Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Density propagator for many-body localization: finite size effects, transient subdiffusion, (stretched-) exponentials[1] FERDINAND EVERS, FELIX WEINER, Institut fr Theoretische Physik, Universitt Regensburg, GIUSEPPE DE TOMASI, SOUMYA BERA, Max-Planck-Institut fr Physik komplexer Systeme, Dresden — We investigate charge relaxation in the spin-less disordered fermionic Hubbard chain. Our observable is the time-dependent density propagator, $\Pi_\varepsilon(x,t)$, calculated in windows of different energy density, ε, of the many-body Hamiltonian and at different disorder strengths, W, not exceeding the critical value W_c. The width $_\varepsilon(t)$ of (x,t) exhibits a behavior $d\ln_\varepsilon(t)/d\ln t{=}\beta_\varepsilon(t)$, where $\beta_\varepsilon(t)1/2$ is seen to depend strongly on L at all investigated parameter combinations. (i) We do not find a region in phase space that exhibits subdiffusive dynamics in the sense that $\beta{<}1/2$ in the thermodynamic limit. Instead, subdiffusion may be transient, giving way eventually to conventional diffusive behavior, $\beta{=}1/2$. (ii) (Transient) subdiffusion $0{<}\beta_\varepsilon(t)1/2$, coexists with an enhanced probability for returning to the origin, $(0,t)$, decaying much slower than $1/_\varepsilon(t)$. Correspondingly, the spatial decay of (x,t) is far from Gaussian, i.e. exponential or even slower. On a phenomenological level, our findings are broadly consistent with effects of strong disorder and Griffiths regions.

[1]We acknowledge support from the DFG under projects EV30/7-1 and EV30/11-1 and from the ERC starting grant QUANTMATT NO. 679722

Ferdinand Evers
Institut fr Theoretische Physik, Universitt Regensburg

Date submitted: 11 Nov 2016 Electronic form version 1.4