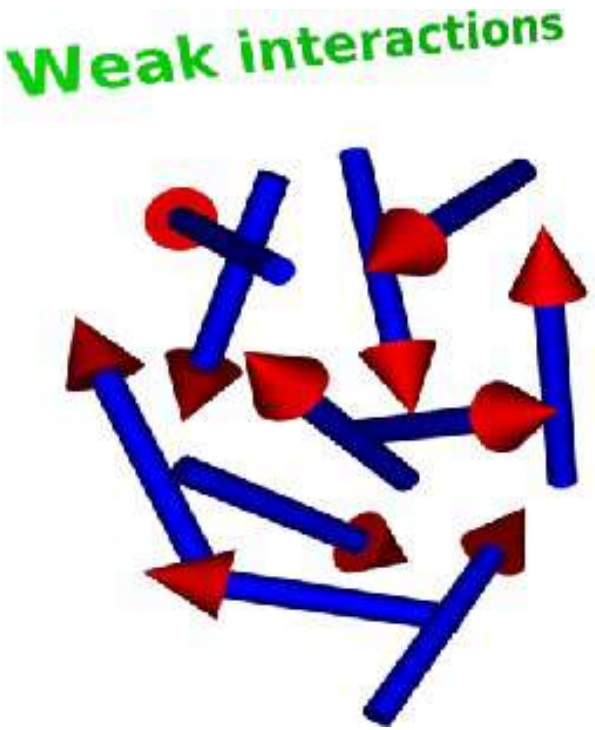
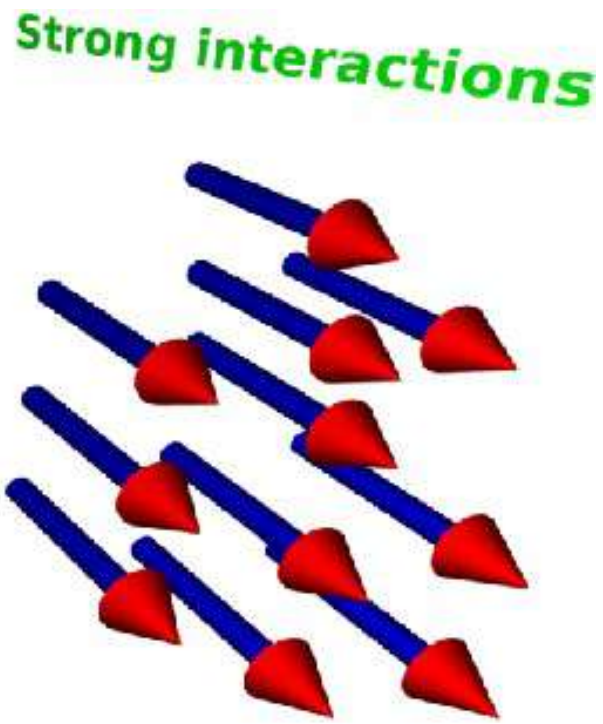
More is different for condensed matter physics





