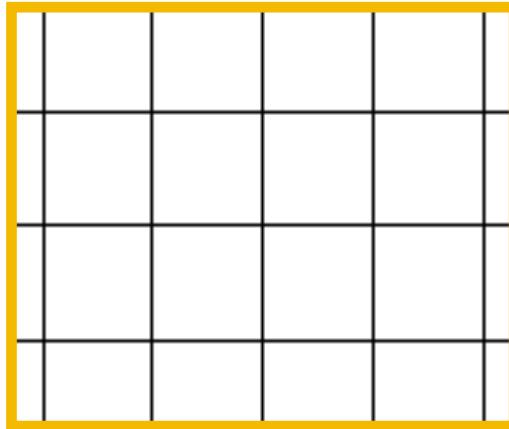


Mott-Transition in Triangular Lattices

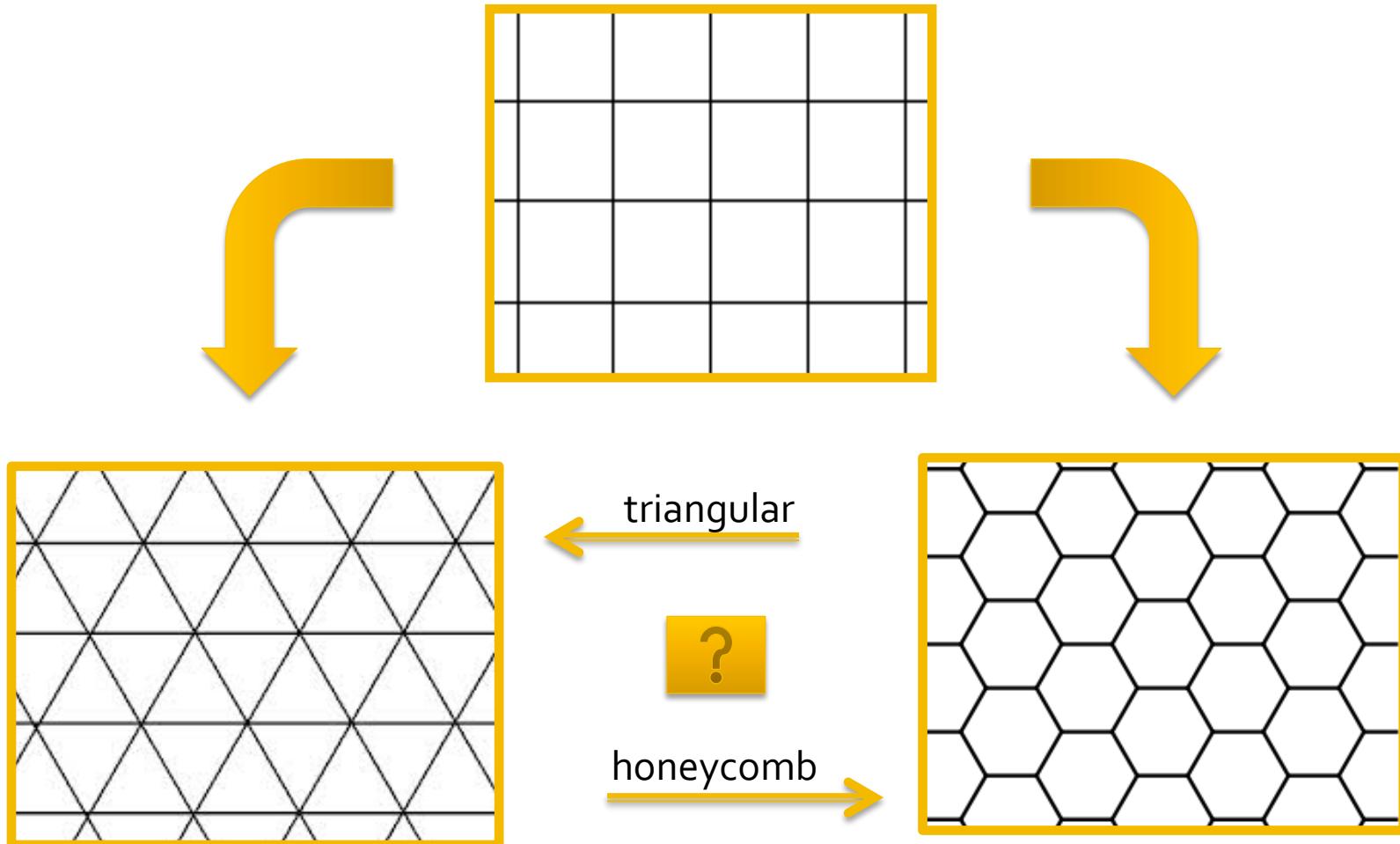
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Motivation



- Existing routine for square lattice
- Other lattice types?

