The Fourth Conference on Nuclei and Mesoscopic Physics 2014

East Lansing, Michigan, United States
5–9 May 2014

Editors
Pawel Danielewicz
Alex Levchenko
Vladimir Zelevinsky
Michigan State University, Michigan, USA

Sponsoring Organizations
National Superconducting Cyclotron Laboratory, Michigan State University
Department of Physics and Astronomy, Center for Complex Materials, Michigan State University
Office of Information and Technology, Michigan State University

All papers have been peer reviewed.

To learn more about AIP Proceedings visit http://proceedings.aip.org
## Table of Contents

### Preface: Fourth Conference on Nuclei and Mesoscopic Physics
Pawel Danielewicz, Alex Levchenko, Linna Leslie, and Vladimir Zelevinsky  
1

### Program
3

### Photo Collection
Felix Izrailev  
8

### Nuclear energy density functionals: What we can learn about/from their global performance?
A. V. Afanasjev, S. E. Agbemava, D. Ray, and P. Ring  
13

### Mesoscopic superconductivity in ultrasmall metallic grains
Y. Alhassid and K. N. Nesterov  
24

### Resonant control of spins in the quasi-one-dimensional channel by interplay of confinement and Zeeman splitting
D. H. Berman, M. Khodas, and M. E. Flattê  
33

### Highly frustrated spin-lattice models of magnetism and their quantum phase transitions: A microscopic treatment via the coupled cluster method
R. F. Bishop, P. H. Y. Li, and C. E. Campbell  
40

### Unconventional states and geometric effects in mesoscopic systems of ultra-cold atomic Fermi gases
C. J. Bolech  
51

### A superradiance-based biological switch
Fausto Borgonovi and Giuseppe L. Celardo  
54

### Superradiance, disorder, and the non-Hermitian Hamiltonian in open quantum systems
G. L. Celardo, A. Biella, G. G. Giusteri, F. Mattiotti, Y. Zhang, and L. Kaplan  
64
Pairing in bulk nuclear matter beyond BCS
D. Ding, S. J. Witte, W. H. Dickhoff, H. Dussan, A. Rios, and A. Polls

Low-energy magnetic radiation: Deviations from GOE
S. Frauendorf, R. Schwengner, and K. Wimmer

Resonance at the Rabi frequency in a superconducting flux qubit
Ya. S. Greenberg, E. Il'ichev, G. Oelsner, and S. N. Shevchenko

Superconductivity and superfluidity as universal emergent phenomena in diverse physical systems
Mike Guidry

Quantum states built on classical nonlinear resonances for slowly deforming billiards
Nandan Jha and Sudhir R. Jain

The Magnus expansion and the in-medium similarity renormalization group
T. D. Morris and S. K. Bogner

Open quantum systems and random matrix theory
Declan Mulhall

Spectral fluctuations of quantum graphs
Z. Pluhař and H. A. Weidenmüller

Multiparticle-multihole configuration mixing description of nuclear many-body systems
C. Robin, N. Pillet, J. Le Bloas, J.-F. Berger, and V. G. Zelevinsky

On spectroscopic factors of magic and semimagic nuclei
E. E. Saperstein, N. V. Gnezdilov, and S. V. Tolokonnikov

Statistical approach to nuclear level density
R. A. Sen'kov, V. G. Zelevinsky, and M. Horoi

Microscopic out-of-equilibrium analysis of the zero-bias conductance peak in a one-dimensional topological superconductor
Nayana Shah
Superradiance in a two-channel quantum wire
A. Tayebi and V. Zelevinsky 162

Isolated many-body quantum systems far from equilibrium: Relaxation process and thermalization
E. J. Torres-Herrera and Lea F. Santos 171

Exploring dynamics of unstable many-body systems
Alexander Volya and Vladimir Zelevinsky 181