Gareth Conduit

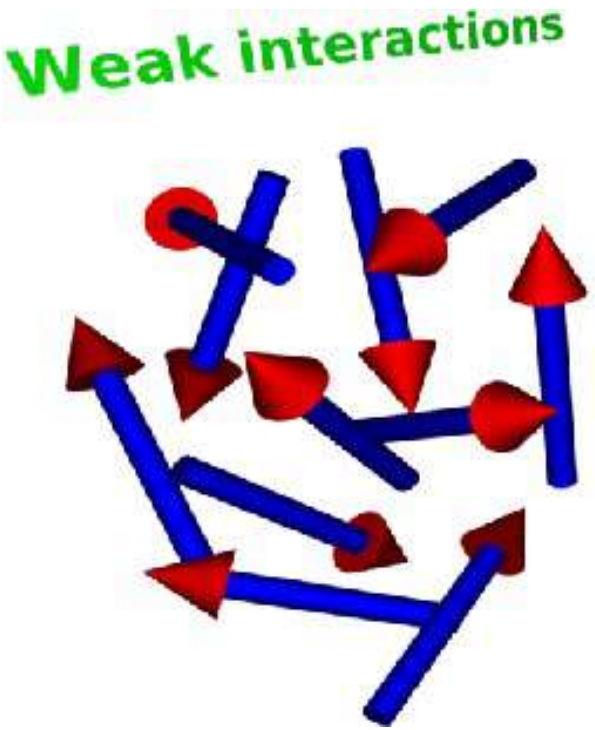
Weizmann Institute of Science, Israel

Weizmann Institute of Science

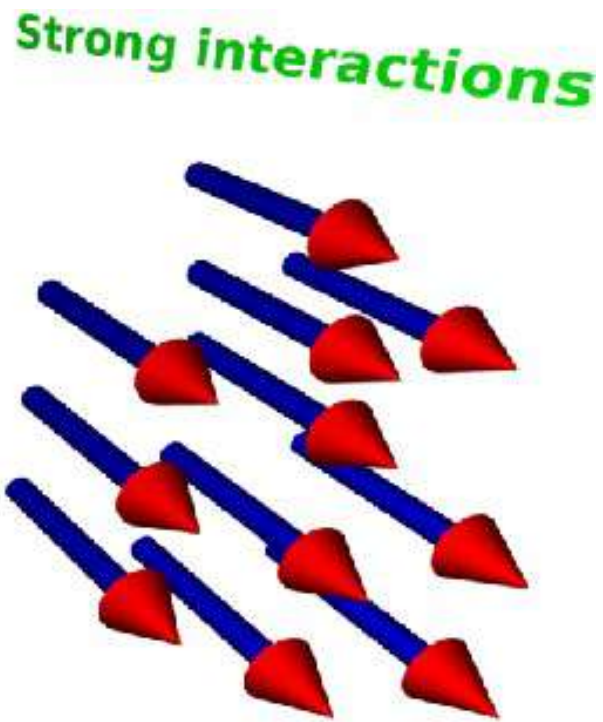
Dr Ada Yonath, Nobel prize *"for studies of the structure and function of the ribosome"*

