

Johannes Gutenberg Universität Mainz

QUANTUM: F. Schmidt-Kaler & U. Poschinger



currently 25 students, PhD, PostDocs

2005 Ulm University, Germany
2010 Mainz Univ., head of QUANTUM
2012 PI in German
cluster of excellence PRISMA

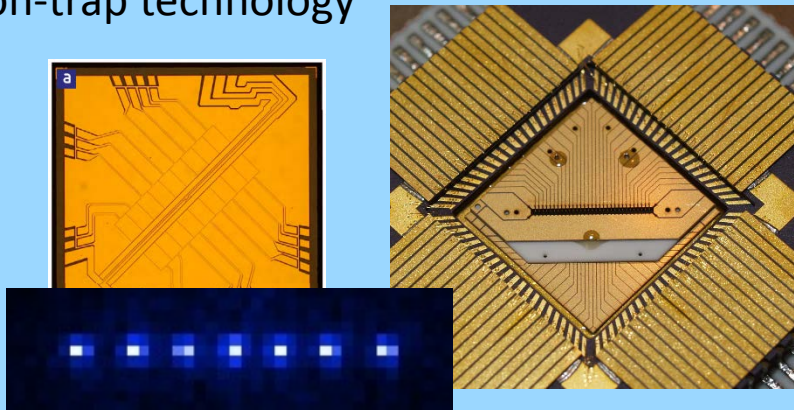
Service to community:
Chair of DPG quantum optics section 2009-2011
Host for European Conf. Trapped Ions 2014
Host for DPG spring meeting 2017

Research interests

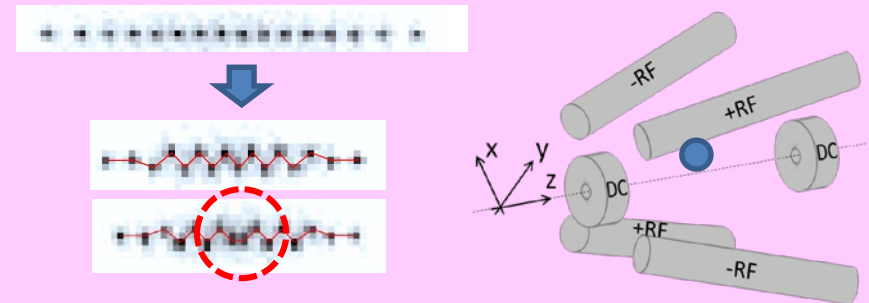


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UNIVERSITÄT MAINZ

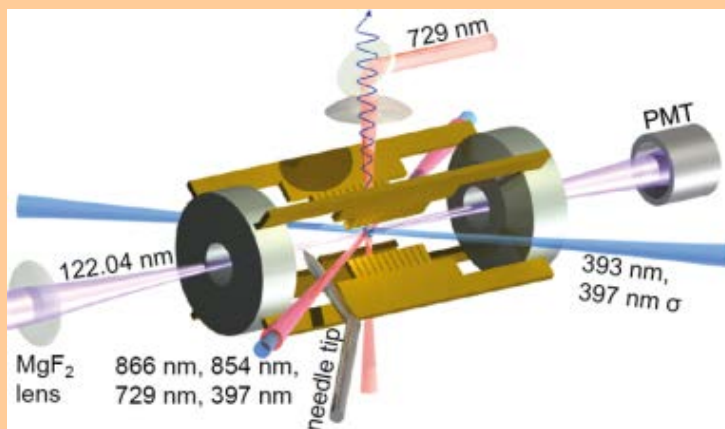
Quantum Information Processing and ion-trap technology



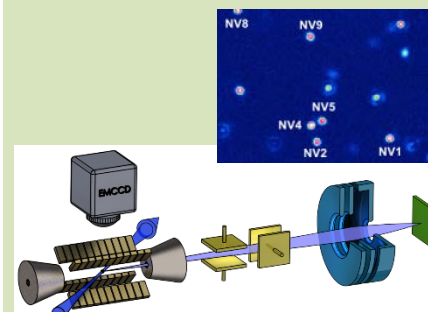
Thermodynamic machines and non-equilibrium dynamics



