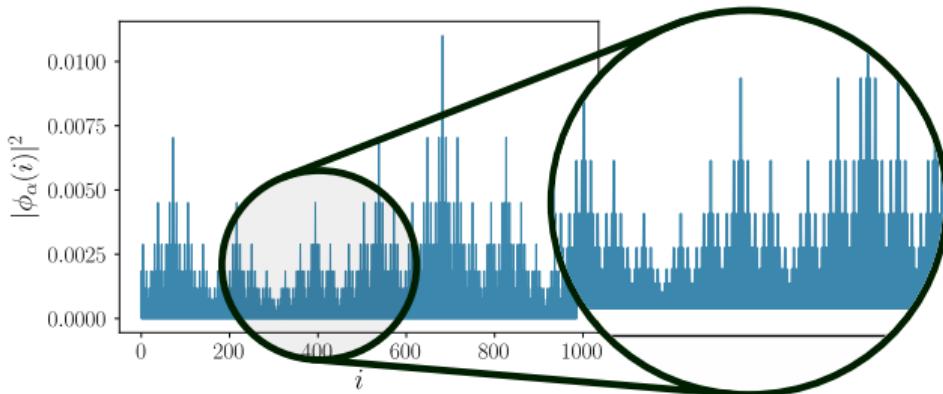
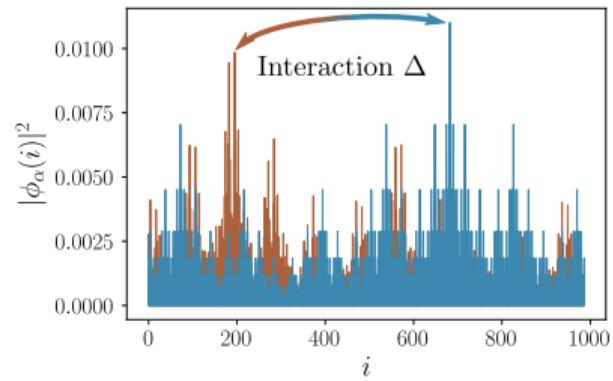


# Interacting electrons on a Fibonacci chain at high temperature

Nicolas Macé



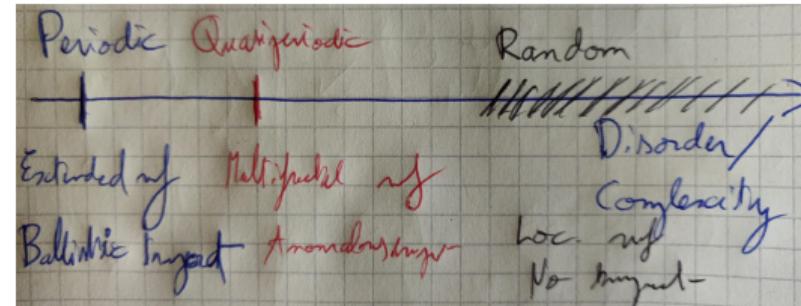
Nicolas Macé



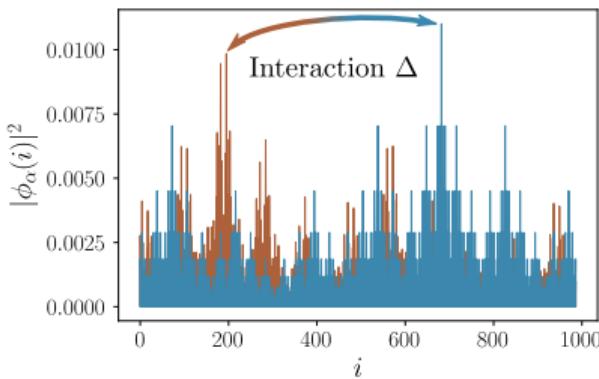
May 24, 2019

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## MOTIVATION: QUASIPERIODICITY + INTERACTING ELECTRONS



Cold atoms: **well-controlled** systems, strong **interactions**



**Quasiperiodicity (QP) + strong interactions?**

Naively: delocalisation, fast transport

**Results:**

- weak QP: delocalisation, fast transport
- strong QP: **many-body localisation**, no transport

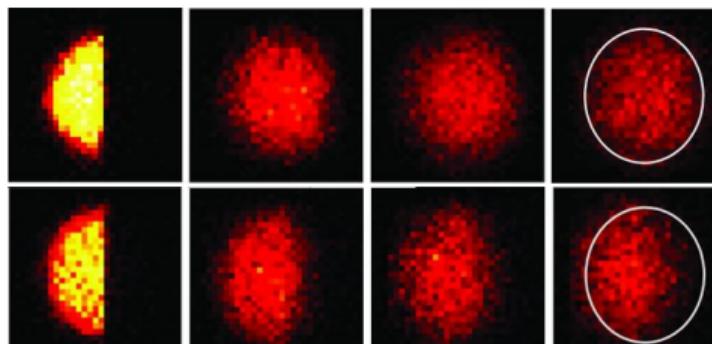
# OUTLINE

## 1 Many-body localisation

# MANY-BODY LOCALISATION

**Isolated** quantum system, **strong interactions**, disorder or quasiperiodicity

- 1 Usual: ergodic dynamics, transport, **eigenstate thermalisation hypothesis (ETH)**,
- 2 Unusual: non-ergodicity, no transport, **many-body localisation (MBL)**.



[Choi *et al* 16]

**Experiments:** cold ions/atoms [Schreiber *et al* 15; Smith *et al* 15; Bordia *et al* 17].

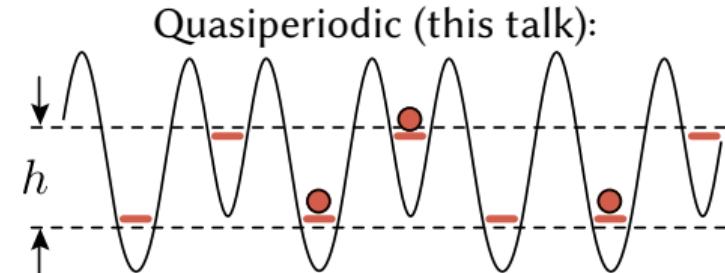
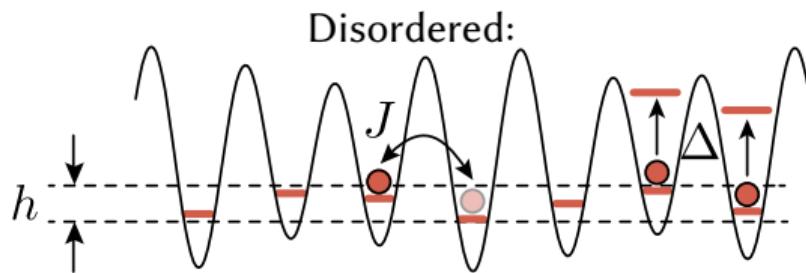
**Motivations:**

- ETH/MBL phase transition,
- MBL in more than 1D,
- Ingredients for MBL (this talk).

# A MODEL FOR MBL

Chain of interacting spinless fermions (nb: no phonons):

$$H = \sum_{i=1}^L \left[ J(c_i^\dagger c_{i+1} + \text{h.c}) + \Delta n_i n_{i+1} - h_i n_i \right]$$



Generic model: fermions,  $\frac{1}{2}$  spins, hardcore bosons.

Disorder strength  $h$  drives the transition:

