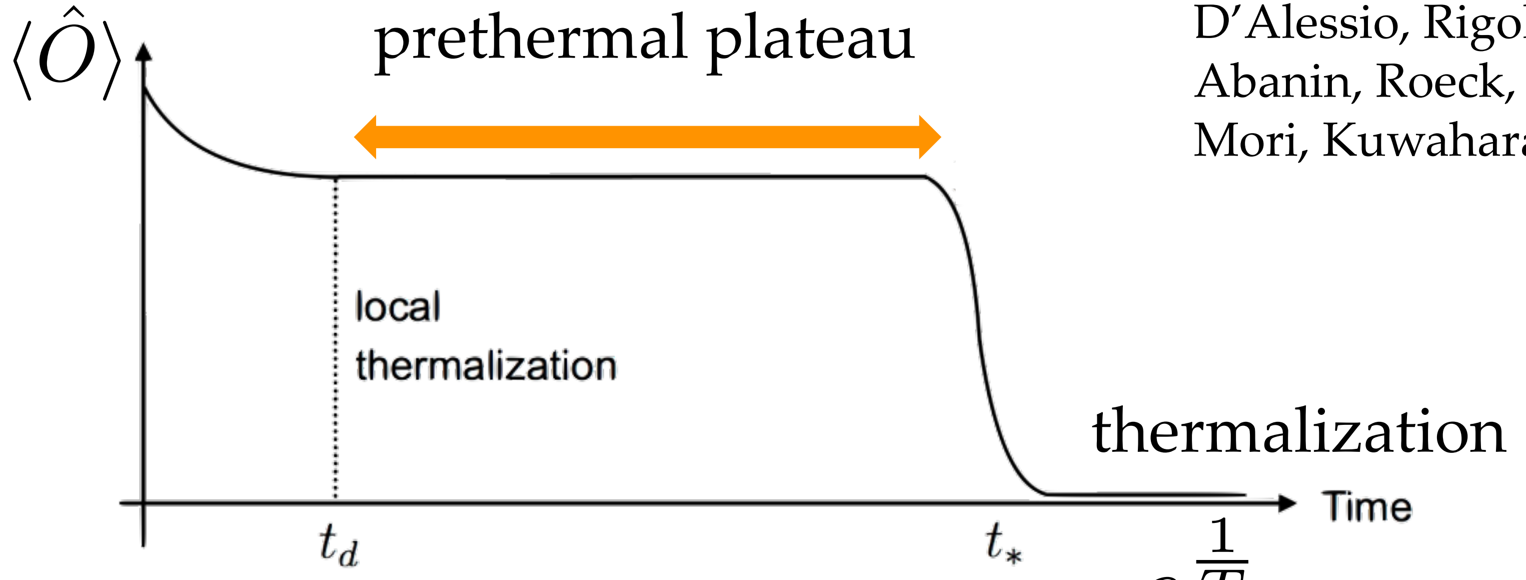
Floquet dynamics

○ Time evolution with a time-dependent Hamiltonian

$$i\partial_t|\Psi\rangle = H|\Psi\rangle \qquad\qquad H(t+T) = H(t)$$

driven system → heat up to infinite temperature

Lanzarides, Das, Moessner ’14
D’Alessio, Rigol ’14
Abanin, Roeck, Huveneers ’15
Mori, Kuwahara, Saito ’16



$$\sim e^{\frac{1}{T}}$$

Trotter dynamics

○ Trotter dynamics can be understood as Floquet dynamics

$$U_{\mathrm{F}} = \mathrm{e}^{-\mathrm{i}H_1 dt}\mathrm{e}^{-\mathrm{i}H_2 dt} \qquad H(t) = \begin{cases} H_1 & t \in [0, T/2), \\ H_2 & t \in [T/2, T) \end{cases}$$

$$\boxed{dt = \frac{T}{2}}$$

$$i\partial_t |\Psi\rangle = H|\Psi\rangle \qquad H(t+T) = H(t)$$

$$|\Psi(0)\rangle \quad |\Psi(T)\rangle \quad |\Psi(2T)\rangle \quad |\Psi(3T)\rangle \quad \cdots$$

