

## Two-nucleon scattering in effective field theory: searching for the power counting.

*Monday, 28 October 2013 15:50 (20 minutes)*

In this talk I consider the two-nucleon system from the effective field theory viewpoint. In particular, I address the problem of constructing a sensible expansion of the scattering amplitude that is able to reconcile the requirements of (i) renormalizability, (ii) the existence of a well-defined power counting at the level of observable quantities and (iii) phenomenological success. Using the proposal of Nogga, Timmermans and van Kolck [1] as a starting point, I show how these conditions can be met by perturbatively renormalizing the chiral two pion exchange contributions to the nuclear force [2,3]. The explicit next-to-next-to-leading order computations show that the present scheme leads to a good description of the phase shifts, comparable with the results obtained in the Weinberg counting at the same order [4,5], but free of the usual inconsistencies generated by the full iteration of chiral nuclear forces [6]. Further aspects of the theory, such as the convergence rate, the expansion parameter, or the power counting in deuteron reactions, will be briefly discussed [7].

- [1.] A. Nogga, R.G. Timmermans and U. van Kolck, Phys.Rev. C72 (2005) 054006
- [2.] M. Pavon Valderrama, Phys.Rev. C83 (2011) 044002
- [3.] M. Pavon Valderrama, Phys.Rev. C84 (2011) 064002
- [4.] E. Epelbaum, W. Gloeckle, U.-G. Meissner, Eur.Phys.J. A19 (2004) 125-137
- [5.] E. Epelbaum, W. Gloeckle, U.-G. Meissner, Eur.Phys.J. A19 (2004) 401-412
- [6.] M. Pavon Valderrama, AIP Conf.Proc. 1322 (2010) 205-213
- [7.] M. Pavon Valderrama, D.R. Phillips (in preparation)

**Primary author:** Dr PAVON VALDERRAMA, Manuel (Institut de Physique Nucleaire d'Orsay, Universite Paris-Sud, IN2P3/CNRS, F-91406 Orsay Cedex, France)

**Presenter:** Dr PAVON VALDERRAMA, Manuel (Institut de Physique Nucleaire d'Orsay, Universite Paris-Sud, IN2P3/CNRS, F-91406 Orsay Cedex, France)

**Track Classification:** Parellel A