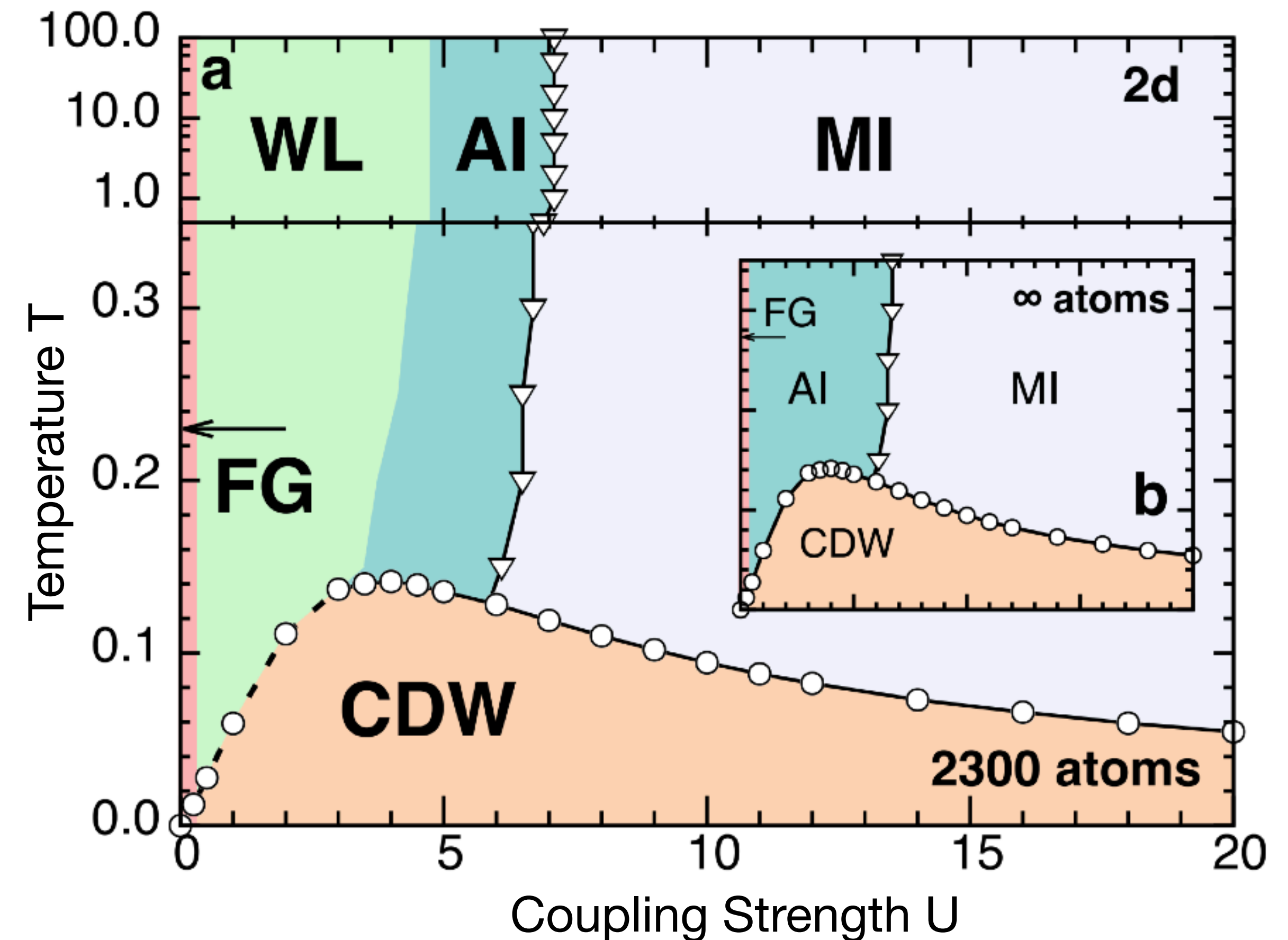


# The Falikov-Kimball Model

- Spinless fermions coupled to a classical spin chain.
- Correlated electron problem testbed.
- Admits an exact MCMC algorithm. [1]



**Can we find the same physics in 1D?**

[1] Vries, Michielsen, and De Raedt, PRL **70**, 2463 (1993)

# The Model

Standard Falikov-Kimball

$$\begin{aligned}
 H_{\text{FK}} = & -t \sum_i c_i^\dagger c_{i+1} + c_{i+1}^\dagger c_i && \text{Fermion hopping} \\
 & + U \sum_i S_i \left( c_i^\dagger c_i - \frac{1}{2} \right) && \text{Fermion-Spin Coupling} \\
 & + 4kJ \sum_{i,j}^N \frac{(-1)^{|i-j|}}{|i-j|^\alpha} S_i S_j && \text{Long Range } (\alpha < 2) \text{ Spin-Spin Coupling}
 \end{aligned}$$