Particle accelerator

Ferromagnetism: more is different



Not magnetic

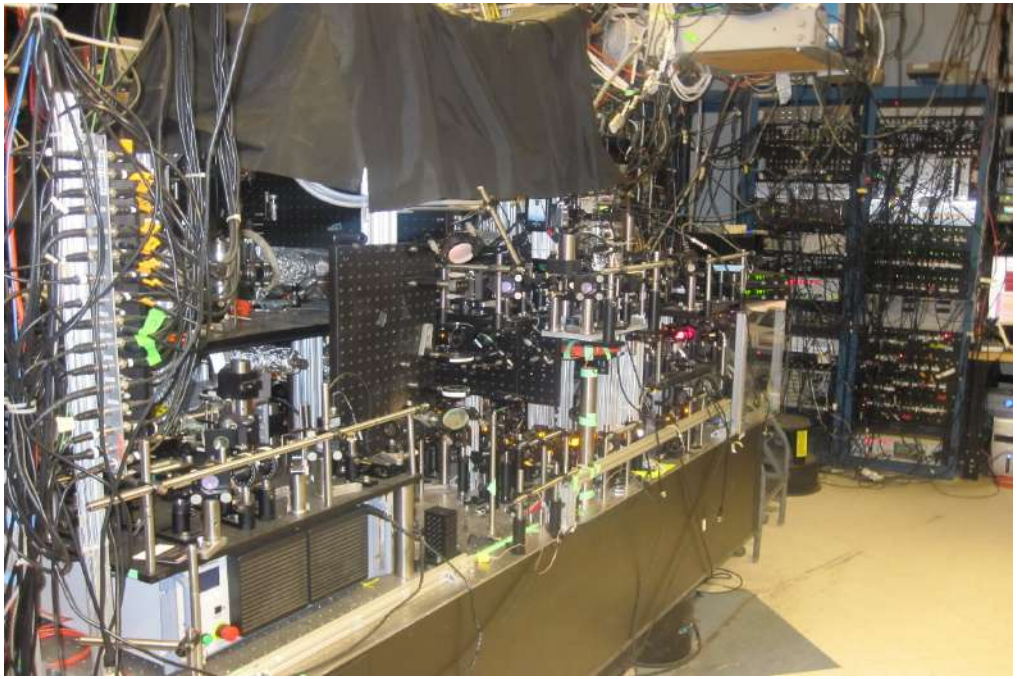


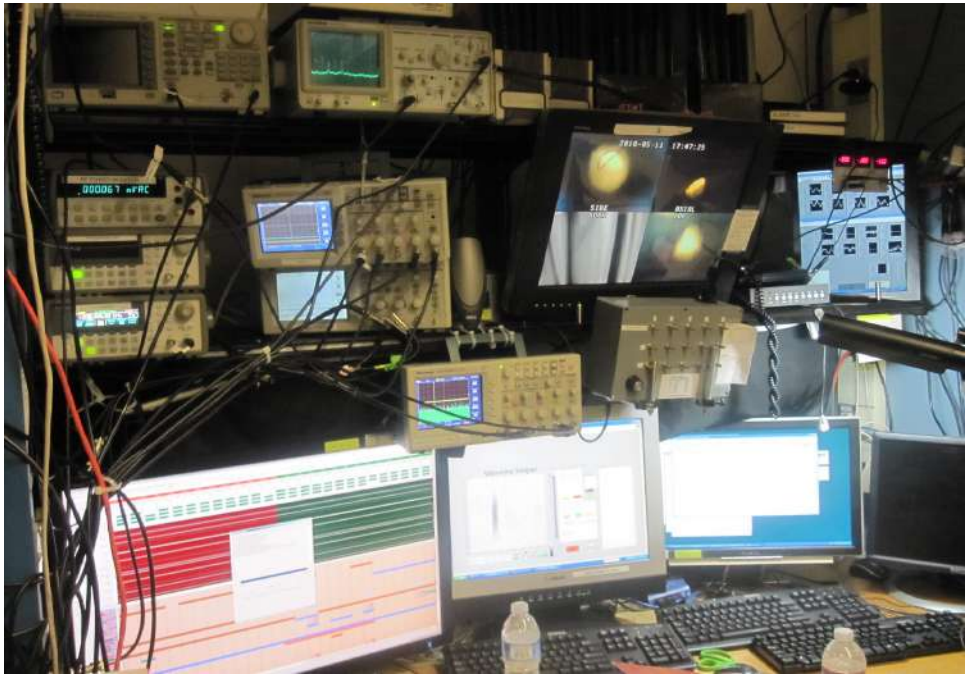
Ferromagnetic

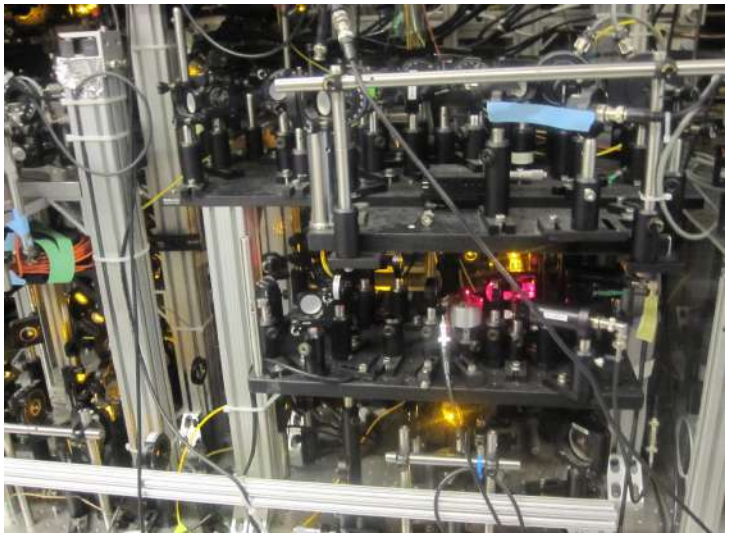
Spiral galaxy

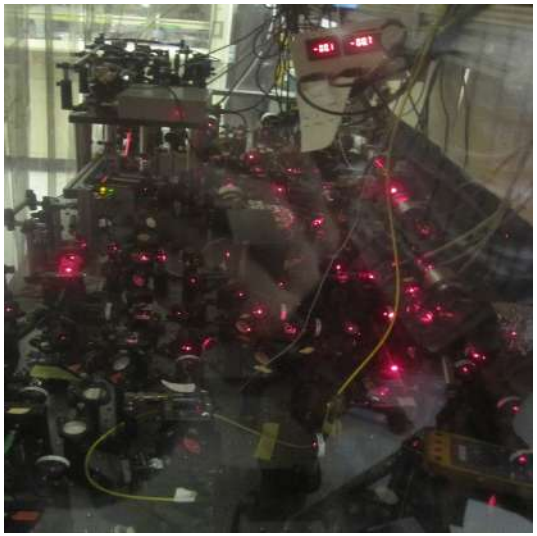
