LMU LUDWIG-
MAXIMILIANS-
UNIVERSITÄT
MÜNCHEN

MATHEMATISCHES INSTITUT
PROF. THOMAS ØSTERGAARD SØRENSEN, PHD

VORLESUNGSANKÜNDIGUNG

SoSe15

Blockveranstaltung (20 – 30 April 2015):

De Finetti theorems, mean-field limits and Bose-Einstein condensation.

Lecturer: Nicolas Rougerie (CNRS / Université Grenoble-Alpes).

Time and place: *20 – 24 April & 27 – 30 April 18:15-20:00 in B 134.*

First meeting: Monday *20 April 2015, 18:15 in B 134.*

Synopsis: The course will adress the mean-field approximation for the equilibrium states of N-body systems in classical and quantum statistical mechanics. The main goal is a rigorous derivation from first principles of effective models that are usually based on statistical independence assumptions. A general strategy to achieve this will be discussed in details. The main tools are structure theorems "à la de Finetti" which describe the possible large-N limits of the admissible states of statistical mechanics. The main application we have in mind is the Bose-Einstein condensation phenomenon, which takes place in cold dilute Bose gases. Accordingly, the main emphasis of the course will be on the justification of the mean-field approximation for the ground state of large bosonic systems. We shall discuss topics such as the concentration-compactness principle, localization methods in Fock space, the structure of bosonic density matrices, the Hartree and Gross-Pitaevskii functionals ... .

Audience: Master students of Mathematics and Physics, TMP-Master.

Prerequisites: A basic knowledge of Mathematical Quantum Mechanics (corresponding to the course `Mathematical Quantum Mechanics 1' (MQM1)) is an advantage.

Language: The lecture will be in English.

Literature: There will be lecture notes (in English).
A version (in French) of N. Rougerie's notes for the 'Cours Peccot' at Collège de France can be found at http://arxiv.org/abs/1409.1182.

Further information: http://www.math.lmu.de/~sorensen

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