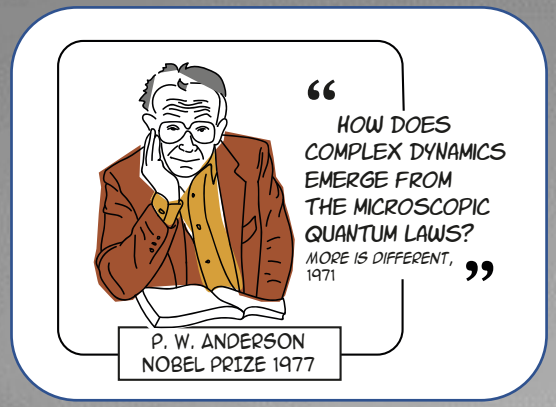
THE CHALLENGE

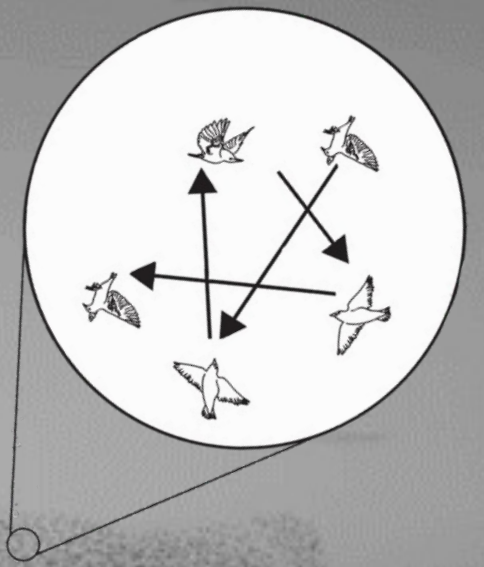


DIFFICULTY AND IMPORTANCE

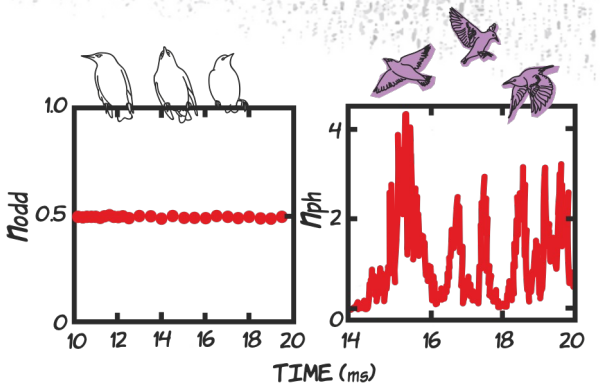
- ***VERY*** CHALLENGING FOR ***STRONGLY INTERACTING*** QUANTUM SYSTEMS (QUANTUM MATERIALS)
- USEFUL PHASES AT ROOM TEMPERATURE

NON-EQUILIBRIUM QUANTUM MANY BODY PHYSICS

- ***EXISTING APPROACHES FOCUS ON SPECIFIC <u>STATIONARY</u> SYSTEMS***
- ***CANNOT SOLVE ANDERSON'S LONG-STANDING QUESTION***



$[H,A]=\omega A$



$A=$ + + ...

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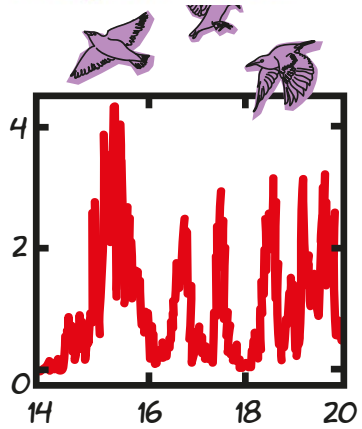
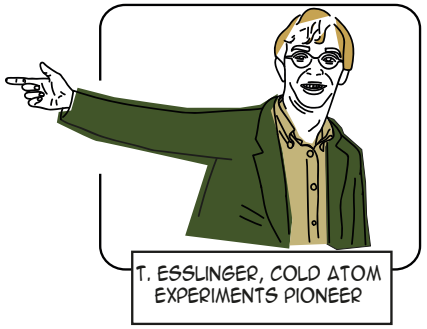
EXAMPLE OF A NEW PHASE OF MATTER: DISSIPATIVE TIME CRYSTAL