Motivation



Motivation

Hubbard Hamiltonian:

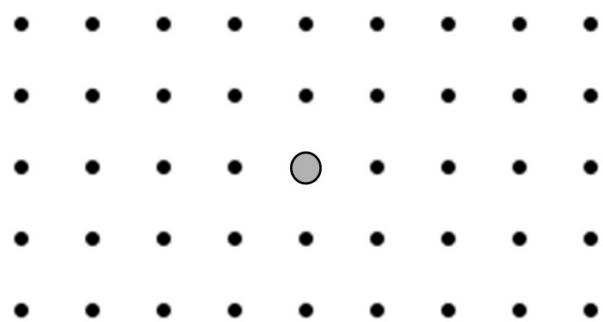
$$H = -t \sum_{\langle i,j \rangle} \sigma c_{i,\sigma}^\dagger c_{j,\sigma} + U \sum_i n_{i\uparrow} n_{i\downarrow}$$

- Easy model for strong correlations
- No exact solution

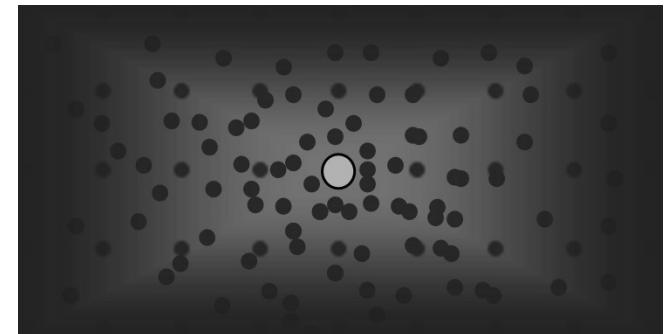
Motivation

Hubbard Hamiltonian:

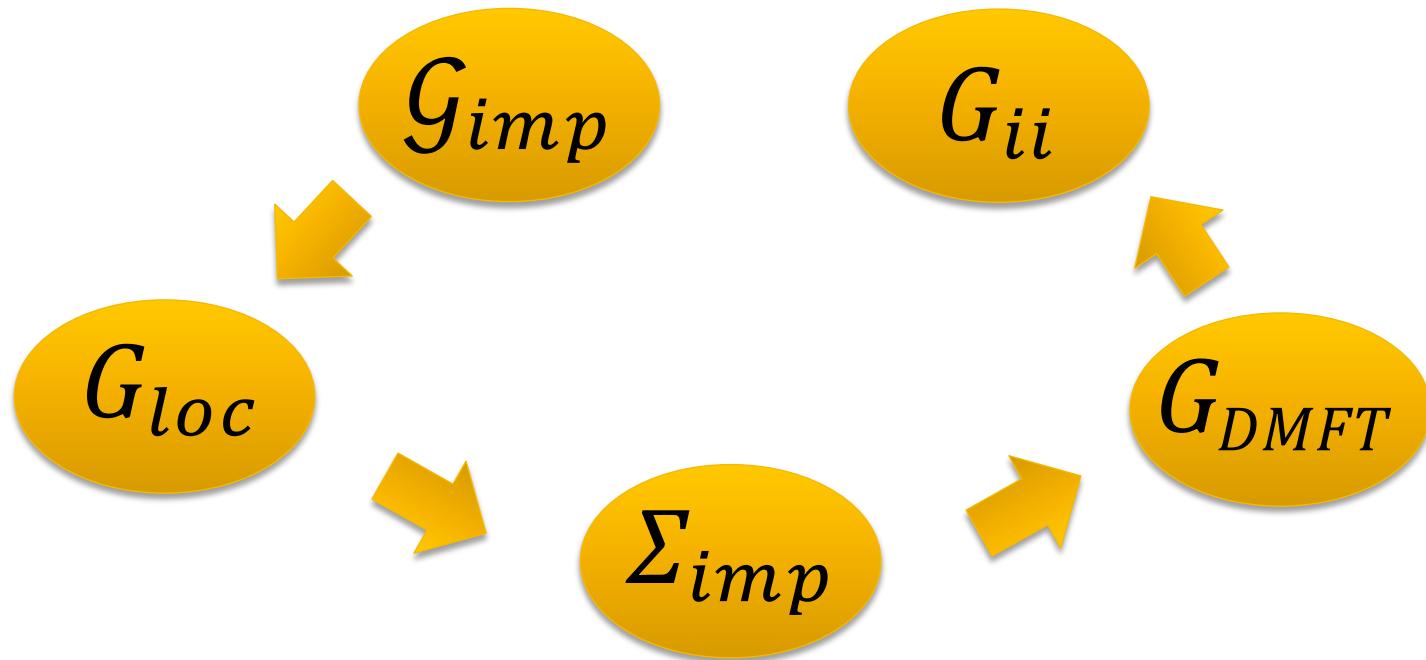
$$H = -t \sum_{\langle i,j \rangle} \sigma c_{i,\sigma}^\dagger c_{j,\sigma} + U \sum_i n_{i\uparrow} n_{i\downarrow}$$



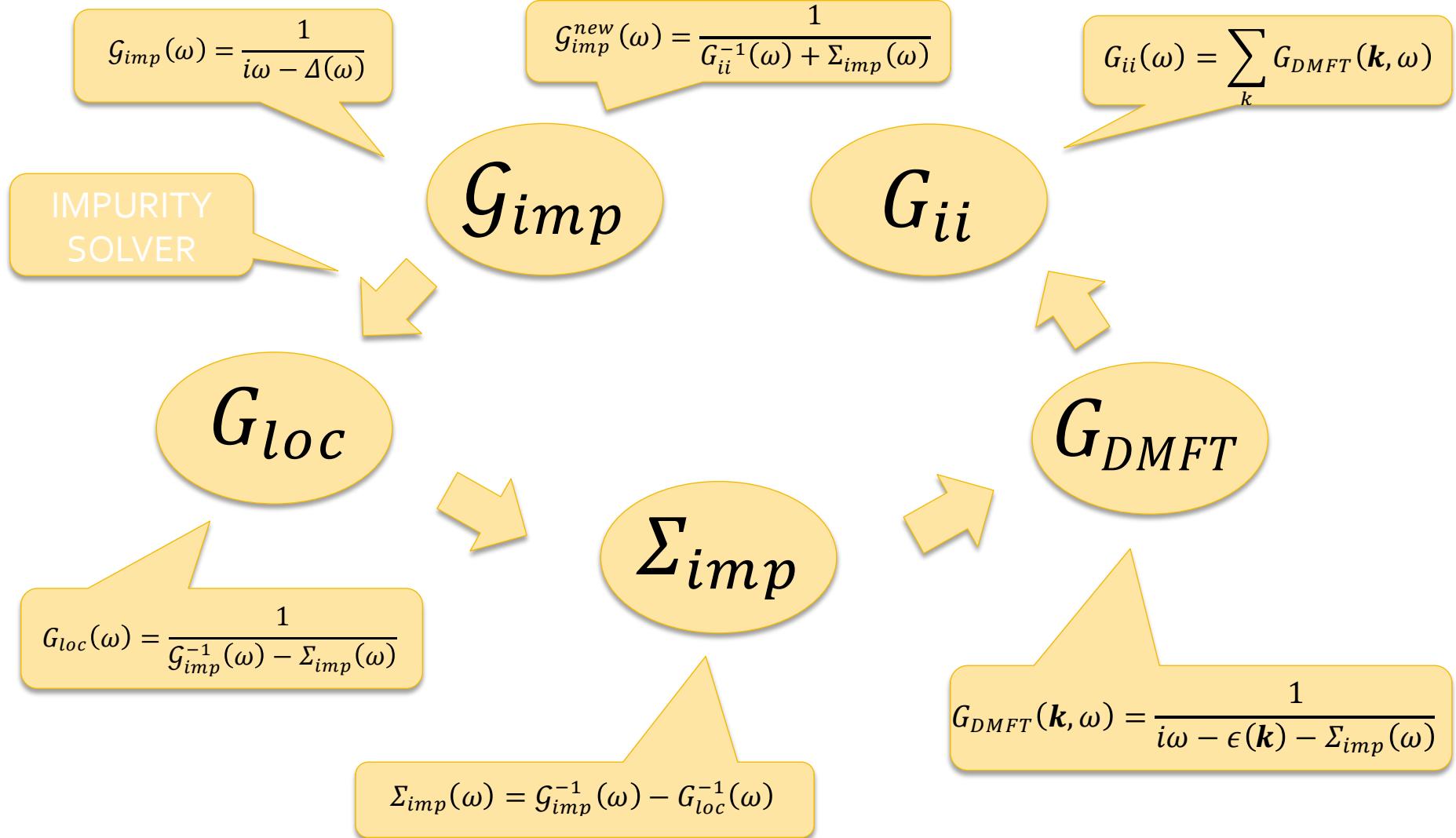
DMFT
→



DMFT Routine



DMFT Routine



DMFT Routine

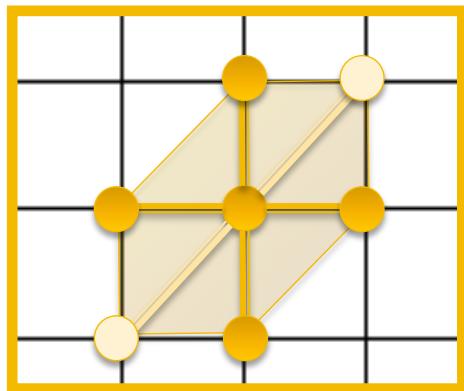
Lattice Geometry

$$G_{DMFT}(\mathbf{k}, \omega) = \frac{1}{i\omega - \epsilon(\mathbf{k}) - \Sigma_{imp}(\omega)}$$

G_{DMFT}

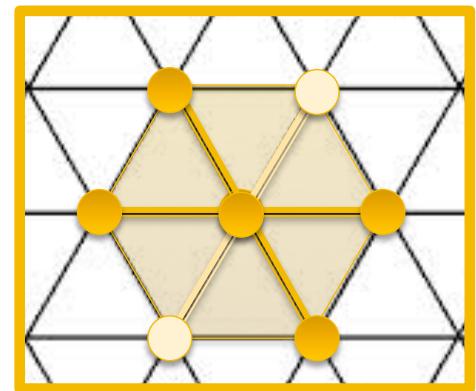
Lattice Geometry

$$H = \sum_{\langle i,j \rangle \sigma} (-t_{ij}) c_{i,\sigma}^\dagger c_{j,\sigma}$$



square lattice

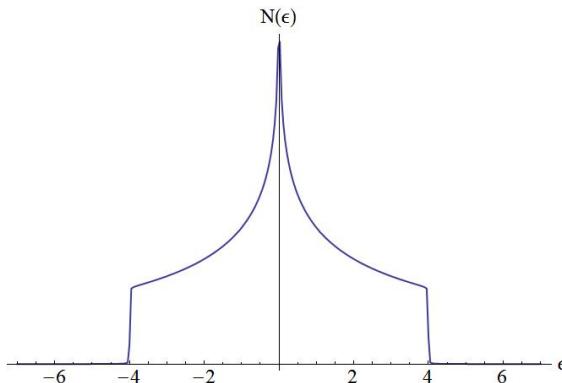
**TOPOLOGICALLY
EQUIVALENT**



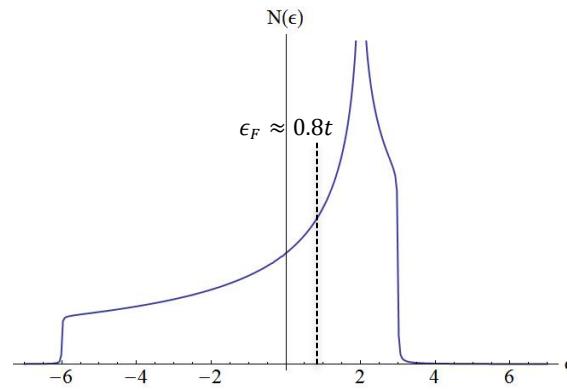
triangular lattice

Lattice Geometry

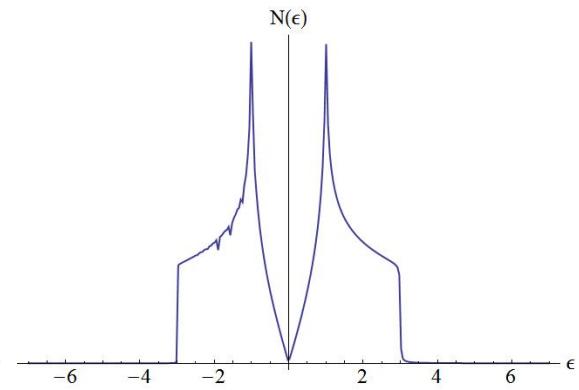
Density of States:



