

**Near-degenerate systems in nuclear structure and quantum chemistry
from ab initio many-body methods**

Workshop of the *Espace de Structure et de réactions Nucléaires Théorique*

March 30th - April 2nd, 2015

CEA Saclay, SPhN, Orme des Merisiers, build. 703, room 135, F-91191 Gif-sur-Yvette Cedex

Lectures	Workshop		
<i>Mon. Mar. 30th</i>	<i>Tue. Mar. 31st</i>	<i>Wed. Apr. 1st</i>	<i>Thu. Apr. 2nd</i>
<i>Room 135</i>	<i>Room 135</i>	<i>Room 135</i>	<i>Room 135</i>
09h15 <i>Welcome</i>	09h30 Hergert	09h30 Signoracci	09h30 Toulouse
09h30 Jimenez-Hoyos	10h15 Break	10h15 Break	10h15 Break
10h45 Break	10h45 Koehn	10h45 Henderson	10h45 Bender
11h15 Bogner	11h30 Evangelista	11h30 Scuseria	11h30 Piecuch
12h30 Lunch	12h15 Lunch	12h15 Lunch	12h15 Lunch
14h15 Soma	14h00 Barbieri	14h00 Soma	14h00 Jansen
15h30 Break	14h45 Holt	14h45 Duguet	14h45 Hagen
16h00 Bartlett	15h30 Break	15h30 Break	15h30 Break
17h15 End	16h00 Musial	16h00 Reining	16h00 Rios
	16h45 Discussion 1	16h45 Discussion 2	16h45 Discussion 3
	18h00 End	18h00 End	18h00 End
	20h00 Dinner		

A. Introductory lectures

1. C. A. Jiménez-Hoyos, *Symmetry broken and restored mean-field theory*
2. S. Bogner, *Basics of single-reference and multi-reference in-medium similarity renormalization group theory*
3. V. Somà, *Basics of self-consistent Green's function theory*
4. R. J. Bartlett, *Basics of single-reference and multi-reference coupled cluster theory*

B. Talks

1. Multi-reference many-body theories
 - H. Hergert, *Multi-reference in-medium similarity renormalization group theory for nuclei*
 - A. Koehn, *Internally contracted multi-reference coupled-cluster method*
 - M. Musial, *Fock space multi-reference coupled-cluster method*
2. Effective operators for ab-initio configuration interaction calculations
 - J. D. Holt, *Non-perturbative shell-model interactions from the in-medium similarity renormalization group*
 - G. Hagen, *Ab-initio coupled-cluster effective interactions for the shell model*
 - C. Barbieri, *Effective operators for shell-model calculations from self-consistent Green's function theory*
3. Symmetry-unrestricted many-body theories
 - V. Somà, *Self-consistent Gorkov Green's function theory for nuclei*
 - A. Rios, *Self-consistent Green's function with anomalous propagators for homogeneous nuclear matter*
 - T. M. Henderson, *Bogoliubov coupled cluster theory for the attractive pairing Hamiltonian*
 - A. Signoracci, *Bogoliubov coupled cluster theory for nuclei*
4. Symmetry- (broken and) restored many-body theories
 - M. Bender, *Symmetry-restored mean-field theory for nuclei*
 - T. Duguet, *Symmetry-restored coupled cluster and self-consistent Green's function theories*
5. Reaching excited states and/or neighboring systems
 - P. Piecuch, *Molecular systems from the equation-of-motion coupled-cluster theory*
 - G. R. Jansen, *Near closed-shells nuclei from the equation-of-motion coupled-cluster theory*
6. Additional flavors
 - F. Evangelista, *The similarity renormalization group in quantum chemistry*
 - J. Toulouse, *QMC trial wave functions and their optimization for chemistry*
 - G. E Scuseria, *Low-cost generalized coupled cluster models for strong and weak correlations*
 - L. Reining, *A direct approach to the calculation of many-body Green's functions*

C. Discussion sessions

1. Discussion 1: *Multi-reference methods*
2. Discussion 2: *Symmetry broken and restored methods*
3. Discussion 3: *Possible cross-disciplinary projects between quantum chemistry and nuclear physics*