NUCLEAR PHYSICS 622, Spring 2005

Dr. Witek Nazarewicz  
Telephone: 574-4580   Fax: 574-8746  
e-mail: witek@utk.edu

Syllabus

1. The Fock Space for Fermions  
2. Second quantization representation  
3. Occupation number representation  
4. Wick's theorem, contractions  
5. Wick's Theorem for the Evaluation of Matrix Elements  
6. Product states  
7. Quasiparticle space  
8. Matrix Bogoliubov transformation  
9. Bogoliubov transformations in the Fock space  
10. Improper Bogoliubov transformations  
11. Ring and Schuck theorem  
12. Thouless theorem  
13. Density matrices and the generalized density matrix  
14. Lipkin model, group structure, exact solutions, quantum numbers  
15. Hartree-Fock method  
16. Lipkin model and Hartree-Fock method. Coherent SU(2) states  
16. Hartree-Fock stability conditions  
17. Self-consistent Hartree-Fock symmetries  
18. Spontaneous symmetry breaking  
19. Parity doublet in the Lipkin model  
20. Hartree-Fock-Bogoliubov  
21. Gauge space and particle number symmetry  
22. Random phase approximation  
23. Generator Coordinate Method (GCM)  
24. GCM in the Lipkin model  
25. Nuclear adiabatic motions: problems and perspectives  

We shall be meeting Mondays and Wednesdays 9:30-10:45, PHY 512

Recommended textbook: "The Nuclear Many Body Problem"  