square lattice



triangular lattice

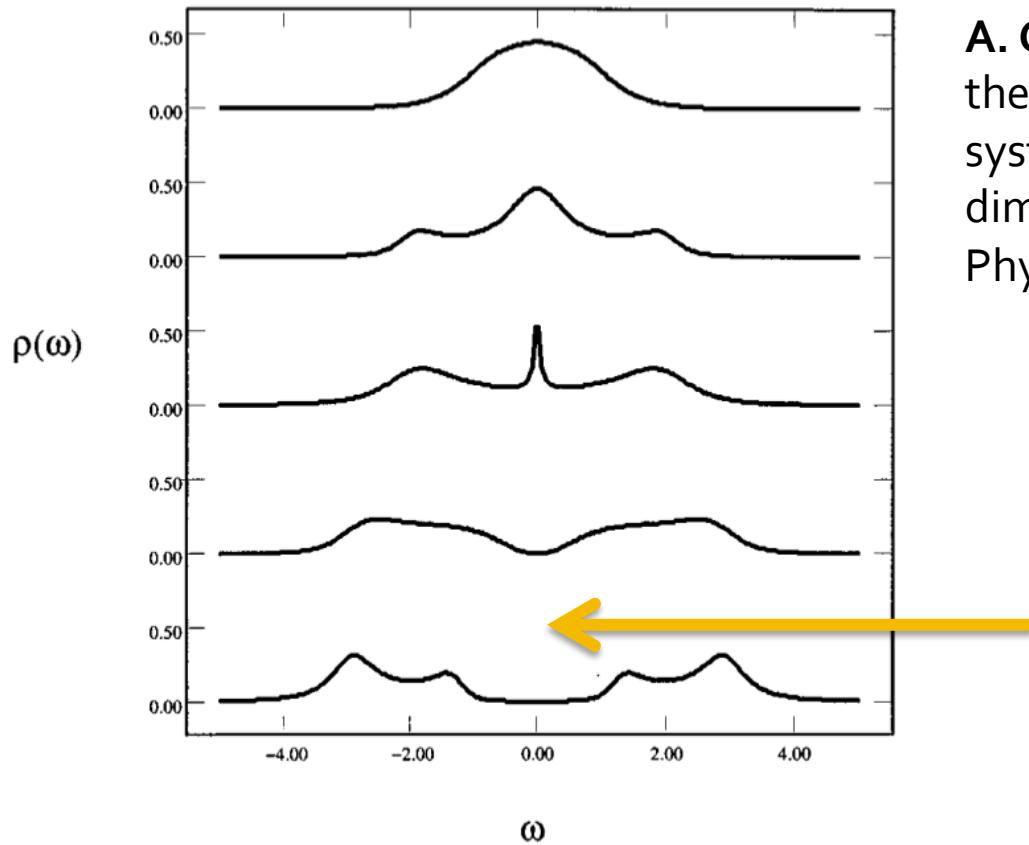


honeycomb lattice

anisotropic
triangular lattice

frustrated
square lattice

Mott transition

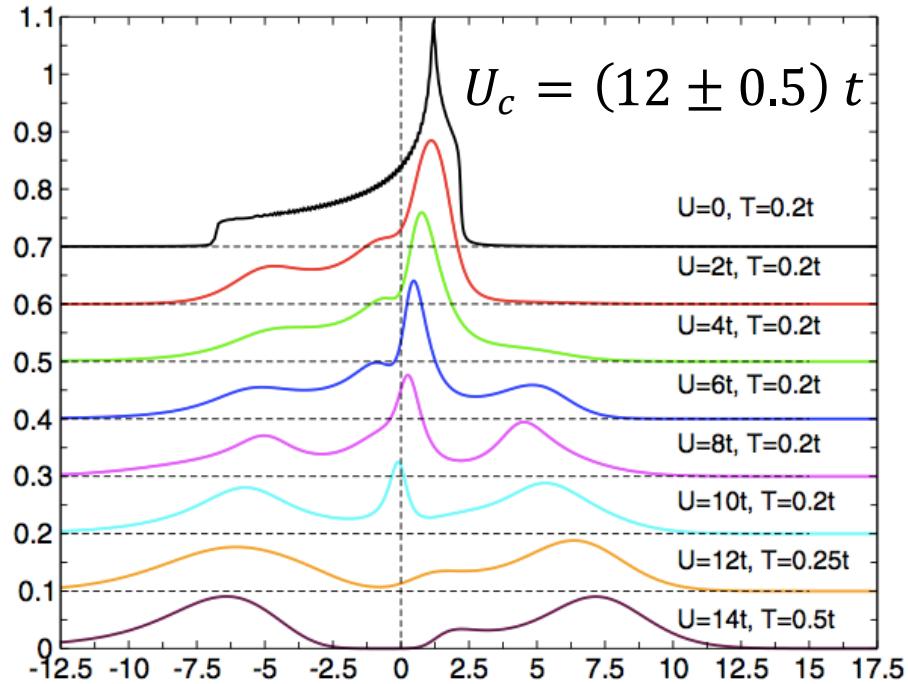