DYNAMICAL SYMMETRIES

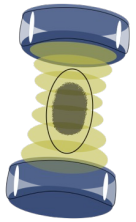
$[H,A]=\omega A$



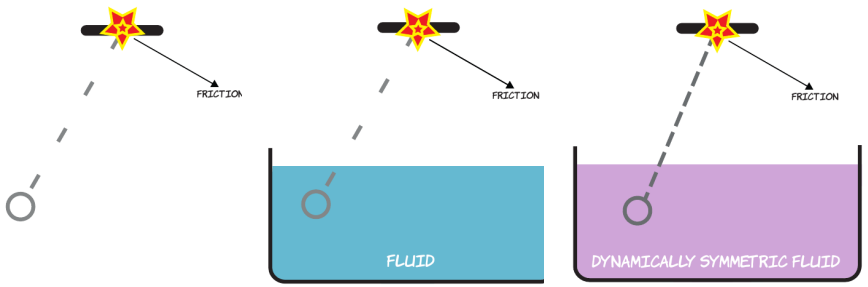
ESSLINGER GROUP SCIENCE



T. ESSLINGER, COLD ATOM EXPERIMENTS PIONEER

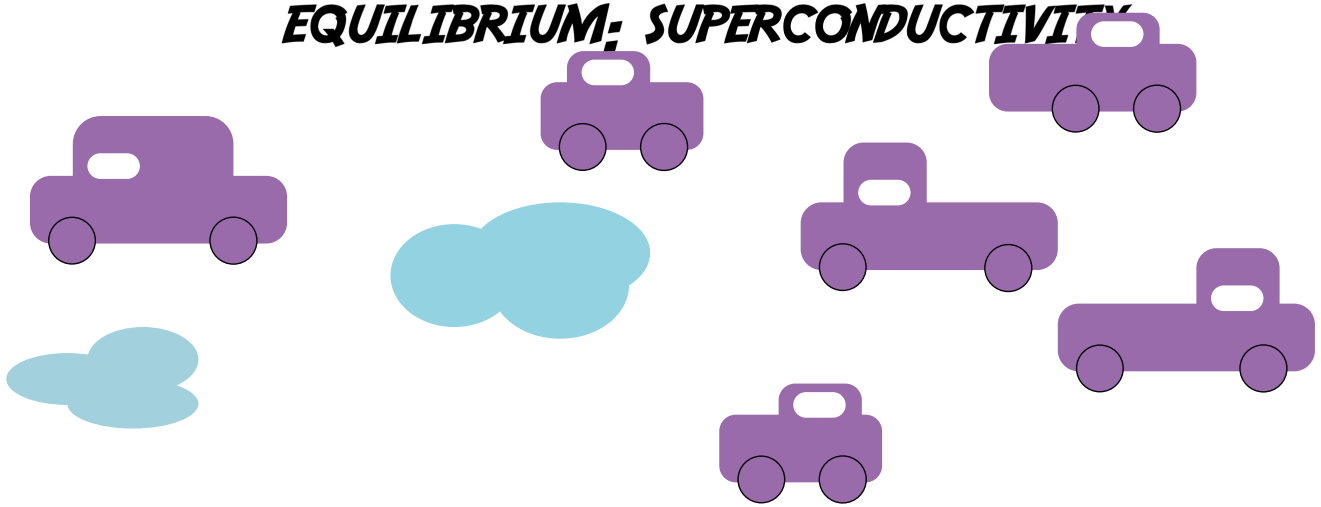


QUANTUM GAS IN AN OPTICAL CAVITY

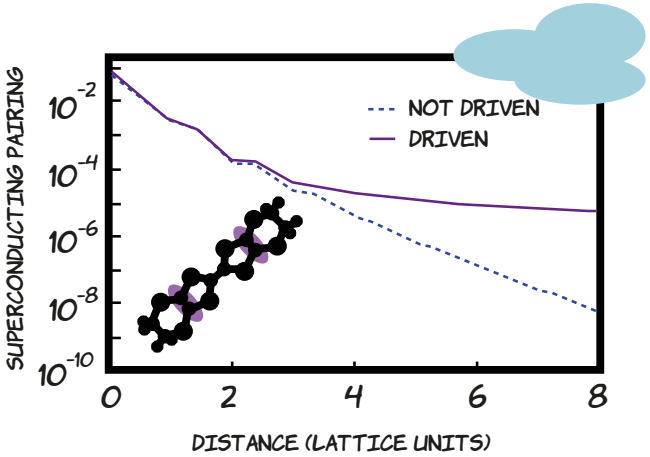


ANALOGY

EXAMPLE OF A KNOWN PHASE OF MATTER OUT-OF-EQUILIBRIUM: SUPERCONDUCTIVITY

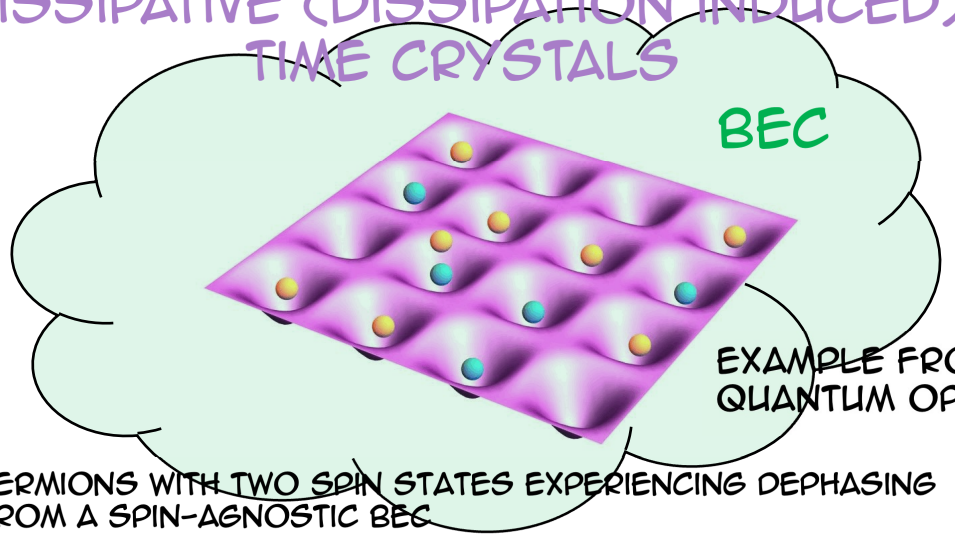


