

Many-body correlations, phase transitions, and clustering: how to identify and quantify them?

Organizers

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7-11 September 2026

CEA Saclay, DPhN, Orme des Merisiers, b. 703, room 135, F-91191 Gif-sur-Yvette

GOALS OF THE WORKSHOP

- (i) To discuss how correlations and clusterisations are treated in various models and how they manifest in experimental data.
- (ii) To discuss how to identify and to quantify, theoretically and experimentally, the emergence of quantum phase transitions associated to pairing and α -like condensation.
- (iii) To explore the methods employed to describe correlations, phase transitions and condensation in condensed matter superfluidity, ultracold gases and quantum information, and to discuss how they can be applied to nuclear systems.

PROGRAM

MONDAY 7 September 2026

9:15-9:40 Welcome and introduction (Organizers) *Morning chair: P. Van Isacker*
9:40-10:30 M. Assié (IJCLab Orsay) Probing neutron-proton pairing through pair transfer: the Anderson limit in nuclei
10:30-11:00 *Coffee*
11:00 – 11:50 B. Cederwall (KTH Royal Institute of Technology, Stockholm) Probing pairing and its isospin modes at finite angular momentum

12-14h: *Lunch* *Afternoon chair: C. Johnson*
14-14:50 F. Barranco (University of Sevilla) Nuclear Josephson effect, theoretical aspects and predictions
14:50-15:20 *Coffee*
15:20 – 16:10 L. Corradi (INFN-LNL, Legnaro) Sub barrier transfer reactions and the nuclear Josephson effect
16:10-17:00 Discussion

TUESDAY 8 September 2026

9:15-9:40 Free discussion *Morning chair: D. Gambacurta*
9:40-10:30 P. Van Isacker (GANIL) Counting pairs in the shell model
10:30-11:00 *Coffee*
11:00 – 11:50 D. Lee (MSU/FRIB) Multimodal superfluidity of neutrons and neutron-rich nuclei

12-14h: *Lunch* *Afternoon chair: A. Volya*
14-14:50 N. Sandulescu (IFIN, Bucharest) Quartet correlations in N=Z nuclei
14:50-15:20 *Coffee*
15:20 – 16:10 N Gavrielov (Hebrew University) Shape-phase transitions and configuration crossing in the A ~ 100 region

WEDNESDAY 9 September 2026

9:15-9:40 Free discussion

Morning chair: D. Lee

9:40-10:30 E. Litvinova (Western Michigan University) Spectral imprints of nuclear many-body correlations: constraining theory toward the spectroscopic accuracy frontier

10:30-11:00 *Coffee*

11:00 – 11:50 P. Magierski (Warsaw University of Technology) Stability and Dissipative Dynamics of Collective Modes in Ultracold Atomic Gases

12-14h: *Lunch*

Afternoon chair: E. Litvinova

14-14:50 D. Gambacurta, (INFN Catania) Coherence and Collectivity in nuclear excitations

14:50-15:20 *Coffee*

15:20 – 16:10 L. Heitz (CEA DAM) Localization/clustering from ab initio methods

16:10-17h Discussion

THURSDAY 10 September 2026

9:15-9:40 Free discussion

Morning chair: M. Assié

9:40-10:30 D. Beaumel (IJCLab Orsay) Approach to nuclear clustering in the ground-state of neutron-rich nuclei via direct reactions: first studies in inverse kinematics at RIKEN and GANIL

10:30-11:00 *Coffee*

11:00 – 11:50 (OPEN SEMINAR) V. Goldberg (Texas A&M)
Experimental Study of α -Cluster States in $N \neq Z$ Light Nuclei

12-14h: *Lunch*

Afternoon chair: T. Otsuka

14-14:50 N. Itagaki (Osaka Metropolitan University) Exotic clustering of light nuclei

14:50-15:20 *Coffee*

15:20 – 16:10 A. Volya (Florida State University) Configuration-interaction studies of nuclear alpha clustering

16:10-17h Discussion

FRIDAY 11 September 2026

9:15-9:40 Free discussion

Morning chair: B. Cederwall

9:40-10:30 Olga Bessidskaia-Bylund (IJCLab Orsay) Photoproduction of vector mesons at the LHC as a probe of nuclear geometry

10:30-11:00 *Coffee*

11:00 – 11:50 A. Nurmukhanbetova (Nazarbayev University) The $^{12}\text{C} + ^{12}\text{C}$ Interaction in Astrophysics and Cluster Structure in ^{24}Mg

12-14h: *Lunch*

Afternoon chair: N. Sandulescu

14-14:50 T. Otsuka (University of Tokyo) Dual rotational modes, compact-object and distant-object, in quantum many-body systems

14:50-15:20 *Coffee*

15:20 – 16:10 C. Johnson (San Diego State University) Can the ground state have a temperature? And other questions

16:10-17h Summary

Schedule

	Monday 7 Sept.	Tuesday 8 Sept.	Wednesday 9 Sept.	Thursday 10 Sept.	Friday 11 Sept.
<i>9h30</i>	<i>Welcome</i>	<i>Discussions</i>	<i>Discussions</i>	<i>Discussions</i>	<i>Discussions</i>
<i>9h40</i>	M. Assié	P. Van Isacker	E. Litvinova	D. Beaumel	O. Bessidskaia-Bylund
<i>10h30</i>	<i>Break</i>	<i>Break</i>	<i>Break</i>	<i>Break</i>	<i>Break</i>
<i>11h</i>	B. Cederwall	D. Lee	P. Magierski	11h Seminar V. Goldberg	A. Nurmukhanbetova
<i>11h50</i>	<i>Discussions</i>	<i>Discussions</i>	<i>Discussions</i>	<i>Discussions</i>	<i>Discussions</i>
<i>12h</i>	<i>Lunch</i>	<i>Lunch</i>	<i>Lunch</i>	<i>Lunch</i>	<i>Lunch</i>
<i>14h</i>	F. Barranco	N. Sandulescu	D. Gambacurta	N. Itagaki	T. Otsuka
<i>14h50</i>	<i>Break</i>	<i>Break</i>	<i>Break</i>	<i>Break</i>	<i>Break</i>
<i>15h20</i>	L. Corradi	N. Gavrielov	L. Heitz	A. Volya	C. Johnson
<i>16h</i>	Discussions	Discussions	Discussions	Discussions	
<i>17h</i>	<i>End</i>	<i>End</i>	<i>End</i>	<i>End</i>	