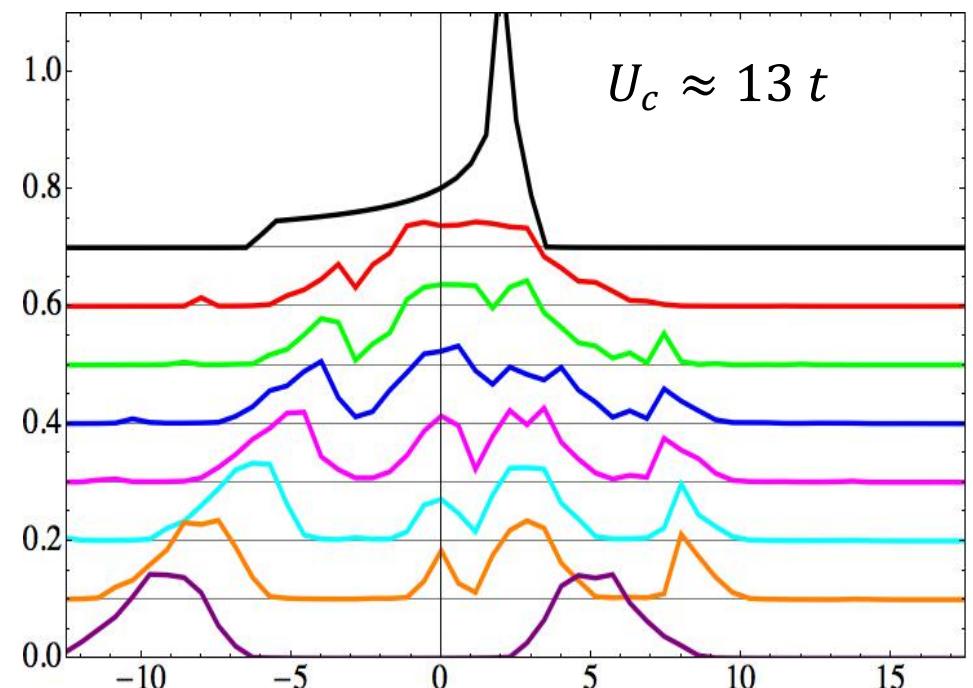


A. Georges et al. »Dynamical mean-field theory of strongly correlated fermion systems and the limit of infinite dimensions«. In: Reviews of Modern Physics 68.1 (1996).

