Hundred Young Academic Leaders Program of Nankai University

Georgios A. Siviloglou

8 May, 2018

UNIVERSITY OF AMSTERDAM

MARIE CURIE ACTIONS

Basic personal information

Basic information

Place of birth:	Athens, Greece
Date of birth:	27.09.1978

Education

1996 – 2003	NTUA, Greece	Diploma of Electrical Engineering
2004 – 2010	CREOL, USA	PhD in Optics

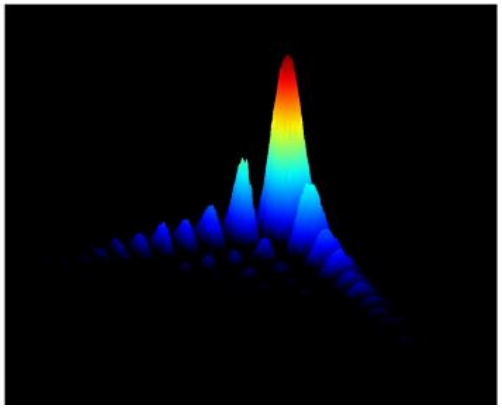
Research

2010 – 2014	MIT, USA	Postdoc and Research Scientist
2014 – 2018	UvA, Holland	Postdoc and Marie Curie Fellow

Main research accomplishments

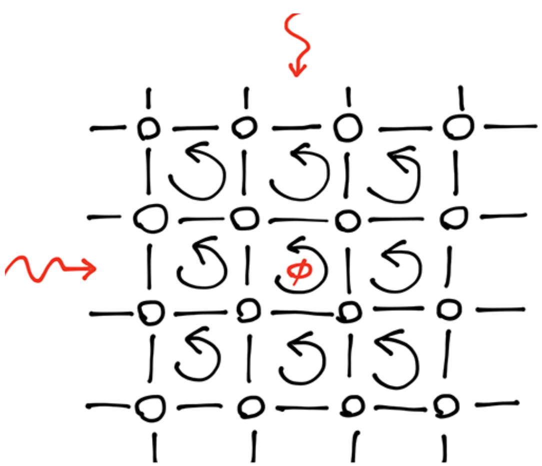
7 papers in the top 1% in the field of Physics (ISI Web of Science) Highly Cited Paper

Self-bending Airy beams (>2000 citations)

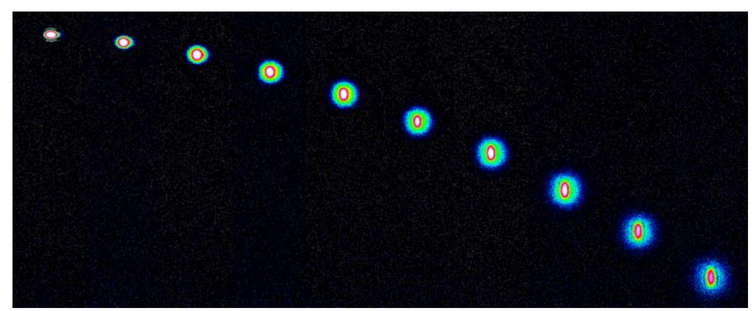


$\mathcal{PT}$-symmetry (1005 citations)

Hofstadter Hamiltonian (citations 449)



