

Panel Discussion  
Confinement and Anomalous Transport  
in Condensed Matter Systems:  
What can we learn?

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## Background

Experimentalists have achieved extraordinary control over designer  
many body systems

Cold Fermi/Bose gases with tuneable interactions

Cold atoms in optical lattices with tuneable geometry and hopping

Gauge fields from Aharonov Bohm phases

Designer Dirac/Weyl cones, topologically protected surface states

## Possible impacts

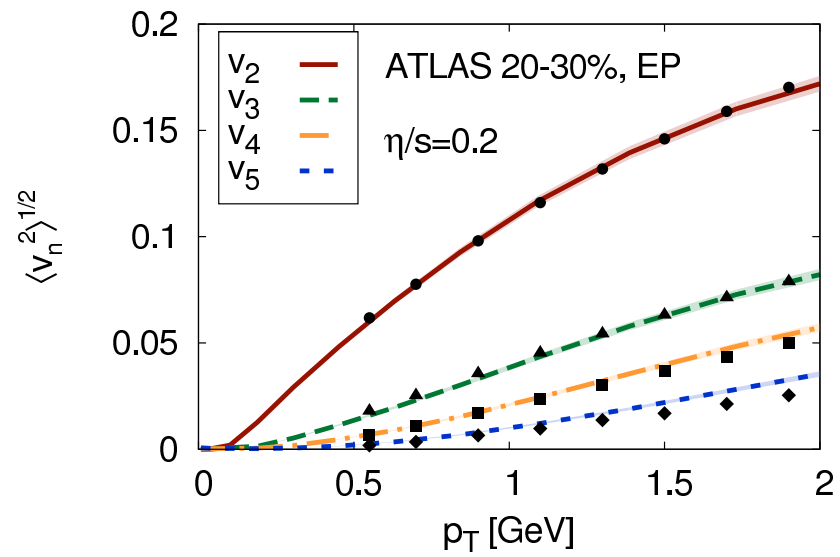
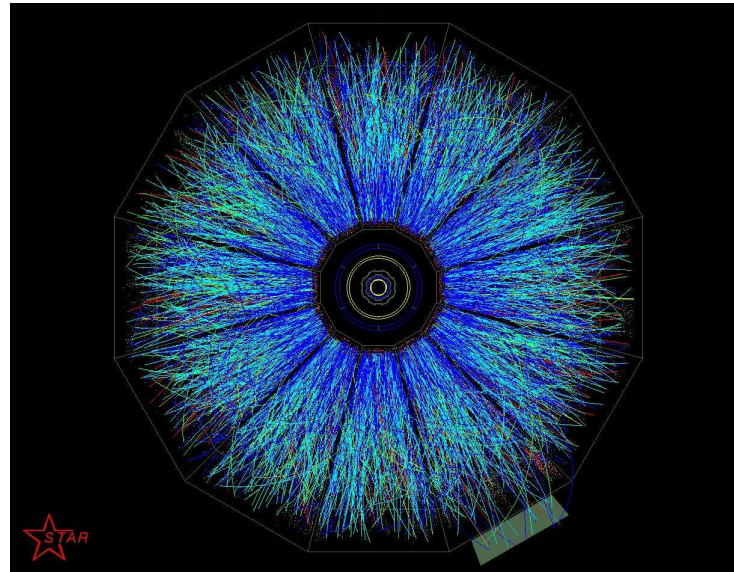
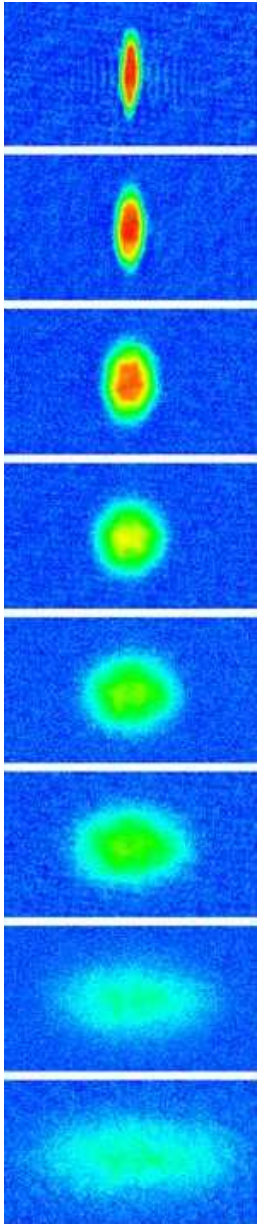
Study analog systems for bulk phenomena: Low viscosity flow, anomalous transport. Study universal effects:  $\eta/s$ , CME coefficient.

