

Justipen Exit Report: Nicolas Schunck

I spent one week between December, 9th 2007 and December, 15th 2007 at RIKEN main campus in Wakōshi as Justipen visitor.

Most of my stay was devoted to scientific discussions with our Japanese colleagues, especially Prof. Matsuyanagi from Kyoto University, Prof. Sagawa from University of Aizu and Prof. Matsuo from Niigata University who traveled to Riken for the occasion. Prof. Nakatsukasa was also present at most of our discussions. Several points of physics were addressed:

- Of particular interest for me was the discussion of a recent work by Prof. Sagawa and collaborators on iso-vector properties of the nuclear pairing correlations. They showed that adding a simple term depending on the iso-vector density ($\rho_n - \rho_p$) in the pairing channel could very significantly improve the description of nuclear pairing gaps in particular in neutron-rich nuclei. I expect this discussion to be very beneficial in the context of the SciDac UNEDF project, which funds a systematic effort to determine a universal energy functional.
- At my request we also discussed various aspects of the nuclear tetrahedral symmetry, with a special emphasis on dynamical properties and experimental signatures of such systems. The expertise of Prof. Matsuyanagi greatly helped clarify several fascinating aspects of this physics. The major theoretical problem in tetrahedral nuclei, at the limit of exact symmetry, is the absence of elongation axis: the system behaves like a “spherical top” and there is no clear connection between the properties of the system in the intrinsic and laboratory frame. This physics is to a great extent poorly understood and deserves more attention.

On December, 12th I gave a seminar entitled “Towards a Universal Nuclear Density Functional: Spectroscopy of Odd Nuclei” which presented to the Japanese audience the first results of systematic large-scale computations of odd-mass nuclei within the DFT approach. This work is part of the SciDac UNEDF effort and was highlighted as such. It triggered many interesting discussion with our Japanese colleagues, both on the scientific and practical aspects. The calculations that I presented were obtained on the Jaguar super-computing facility at ORNL, and this aspect was especially interesting for our hosts at Riken who are considering building a similar facility in Japan for the nuclear structure community.

As a first-time visitor to Japan, I wish to emphasize the exceptional hospitality of our Japanese colleagues and the excellent working environment they provided.