Quantum gases of strontium

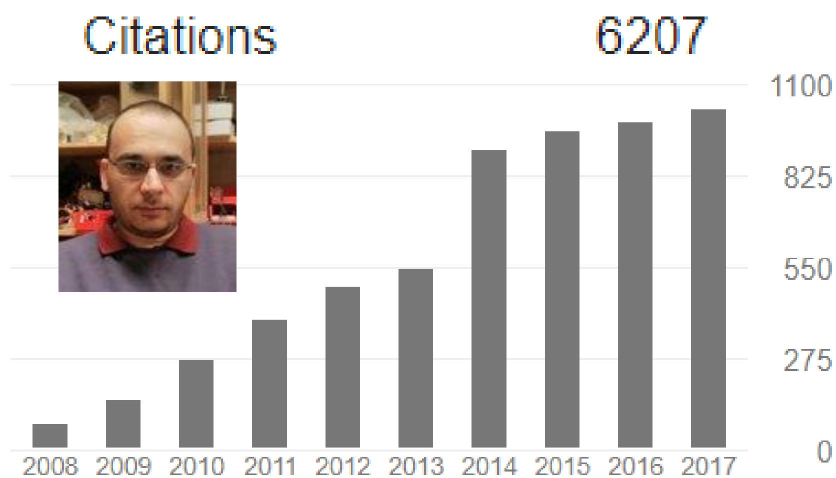


Publication summary

- 18 + 1 (in preparation) peer-reviewed articles
- Among them 6 Phys. Rev. Lett. and 1 Science
- 4 publications in Optics and Photonics News (published by OSA)
- 1 invited book chapter
- Total citations > 4250
- 7 papers in the top 1% of physics
- 224 citations per paper

Highly Cited Paper

Google Scholar



Citations per year

Publication list

1. J. Schachenmayer, D. M. Weld, H. Miyake, **G. A. Sivilоglou**, W. Ketterle, and A. J. Daley,
" Adiabatic cooling of bosons in lattices to magnetically ordered quantum states"
Physical Review A 92, 041602(R) (2015). (ISI citations 5)

2. H. Miyake, **G. A. Siviloglou**, C. J. Kennedy, W. C. Burton, and W. Ketterle,
"Realizing the Harper Hamiltonian with Laser-Assisted Tunneling in Optical Lattices"
Physical Review Letters 111, 185302 (2013). (ISI citations 431)

3. C. J. Kennedy, **G. A. Siviloglou**, H. Miyake, W. C. Burton, and W. Ketterle,
"Spin-Orbit Coupling and Spin Hall Effect for Neutral Atoms without Spin Flips"
Physical Review Letters 111, 225301 (2013). (ISI citations 75)

4. H. Miyake, **G. A. Siviloglou**, G. Puentes, D. E. Pritchard, W. Ketterle, and D. M. Weld.
"Bragg scattering as a probe of atomic wave functions and quantum phase transitions in optical lattices"
Physical Review Letters 107, 175302 (2011). (ISI citations 37)

5. **G. A. Siviloglou**, J. Broky, A. Dogariu, and D. N. Christodoulides,
"Observation of Accelerating Airy Beams"
Physical Review Letters 99, 213901 (2007). (ISI citations 845)

6. P. Polynkin, M. Kolesik, J. V. Moloney, **G. A. Siviloglou**, D. N. Christodoulides,
"Curved Plasma Channel Generation Using Ultraintense Airy Beams"
Science 324, 229-232 (2009). (ISI citations 396)

7. A. Guo, G. J. Salamo, D. Duchesne, R. Morandotti, M. Volatier-Ravat, V. Aimez, **G. A. Siviloglou**, and D. N. Christodoulides,
"Observation of PT-Symmetry Breaking in Complex Optical Potentials"
Physical Review Letters 103, 093902 (2009). (ISI citations 948)

8. J. Shu, J. Lee, J. W. Fleischer, **G. A. Siviloglou**, and D. N. Christodoulides,
"Diffusion-trapped Airy beams in photorefractive media"
Physical Review Letters 104, 253904 (2010). (ISI citations 59)

Publication list

9. **G. A. Siviloglou** and D. N. Christodoulides,
"Accelerating finite energy Airy beams"
Optics Letters 32, 979-981 (2007). (ISI citations 692)

10. **G. A. Siviloglou**, J. Broky, A. Dogariu, and D. N. Christodoulides,
"Ballistic dynamics of Airy beams"
Optics Letters 33, 207-209 (2008). (ISI citations 213)

