MENU OF CONTENTS

Legenda:
In blu: the modules among which to choose
In white: the fixed modules for everyone

I. Introductory lectures (2): conceptual map of the essential ideas

MCORR. Measurements and correlation functions [4 h]

RESP. Formal development of the Theory of Linear Response [8h]

Choice of [8h]:

GF. Correlation functions and Green's functions (zero and finite temperature) [8h]

QH. Quantum Hydrodynamics [8h]

GF+QH. Elements of Green's functions [4h] + Elements of Quantum Hydrodynamics [4h]

LT. Landau Fermi and Bose liquids [2 h]

(TD)DFT. Choice: A crash dictionary of (Time-Dependent) Density Functional Theory [2h]

QPT. A crash dictionary on broken symmetries and (quantum) phase transitions [2 h]

APPLICATIONS

SUPER. Superfluidity/superconductivity, BEC of neutral/charged Fermi and Bose systems, BEC -BCS crossover [6 h]

K. Choice of the following examples on useful Knobs [2h]:
Ka. Effects of reduced dimensionality: the very special 1D case [2 h]
Kb. Effects of disorder: quantum transport in 1D [2 h]

QUANTUM TECHNOLOGIES

QT. The basic toolbox (2 or 3-levels sys, interactions, gauge fields, and dimensionality) in QT platforms: quantum gases/trapped ions, SC circuits, optical cavities, fluids of light [6h]

PEX. Choice of the following paradigmatic examples [2h]:
PEXa. Engineering analogue quantum simulators in quantum gases and/or trapped ions [2 h]
PEXb. Analogue-gravity simulators in quantum gases and/or fluids of light and/or graphene [2 h]
PEXc. Paradigmatic examples: quantum metrology with quantum gases and trapped ions [2 h]