Exit Report

FUSTIPEN Visit

Saclay and Ganil, Feb. 20–Mar. 04, 2011

Ubirajara van Kolck

Department of Physics, University of Arizona

I was in France for two very busy weeks in a FUSTIPEN exploratory visit.

The first week (Feb. 20-26) was spent at Saclay, hosted by Thomas Duguet. Our goal is to use effective field theory to develop a controlled energy-density-functional parameterization, which would be complementary to on-going attempts based either on trial and error, or on EFT NN+NNN potentials together with many-body perturbation theory. Our discussions centered on power counting: the factors (4π and nucleon mass) that justify a resummation in vacuum of leading interactions from chiral perturbation theory; the failure of naive dimensional analysis in vacuum and the perturbative treatment of sub-leading orders, including three-body forces; the implications of the apparent validity of naive dimensional analysis in existing phenomenological EDF parametrizations (observation by Friar et al., confirmed by Furnstahl et al.); proposals for extension of power counting to the medium, one which is not consistent with the in-vacuum factors (Kaiser et al.), another which might be (Oller et al.). We concluded that the latter could be a starting point for further development, although it relies on certain factors of 4π whose identification is unclear. I also discussed density functional theory with Bertrand Giraud, and delivered two talks on nuclear time-reversal violation (at Saclay and Orsay).

The second week (Feb. 27-Mar. 4) was spent at Ganil, hosted by Marek Ploszajczak. For the first three days I delivered lectures on EFT [1] in the morning, and on the fourth day Marek, Thomas and I organized a one-day topical workshop on "Effective Field Theories for Nuclear Structure Studies" [2]. My lectures were attended by 20-30 people, including experimentalists (eg, N. Alahari) and theorists from elsewhere in France (eg, J. Carbonell from Grenoble). There were many questions and discussions, and each day they went for 2.5-3 hours. The workshop had three speakers from elsewhere in Europe (H. Krebs, A. Nogga, and J. Oller) and one from Saclay (V. Soma), apart from an introduction by me and a discussion led by Thomas. It was attended mostly by French physicists and, again, had lively discussions. At Ganil I also had opportunity to talk about halo nuclei with Marek and the interacting boson model with Piet van Isacker.

I hope this productive visit will be followed by more extensive collaborations in the next years.

[1] http://fustipen.ganil.fr/Conferences/eftlecture/lecturevankolck

[2] http://fustipen.ganil.fr/Conferences/EFT%20workshop/eft