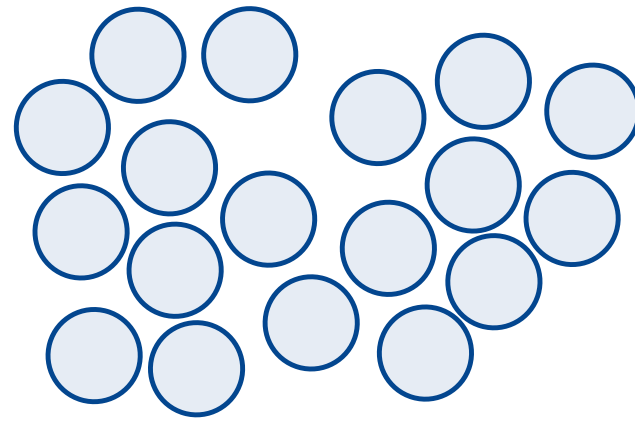


MANY - BODY - QUANTUM DYNAMICS

QOTTA 2024

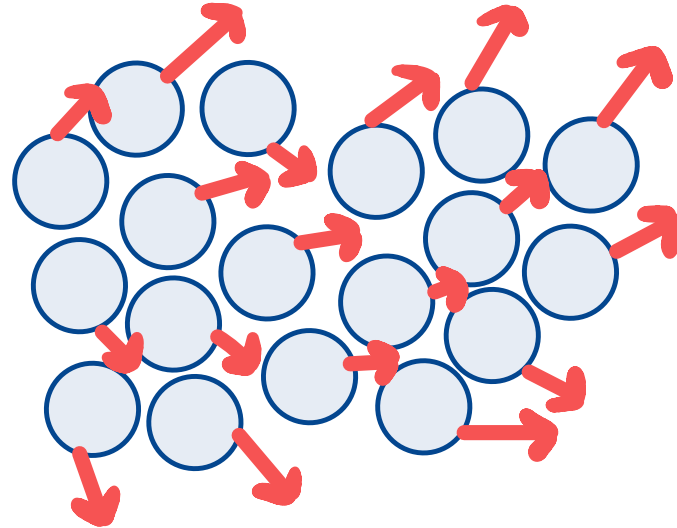
Sept. 02-06
2024
CORTONA

MANY - BODY QUANTUM SYSTEMS



MICROSCOPIC DESCRIPTION

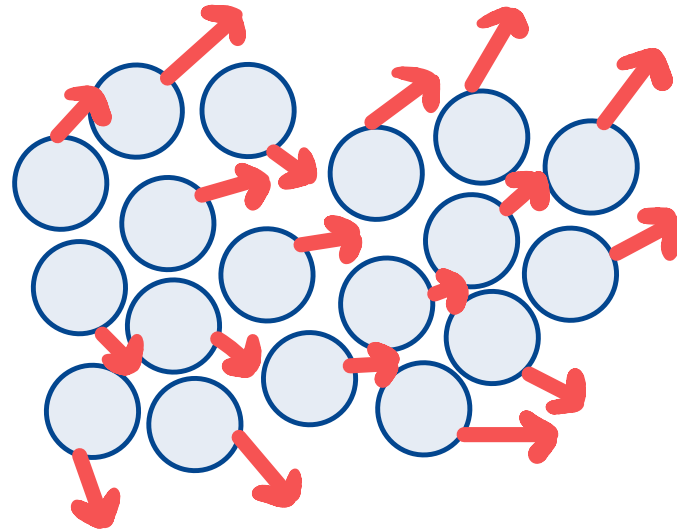
MANY - BODY QUANTUM SYSTEMS



MICROSCOPIC DESCRIPTION

- N individual interacting particles

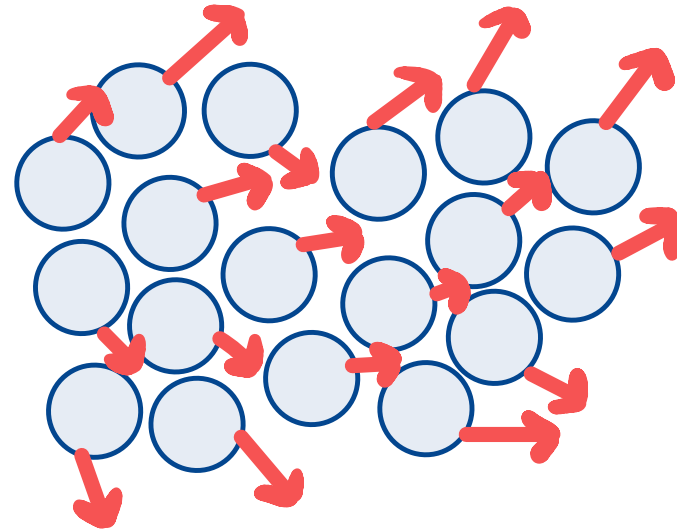
MANY - BODY QUANTUM SYSTEMS



MICROSCOPIC DESCRIPTION

- N individual interacting particles