$$\rho(\omega = 0) \rightarrow 0$$

Mott transition

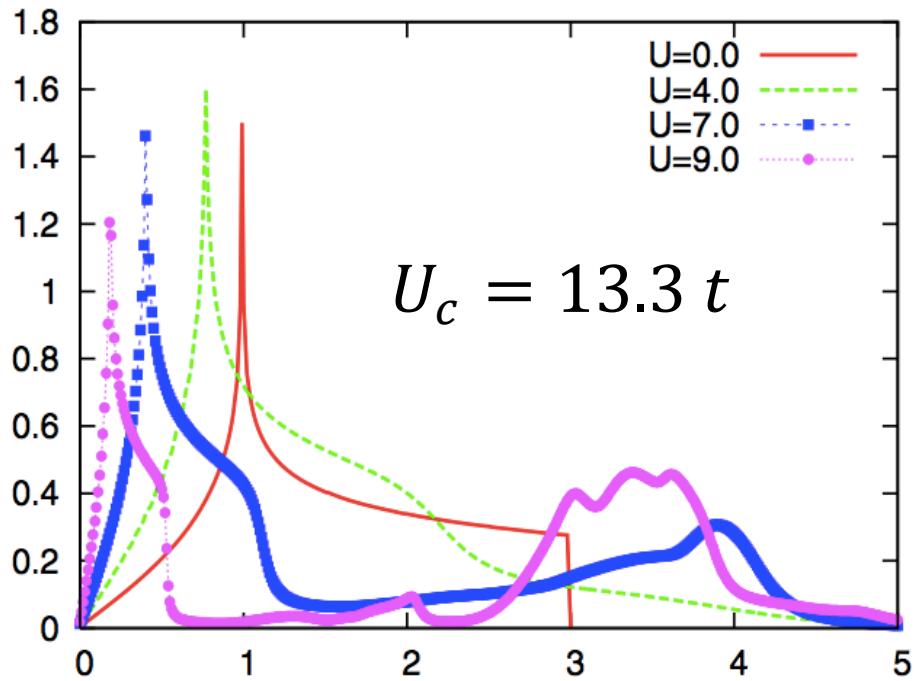
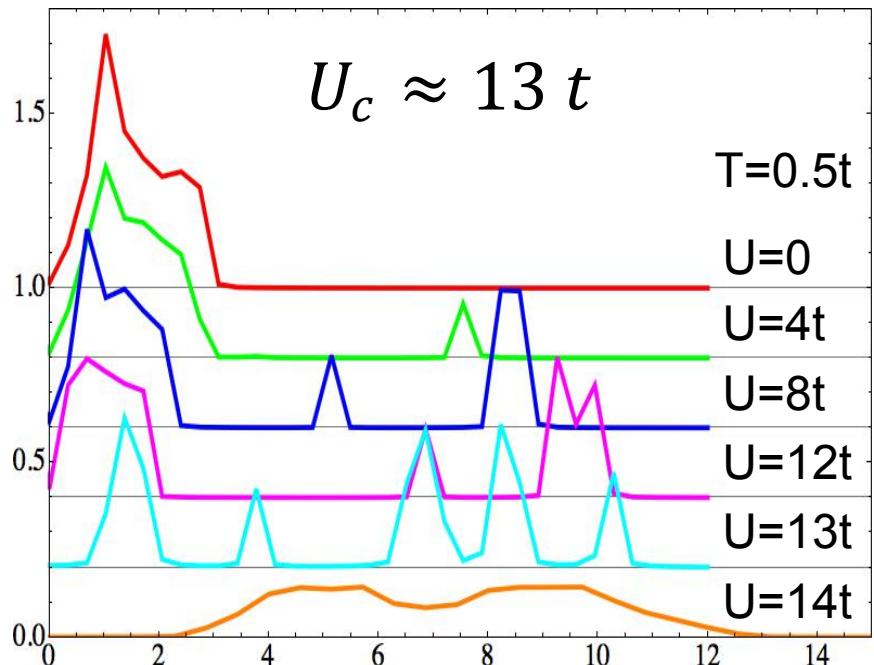
DMFT Results – triangular lattice



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K. Aryanpour, W. E. Pickett und R. T. Scalettar. »Dynamical mean-field study of the Mott transition in the half-filled Hubbard model on a triangular lattice«. In: Physical Review B 74.085117 (2006).

DMFT Results – honeycomb lattice



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Bachelor Thesis (2012)
AG - Held

S.A. Jafari. »Dynamical mean field study of the Dirac liquid«. In: European Physical Journal B 68 (2009), S. 537–542.

Perspective

DMFT only considers local correlations

→ similar results for all lattice types

DΓA considers non-local correlations

→ possibly more diverse results