11. **G. A. Siviloglou**, K. G. Makris, R. Iwanow, R. Schiek, D. N. Christodoulides, G. I. Stegeman, Y. Min, and W. Sohler,
"Observation of discrete quadratic surface solitons"
Optics Express 14, 5508-5516 (2006). (ISI citations 67)

12. **G. A. Siviloglou**, S. Suntsov, R. El-Ganainy, R. Iwanow, G. I. Stegeman, D. N. Christodoulides, R. Morandotti, D. Modotto, A. Locatelli, C. De Angelis, F. Pozzi, C. R. Stanley, and M. Sorel,
"Enhanced third-order nonlinear effects in optical AlGaAs nanowires"
Optics Express 14, 9377-9384 (2006). (ISI citations 42)

13. J. Broky, **G. A. Siviloglou**, A. Dogariu, and D. N. Christodoulides,
"Self-healing properties of optical Airy beams"
Optics Express 16, 12880-12891 (2008). (ISI citations 378)

14. S. Suntsov, K. G. Makris, **G. A. Siviloglou**, R. Iwanow, R. Schiek, D. N. Christodoulides, G. I. Stegeman, R. Morandotti, H. Yang, G. Salamo, M. Volatier, V. Aimez, R. Ares, M. Sorel, Y. Min, W. Sohler, X. S. Wang, A. Bezryadina, Z. G. Chen,
"Observation of one- and two-dimensional discrete surface spatial solitons"
Journal of Nonlin. Opt. Phys. & Mat. 16, 401-426 (2007). (Invited Paper) (ISI citations 33)

15. N. K. Efremidis, **G. A. Siviloglou**, and D. N. Christodoulides,
"Exact X-wave solutions of the hyperbolic nonlinear Schrödinger equation with a supporting potential"
Physics Letters A 373, 4073 (2009). (ISI citations 5)

16. T. J. Eichelkraut, **G. A. Siviloglou**, I. M. Besieris, and D. N. Christodoulides,
“Oblique Airy wave packets in bidispersive optical media”
Optics Letters 35, 3655 (2010). (ISI citations 18)

Publication list

17. N. Barbieri, M. Weidman, G. Katona, M. Baudelet, Z. Roth, E. Johnson, **G. A. Siviloglou**, D. N. Christodoulides, and M. Richardson,
"Double helical laser beams based on interfering first-order Bessel beams"
J. Opt. Soc. Am. A 28, 1462 (2011). (ISI citations 11)

18. M. S. Mills, **G. A. Siviloglou**, N. Efremidis, T. Graf, E. M. Wright, J. V. Moloney, D. N. Christodoulides,
"Localized Waves with Spherical Harmonic Symmetries"
Physical Review A 86.6 (2012). (ISI citations 4)