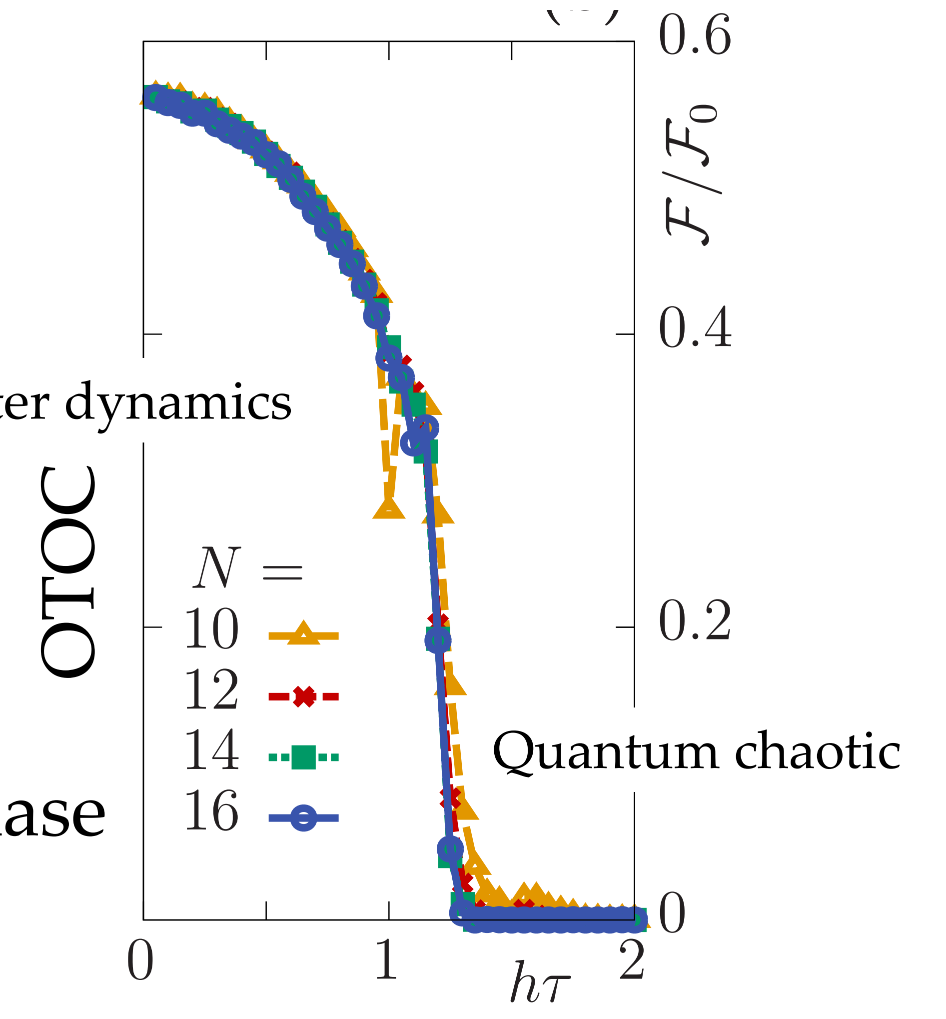
$$|\Psi(N_t)\rangle = (U_{\mathrm{F}})^{N_t}|\Psi(0)\rangle$$

Trotter dynamics

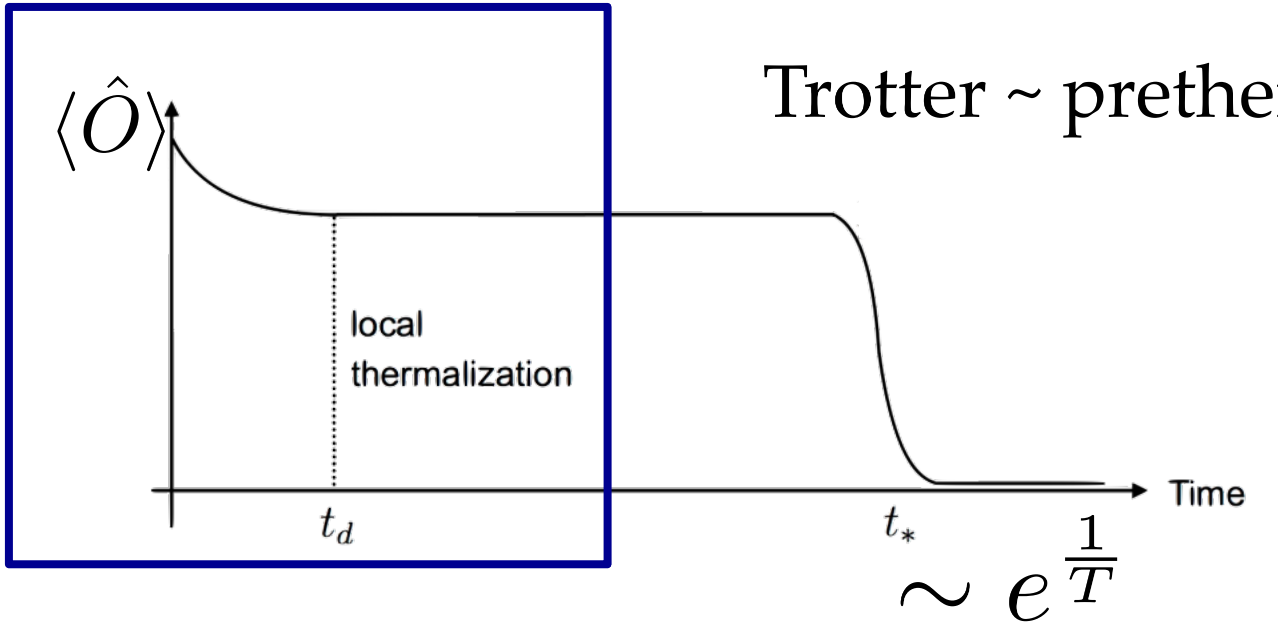
○ Trotter transition

Heyl, Hauke, Zoller '18
Varnier, Bertini, Giudici, Piroli '23

Trotter error is under control if $dt < dt_c$



Trotter ~ prethermal phase



prethermalizaion dynamics
is feasible to NISQ devices