Coandă effect

Experimental setup

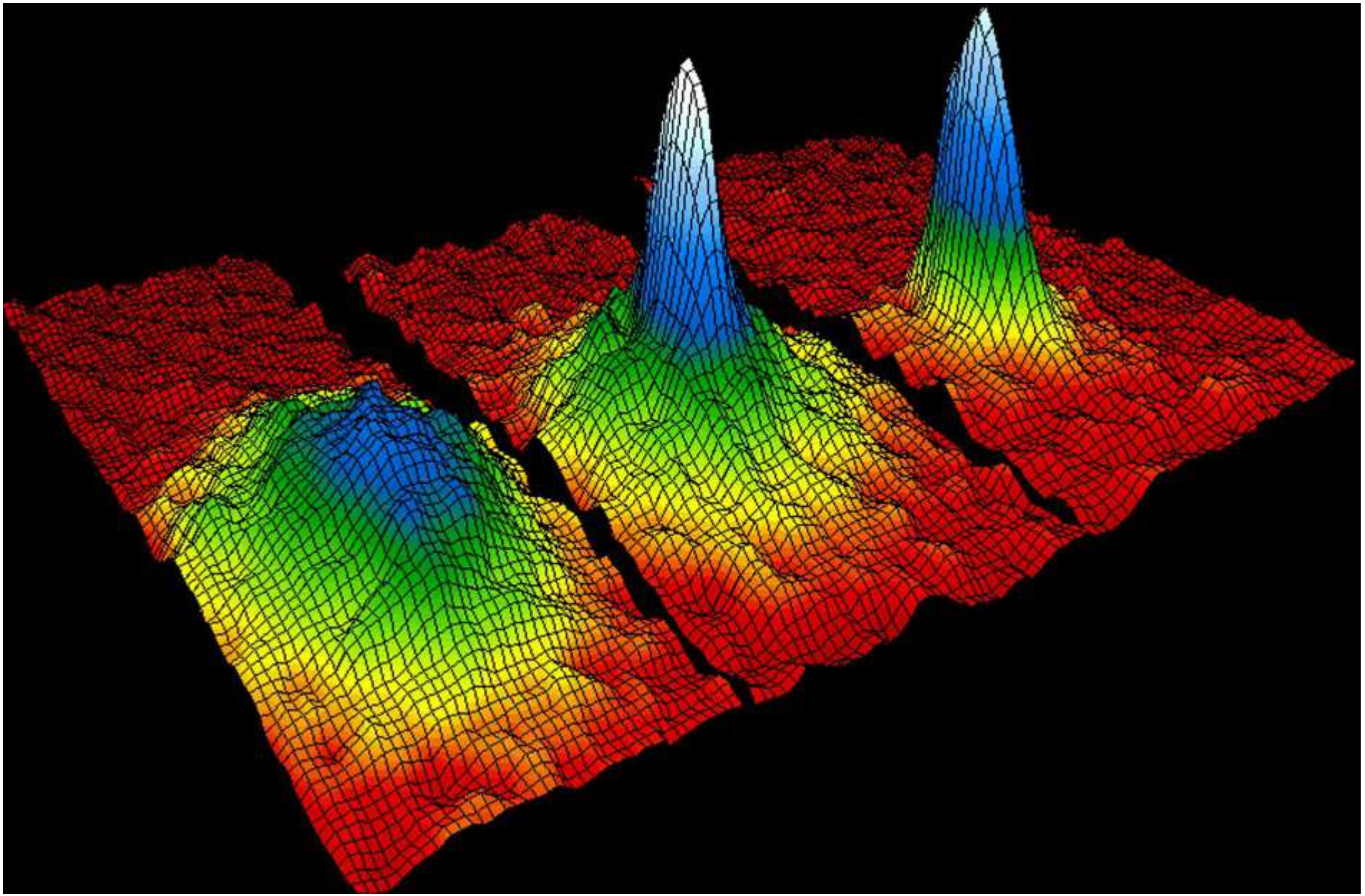




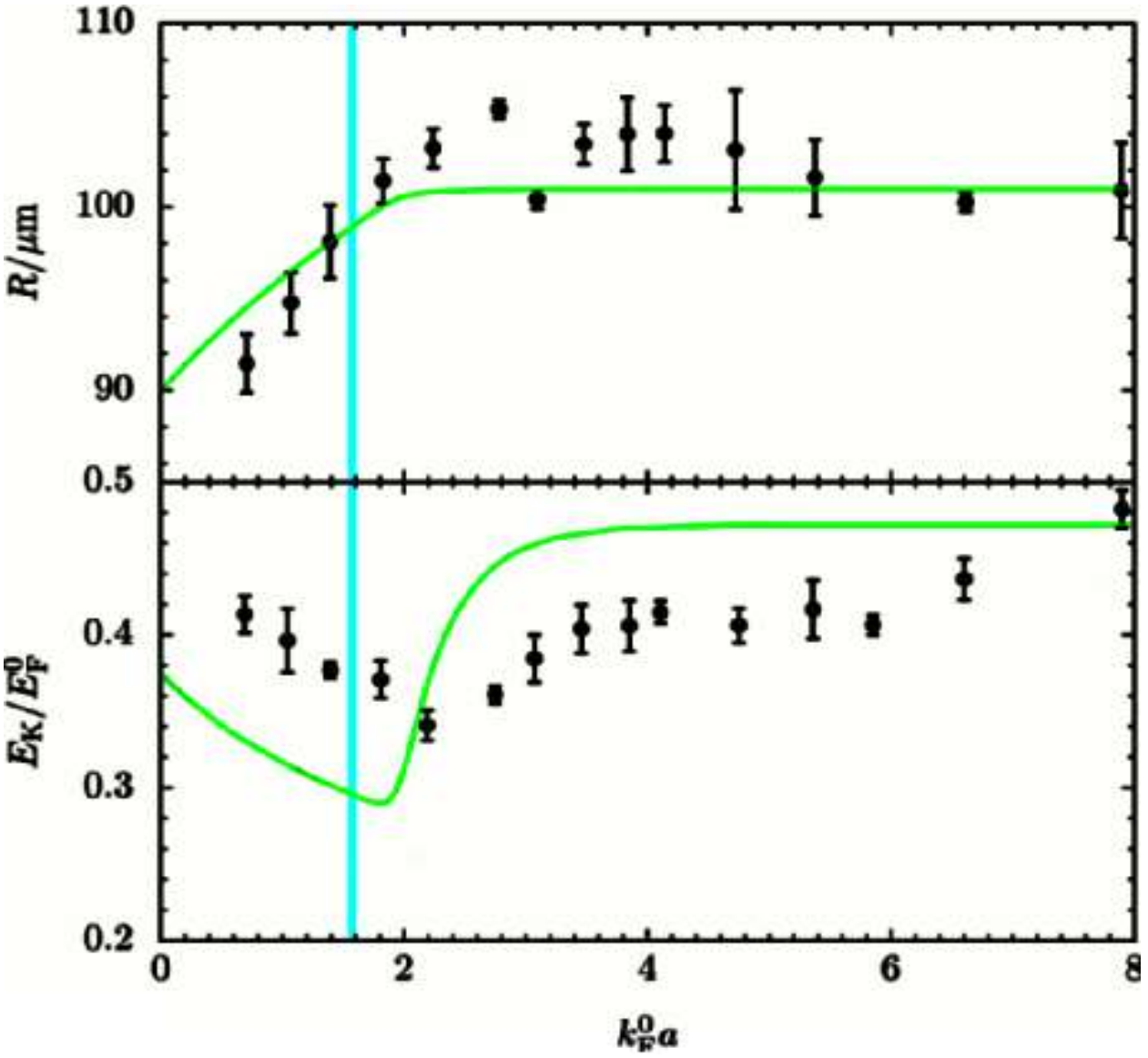




What is all this about? Attractive interactions



Experimental results



Summary: *more is different*

- Particles obeying well understood microscopic physics display poorly understood collective motion – *more is different*
- Many-body interactions coupled with quantum mechanics leads to new counterintuitive phenomena
- Real-life applications:
  - Electronics
  - Material science
  - Chemistry