Representative publications

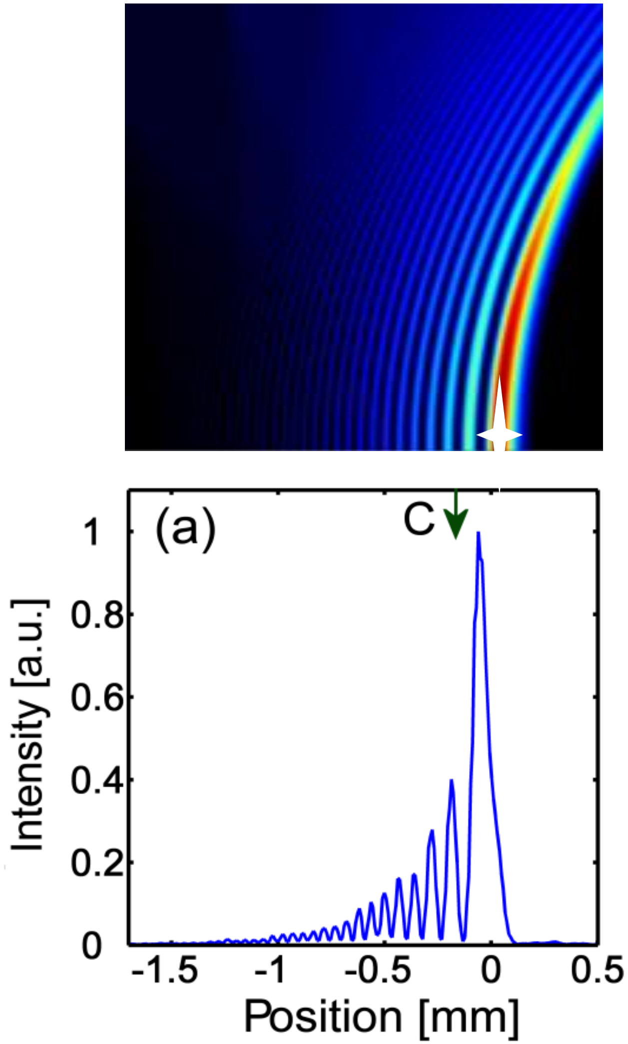
Other publications

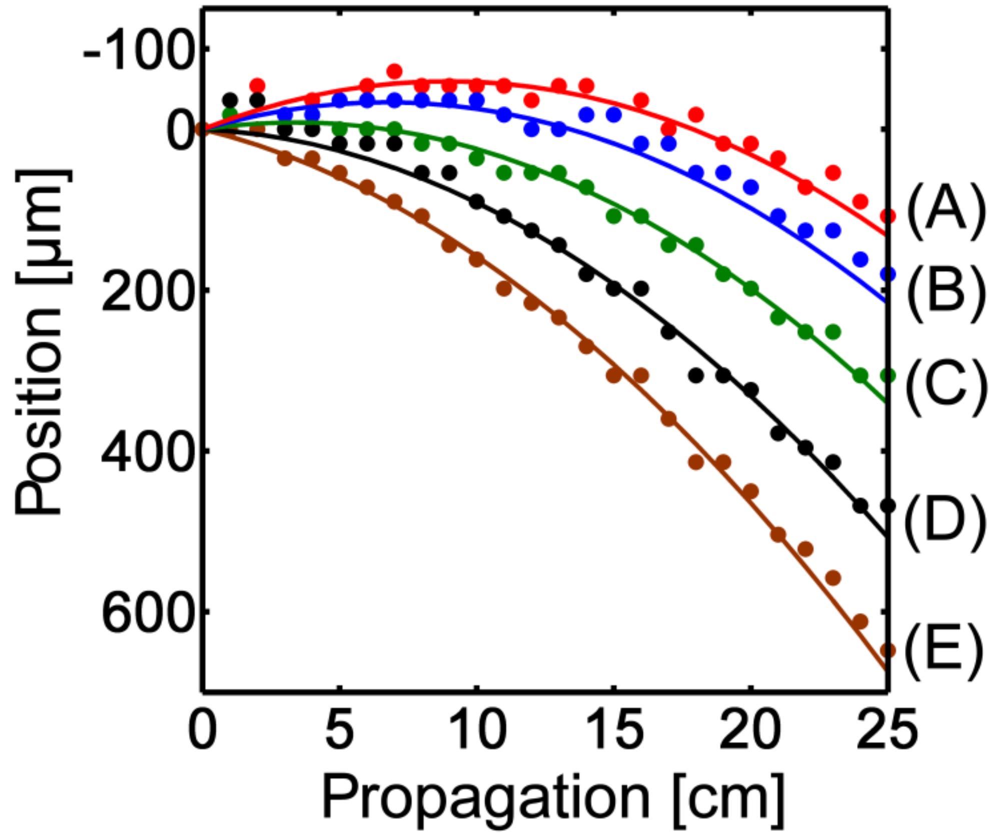
1. P. Polynkin, M. Kolesik, J. Moloney, **G. A. Siviloglou**, and D. Christodoulides,
   "Extreme Nonlinear Optics with Ultra-Intense Self-Bending Airy Beams"
   Optics and Photonics News, September 2010 (Invited publication)
2. P. Polynkin, M. Kolesik, J. Moloney, **G. A. Siviloglou**, and D. Christodoulides,
   "Curved Plasma Channel Generation in Air Using Ultra-Intense Self-Bending Airy Beams"
   Optics and Photonics News, Optics in 2009, December 2009
3. **G. A. Siviloglou**, J. Broky, A. Dogariu, and D. Christodoulides,
   "Airy Beams: A New Class of Optical Waves"
   Optics and Photonics News, Optics in 2008, December 2008
4. F. Pozzi, M. Sorel, **G.A. Siviloglou**, S. Suntsov, R. El-Ganainy, R. Iwanow, G.I. Stegeman,
   D.N. Christodoulides, D. Modotto, A. Locatelli, C. De Angelis and R. Morandotti,
   "Enhanced Third-Order Nonlinear Effects in Ultra-Compact AlGaAs Nanowires"
   Optics and Photonics News, Optics in 2006, December 2006

