

An introduction to ultracold quantum gases

1-2 July 2013

IPCMS – Institut de Physique et Chimie des Matériaux de Strasbourg

Since the realization of Bose-Einstein condensation in 1995 using dilute atomic gases, the field of atomic, molecular and optical (AMO) physics has evolved into a rich playground for the discovery of novel quantum phenomena. Precise simulations of quantum many-body systems are now being implemented by combining the microscopic knowledge of Hamiltonians that are realized in AMO experiments with the possibility to control and tune system parameters via external fields. The aim is to shed light on complex quantum mechanical behavior, ranging from the physics of Bose and Fermi Hubbard models relevant to condensed matter physics, to dynamics in quantum many-body systems, to lattice gauge theories for high-energy physics.

This lecture series provides an introduction to the physics of ultracold (sub-microkelvin) atomic and molecular quantum gases. The basic ideas will be presented together with a panorama of key recent experiments and theoretical breakthroughs in this field, which presents many exciting research opportunities for young researchers.

Program:

Monday, July 1st

09:20 – 09:30	Welcome addresses
09:30 – 11:30	Dr. J. Leonard , IPCMS Strasbourg, FR <i>Cooling and trapping atoms</i>
11:30 – 13:00	Lunch break
13:00 – 15:00	Dr. M. Dalmonte , Universität Innsbruck, AT <i>Basic theory of Bose-Einstein condensates</i>
15:00 – 15:30	Coffee break
15:30 – 17:30	Prof. A. Widera , Technische Universität Kaiserslautern, DE <i>Key experiments with ultracold gases</i>

Tuesday, July 2nd

09:00 – 09:30	Coffee break
09:30 – 11:30	Dr. M. Dalmonte , Universität Innsbruck, AT <i>Many-body theory of quantum gases</i>
11:30 – 13:00	Lunch break
13:00 – 15:00	Prof. G. Pupillo , UdS and IPCMS Strasbourg, FR <i>Dipolar quantum gases</i>
15:00 – 15:30	Coffee break
15:30 – 17:30	Dr. F. Mintert , Freiburg Institute of Advanced Studies, DE <i>Analog and digital quantum simulations in AMO systems</i>

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