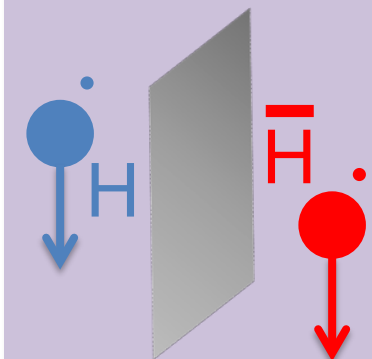
Rydberg excitations with trapped ions

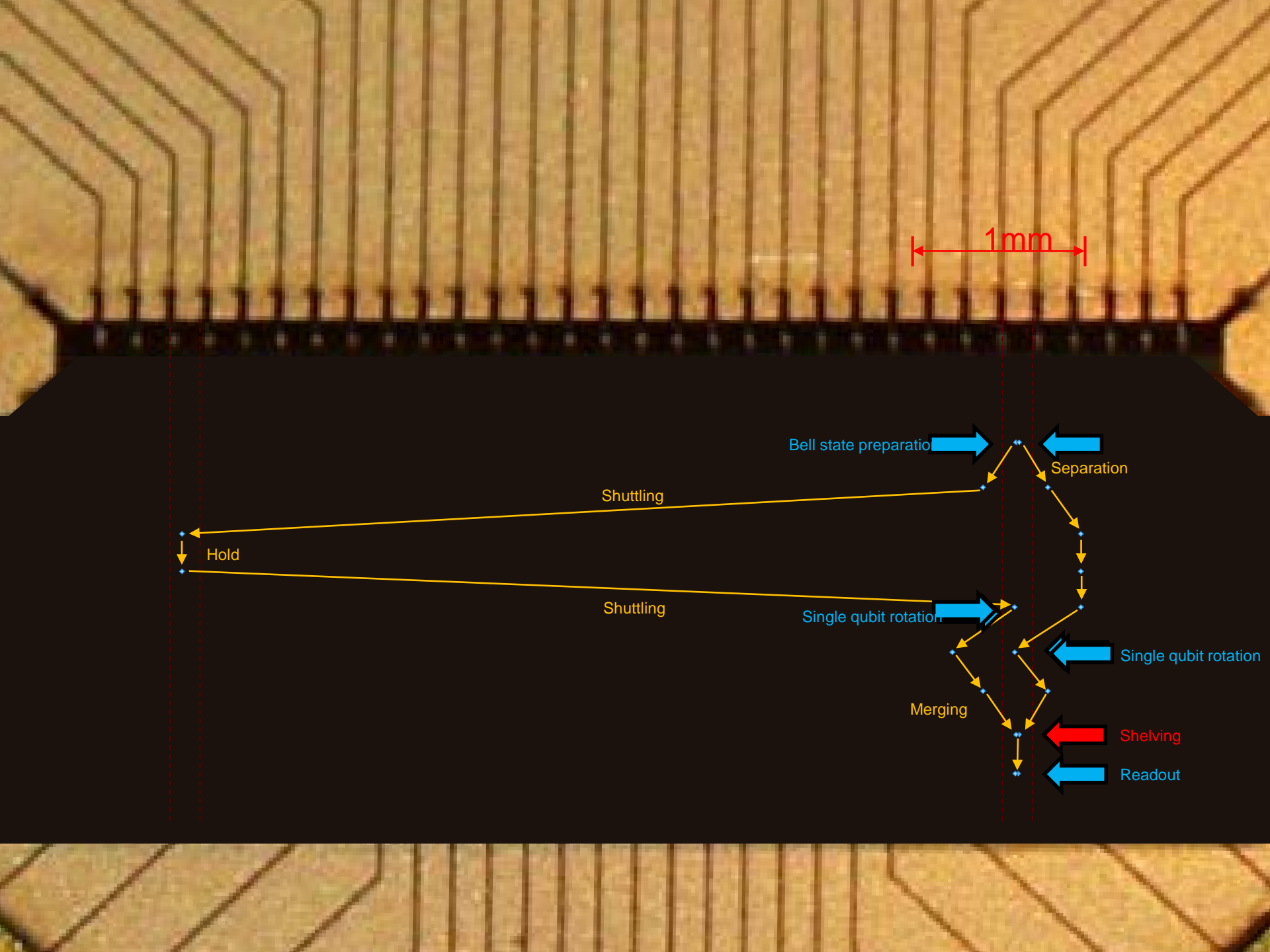


Deterministic single ion source with nm spatial resolution



Cold anti-Hydrogen to measure gbar





1mm

Hold

Shuttling

Shuttling

Bell state preparatio

Separation

Single qubit rotation

Single qubit rotation

Merging

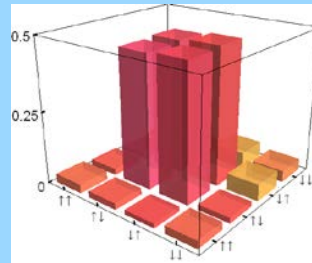
Shelving

Readout

Qualifications and capabilities

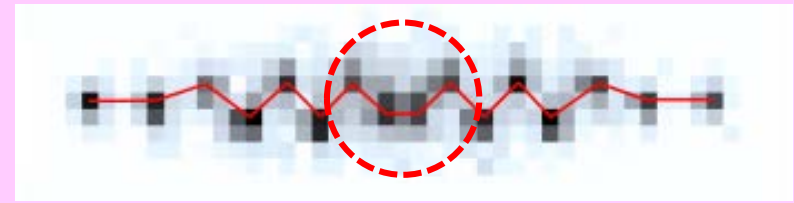
Quantum Information Processing and ion-trap technology:

- Fast transport and separation
- Distributed long-lived entanglement
- Development of waveform generators and exp. control
- Studies of 2D ion crystals



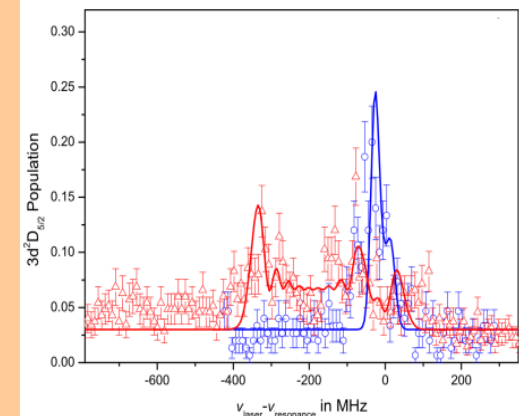
Thermodynamic machines and non-equilibrium dynamics:

- Single ion heat engine: proposal and realization
- linear-to-zigzag transition
- Defect formation in ion crystals



Rydberg excitations with trapped ions

- First trapped Rydberg ions ever
- Spectroscopy and full understanding of line shape
- Proposal on multi-spin plaquette interaction for spin liquid state simulation



Seeking for logic qubit connections



Complementary fitting
research lines with team.....

Rainer Blatt, Innsbruck

Implement radically novel coupling schemes for trapped ions

- Rydberg enabled interaction
- Pulsed laser setup for sub- μ s gate times
- Dipolar blockade mechanism in ion crystals
- Rydberg-enabled mode design in planar ion crystals
- plaquette interactions

Logic qubit interconnection and coupling

- Coupling of logic qubits in 1D geometries
- Implementation of coupling schemes in 2D specialized trap array

Contact information

- Name: Ferdinand Schmidt-Kaler
- Title: Univ. Prof. Dr.
- Organization: Universität Mainz,
QUANTUM
Institut für Physik
- Email address: fsk@uni-mainz.de
- Phone number: +49 6131 39 22279
- url: www.quantenbit.de