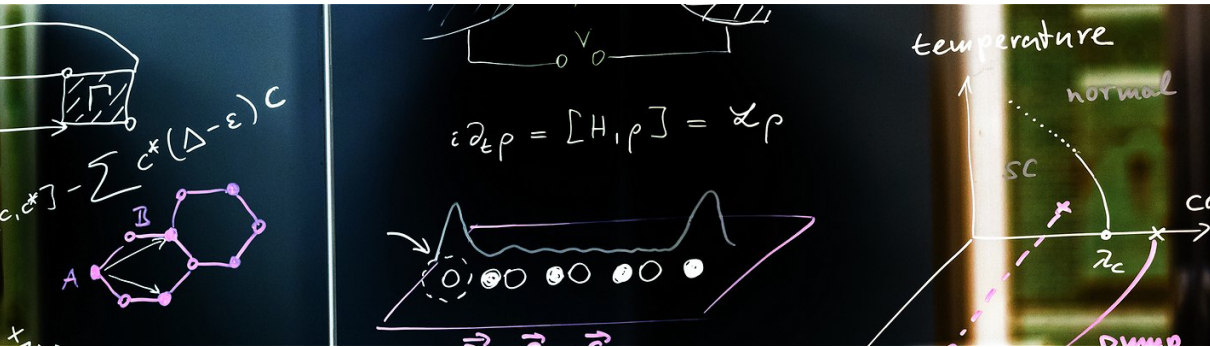
Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG

FAKULTÄT
FÜR MATHEMATIK, INFORMATIK
UND NATURWISSENSCHAFTEN



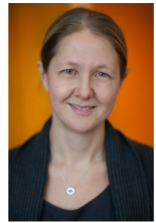
Tjark Sievers – I. Institute of Theoretical Physics 27th June 2024

Superconductivity, flat bands and quantum metric

- Quarter time of my masters thesis

Hamburg - Computational Condensed Matter Theory

Uppsala - Quantum Matter Theory



Flat Bands - A Road to High TC Superconductivity?

$$T_C \propto \exp\left(-\frac{1}{U n_0(E_F)}\right) \qquad (1)$$

Twisted bilayer materials, in particular twisted bilayer graphene: flat bands can be tuned by changing the twist angle

Experiment: [1]

Transport in flat-band systems

aka Superfluid weight

Quantum geometry and superfluidity

aka Quantum metric

My work so far

Outlook

Superfluid phase stiffness and coherence length from finite-momentum constraint

Connection to old and recent Peotta/Töma papers

Suggestions for Hamburg after 3 months in Sweden

Summary

- Flat bands