A. CAVALLERI, FOUNDING DIRECTOR, MAX PLANCK INSTITUTE, HAMBURG



CAVALLERI GROUP PHYS. REV. X

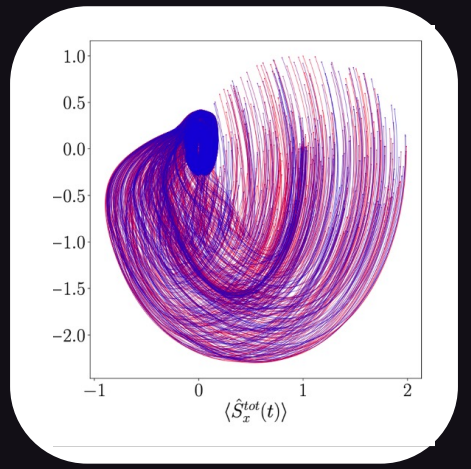
DISSIPATIVE (DISSIPATION INDUCED) TIME CRYSTALS



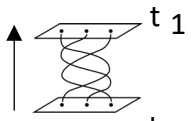
EXAMPLE FROM QUANTUM OPTICS

FERMIONS WITH TWO SPIN STATES EXPERIENCING DEPHASING FROM A SPIN-AGNOSTIC BEC

QUANTUM COMPLEX DYNAMICS



STABILIZED QUANTUM COHERENCE



AND STRANGER STILL