 024313, 13 pages, 2009
- [3] *Di-neutron correlation in soft octupole excitations of neutron-rich Ni isotopes beyond $N=50$* , Yasuyoshi Serizawa, Masayuki Matsuo, Prog. Theor. Phys. 121, 97-119, 2009
- [4] *Spatial structure of neutron Cooper pair in low density uniform matter*, M. Matsuo, Phys. Rev. C 73, 044309, 16 pages, 2006
- [5] *Di-neutron correlations in medium-mass neutron-rich nuclei near the drip-line*, M. Matsuo, K. Mizuyama, Y. Serizawa, Phys. Rev. C, 71, 064326, 24 pages, 2005
- [6] *Continuum Linear Response in Coordinate Space Hartree-Fock-Bogoliubov Formalism for Collective Excitations in Drip-line Nuclei*, M. Matsuo Nuclear Physics A696, 371-395, 2001

Large amplitude collective motion

- [7] *Microscopic description of oblate-prolate shape mixing in proton-rich Se isotopes*, HINOHARA, Nobuo, NAKATSUKASA, Takashi MATSUO, Masayuki, MATSUYANAGI, Kenichi Phys. Rev. C 80, 014305, 11 pages, 2009
- [8] *Adiabatic Selfconsistent Collective Coordinate Method for Large Amplitude Collective Motion in Superconducting Nuclei*, M. Matsuo, T. Nakatsukasa, and K. Matsuyanagi, Prog. Theor. Phys. 103, 959-979, 2000

Structure of rapidly rotating nuclei

- [9] *Probing the order-to-chaos region in superdeformed ^{151}Tb and ^{196}Pb nuclei with continuum gamma-transitions*, S. Leoni, G. Benzoni, et al. Phys. Rev. Lett. 101, 142502, (4 pages), 2008
- [10] *Barrier penetration and rotational damping of thermally excited superdeformed nuclei*, K. Yoshida, M. Matsuo, Y. R. Shimizu, Nuclear Physics A696, 85-122, 2001
- [11] *Shell Model for Warm Rotating Nuclei*, M. Matsuo, T. Dossing, E. Vigezzi, R.A. Broglia, and K. Yoshida, Nucl. Phys. A617, 1-33, 1997

Statistical properties in nuclei

- [12] *Fluctuation properties of strength functions associated with giant resonances*, H. Aiba, M. Matsuo, S. Nishizaki and T. Suzuki, Phys. Rev. C68, 054316, 2003