

FUSTIPEN Trip Report : GANIL 3/16/2011 to 3/26/2011

During a Workshop on NP pairing correlations that took place November 2010 in RIKEN, Dr. Piet Van Isacker from GANIL and I discussed about the possibility of collaborating on some common ideas we had on the problem of np pairing.

A proposal was submitted to FUSTIPEN and approved by the end of December.

I traveled to Caen on March 16<sup>th</sup>, 2011 and returned to the US on March 26<sup>th</sup>.

During this exploratory visit, we worked on an interesting aspect of the competition of isovector and isoscalar neutron-proton pairing.

Shell-model (SM) calculations carried out with an schematic interaction, a mixture of  $T=0$  and  $T=1$ , show that the ground state of an  $N=Z$  nucleus with dominant  $T=0$  character is an aligned “quasi-deuteron” configuration, ie.  $I^P=N_d^*1^+$ . A boson mapping of  $J=0$  and  $J=1$  pairs was developed to study the spin of the ground state of the system and shows clearly this interesting effect. The SM calculations indicate that this behavior is driven by the spin-orbit splitting. We discussed the potential for extending the boson mapping using the LS coupling scheme to study this transition. Dr. Salima Zerguine (Algeria) is a collaborator on this project.

We also studied the geometry of the shears bands within a formal shell model approach. These type of bands, of M1 character, are observed in nuclei near closed-shell and show a rotational-like pattern in spite of the fact that their quadrupole deformation is very small. By making use of classical limits of the re-coupling coefficients entering the energy expressions, the rotational-like motion observed in these bands seems to appear naturally.

During the stay, I also chat with several students and post-docs working with Dr. Van Isacker on their projects and had very enlightening discussions with Drs. Marek Ploszajczak and Nicola Michel on aspects of coupling to the continuum.

A FUSTIPEN Topical meeting on «Probing two-nucleon correlations using reactions» took place on March 18, 2011. I presented an overview talk on possible studies of 2N correlations using direct reactions. The workshop was very informative and productive, allowing for interesting discussions among the theorists and experimentalists.

Besides the main topic of collaboration, the trip gave me the opportunity to visit GANIL for the first time. I had the chance of meeting with experimental colleagues at the facility. In particular, we had discussions with Dr. Navin Alahari on some of the recent results obtained by his group on transfer reactions using  ${}^6,8\text{He}$ . Dr. Alahari gave me a very informative tour of the facility.

In summary, I believe this was a very productive visit to GANIL, anticipating two papers describing the results obtained so far.

I must say I have not had such a stimulating week in a long time and I would like to thank the FUSTIPEN Governing Board for this grant.

Last but not least, many thanks to the local staff at GANIL, their help and hospitality made my stay a most enjoyable experience.

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