Abstract Submitted
for the DAMOP08 Meeting of
The American Physical Society

On the Application of Group Theoretical and Graphical Techniques in Pursuit of the General, Interacting N-body Problem[1] W. BLAKE LAING, MARTIN DUNN, DAVID W. KELLE, DEBORAH K. WATSON, University of Oklahoma — We use group theoretical and graphical techniques to develop a method that does not require intensive numerical effort when solving for systems with arbitrary interactions where N may be large (such as a BEC or a superfluid helium droplet). This method generalizes an N-body dimensional perturbation theory to higher order and is a significant advancement in our long-term project to analytically describe beyond-mean-field effects in confined, large-N quantum systems. We use symmetry properties and group representation theory, and have developed a graphical technique to analytically derive the next-order, N-body wave function for a fully-interacting confined quantum system. This method makes no assumptions concerning the number of particles or the strength of interparticle interactions and holds promise for applications to experimental systems such as a BEC with "tunable" interactions.

[1]This work was supported by ARO.

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Date submitted: 29 Jan 2008

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