

Exit Report

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The purpose of my visit to GANIL under the support of FUSTIPEN was to begin a research project with Piet Van Isacker to explore the role of multi-shell correlations in producing spatial correlations in alpha-like nuclei. We set out to explore this in the context of a system of two neutrons and two protons outside an inert ^{16}O core, using a schematic (albeit fairly realistic) hamiltonian that would enable us to probe the role of the various pieces of the hamiltonian in enhancing the spatial correlation structure.

During the period of the visit, the following phases of the project were completed:

1. A code was completed to carry out shell-model calculations for two neutrons and two protons in two major shells for a general shell-model hamiltonian.
2. A code was completed to determine the necessary hamiltonian parameters for the various important components of the two-nucleon interaction: (1) isoscalar and isovector pairing, (2) a quadrupole-quadrupole interaction, and (3) an octupole-octupole interaction.
3. The formalism needed to obtain appropriate size measures for the alpha-like structure was developed.

The next step is to bring all the components together and to carry out systematic calculations as a function of the relative strengths of the various parts of the hamiltonian.

A second thrust of my visit was to co-organize with Dr. Van Isacker a topical workshop on "Recent Advances in the Nuclear Shell Model", which was held at GANIL on the 19th and 20th of June under the auspices of FUSTIPEN. The workshop included 13 invited talks covering such topics as: the evolution of shell structure as we move away from stability, modern effective interactions (including many-body terms), coexistence near closed

shells, optimal single-particle spaces to use in shell model studies, and symmetry tests within the shell model. The talks were uniformly of very high quality and the discussion was extremely lively.

Lastly, while at GANIL I presented a colloquium entitled "Proton-neutron pairing correlations and the nuclear shell model".

Overall, I enjoyed the visit thoroughly, both professionally and personally, and greatly appreciate the support from FUSTIPEN that enabled it.