Study microscopic objects in controlled settings: Strings, Wilson lines, branes, monopoles. Study dynamics. Look for universality.

(The far future) Real time simulations of QCD in optical lattices, cavity QED, or trapped ion quantum computers. Real time dynamics, finite baryon density.

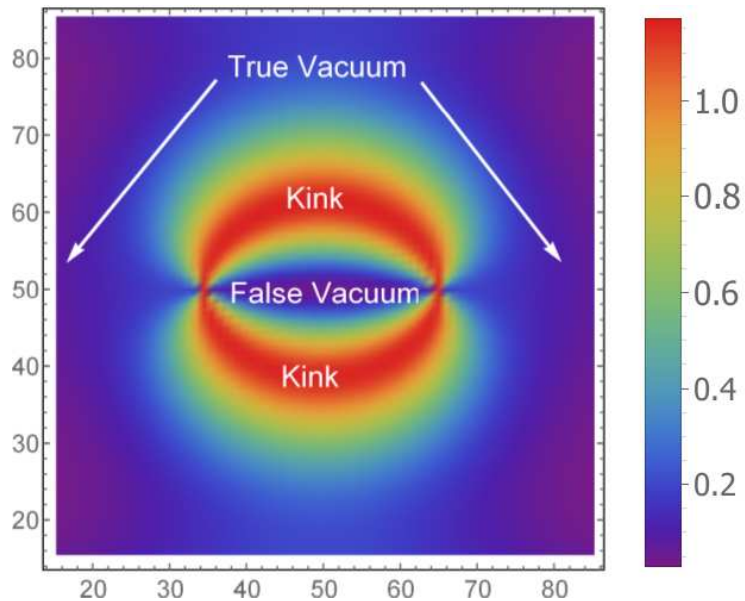
(The near future) String breaking, Schwinger mechanism, etc in abelian lattice systems.

# Example I: Flow and $\eta/s$



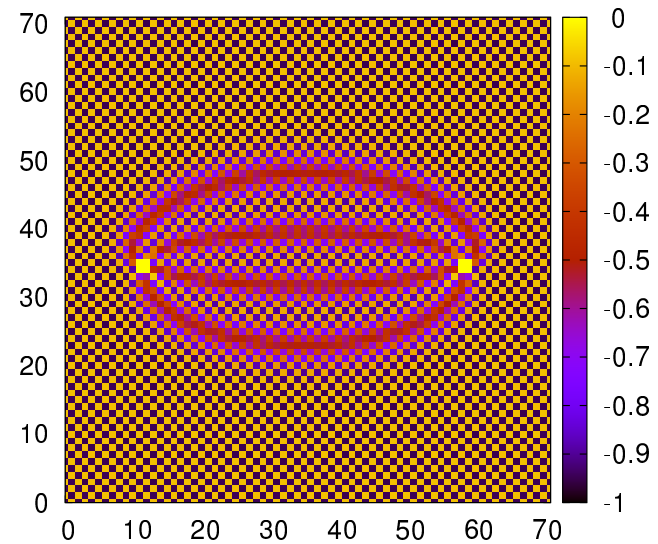
O'Hara et al. (2002), Gale et al. (2013)

## Example II: Strings



SUSY QCD string

Poppitz & Sulejmanpasic



String in quantum link model

U.-J. Wiese

# Example III: Real time Schwinger mechanism

## LETTER

doi:10.1038/nature18318

### Real-time dynamics of lattice gauge theories with a few-qubit quantum computer

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