- hardly accessible

MANY - BODY QUANTUM SYSTEMS

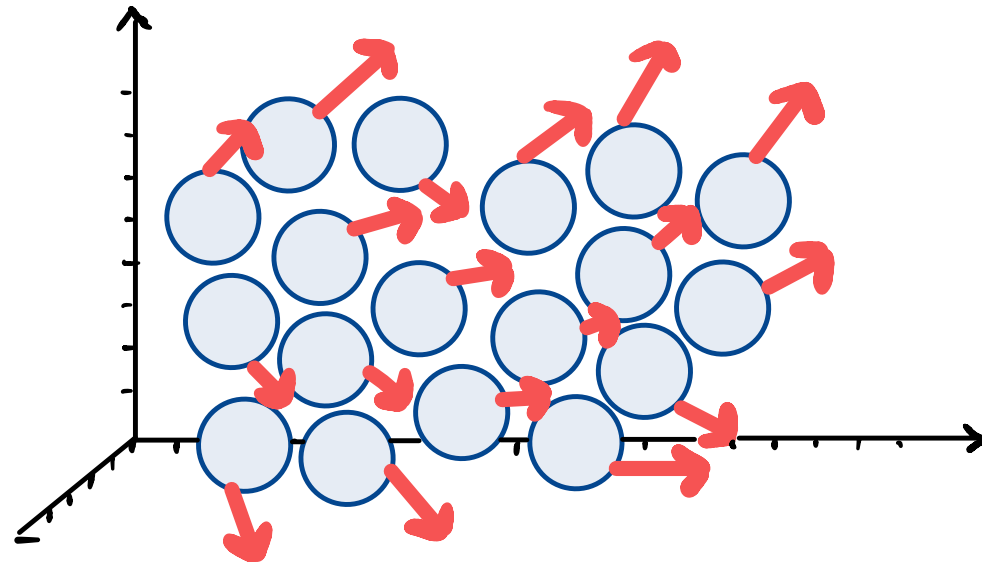


MICROSCOPIC DESCRIPTION

- N individual interacting particles
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Ex. 50 rubidium atoms
 $* 50 \times 3 = 150$ degrees of freedom

MANY - BODY QUANTUM SYSTEMS



MICROSCOPIC DESCRIPTION

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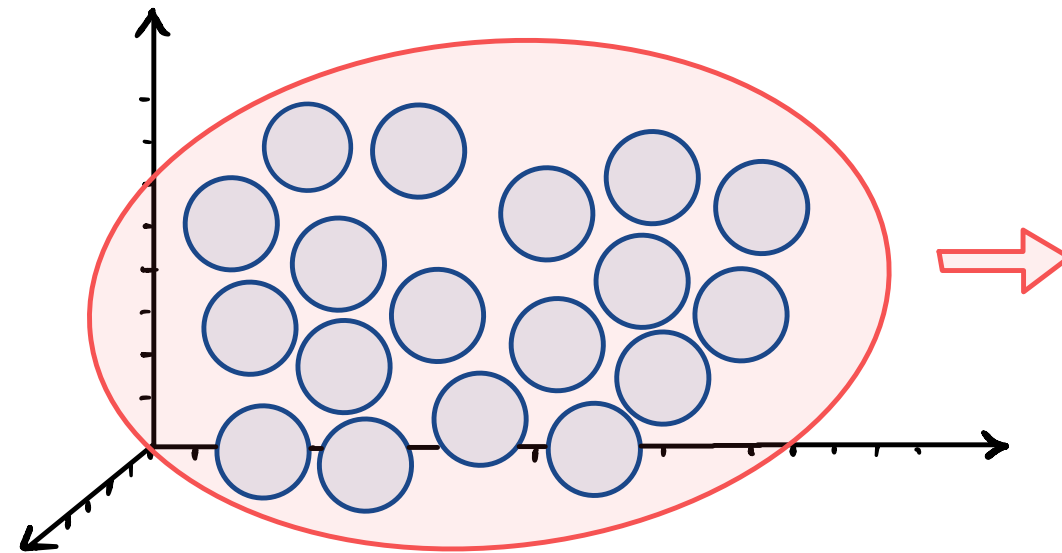
Ex. 50 rubidium atoms

$$* 50 \times 3 = 150 \text{ degrees of freedom}$$

$$* 10^{150} > 10^{80}$$

memory units atoms in the univers

MANY - BODY QUANTUM SYSTEMS



MICROSCOPIC DESCRIPTION

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Ex.

50 rubidium atoms

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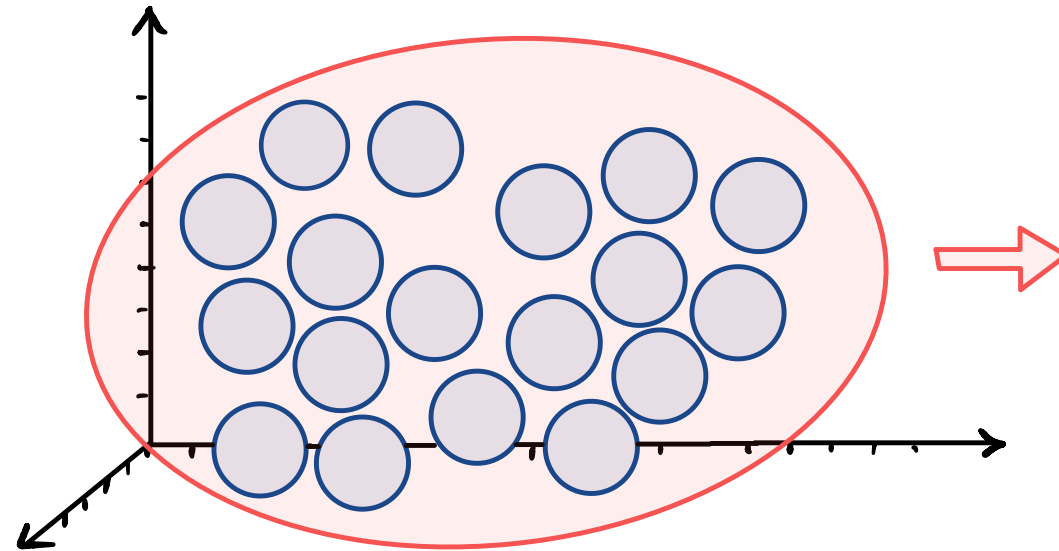
$$* 10^{150} > 10^{80}$$

memory units atoms in the univers

MACROSCOPIC DESCRIPTION

- collective behavior of individual particles
- easier accessible effective description

MANY - BODY QUANTUM SYSTEMS



MICROSCOPIC DESCRIPTION

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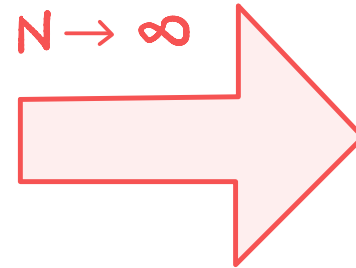
(Ex.) 50 rubidium atoms

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memory units atoms in the univers

$N \rightarrow \infty$



MACROSCOPIC DESCRIPTION

- collective behavior of individual particles
- easier accessible effective description

STRUCTURE

— DYNAMICS OF THE MEAN-FIELD ROSE GAS —

1. Physical motivation
2. Mathematical description
3. Law of large numbers
4. Quantum fluctuations (around the condensate)
5. Central limit theorem
6. Large deviations
7. Outlook: Quantum fluctuations in equilibrium
8. Open questions