Book chapter

Y. Hu, **G. A. Siviloglou**, P. Zhang, N. K. Efremidis, D. N. Christodoulides, and Z. Chen.
Self-accelerating Airy beams: generation, control, and applications.
In Nonlinear Photonics and Novel Optical Phenomena, pp. 1-46. Springer New York, 2012.

Optical Airy beams





G. A. Siviloglou and D. N. Christodoulides, **Opt. Lett.** 32, 979 (2007). (cited 878)
G. A. Siviloglou, J. Broky, A. Dogariu, and D. N. Christodoulides, **Phys. Rev. Lett.** 99, 213901 (2007) (cited 718)
G. A. Siviloglou, J. Broky, A. Dogariu, and D. N. Christodoulides, **Opt. Lett.** 33, 207 (2008) (cited 213)

Optical Airy beams

nature

News & Views

Optics: Against the spread of the light

Kishan Dholakia

Physics

Focus: Light Beam with a Curve

November 28, 2007 • *Phys. Rev. Focus* 20, 19

SCIENTIFIC AMERICAN

High-Intensity Lasers Throw Scientists a Curve

Researchers defy the laws of physics by making a laser beam bend

Science AAAS

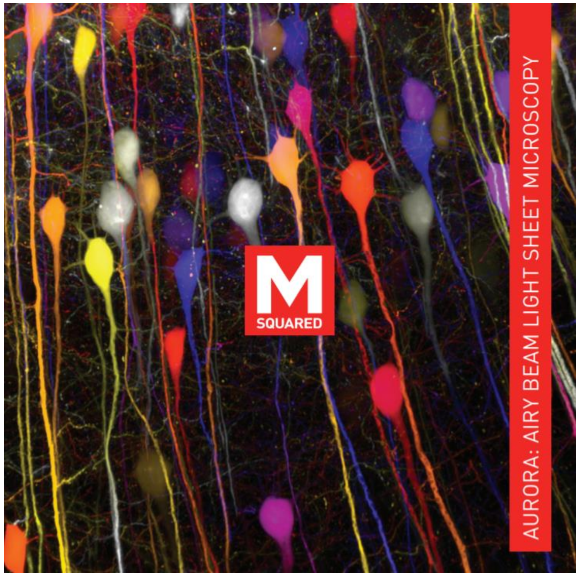
PERSPECTIVE | APPLIED PHYSICS

Laser Beams Take a Curve

G. A. Siviloglou and D. N. Christodoulides, **Opt. Lett.** 32, 979 (2007).
G. A. Siviloglou, J. Broky, A. Dogariu, and D. N. Christodoulides, **Phys. Rev. Lett.** 99, 213901 (2007)
P. Polynkin, M. Kolesik, J. V. Moloney, **G. A. Siviloglou**, and D. N. Christodoulides, **Science** 324, 229 (2009) (cited 396)

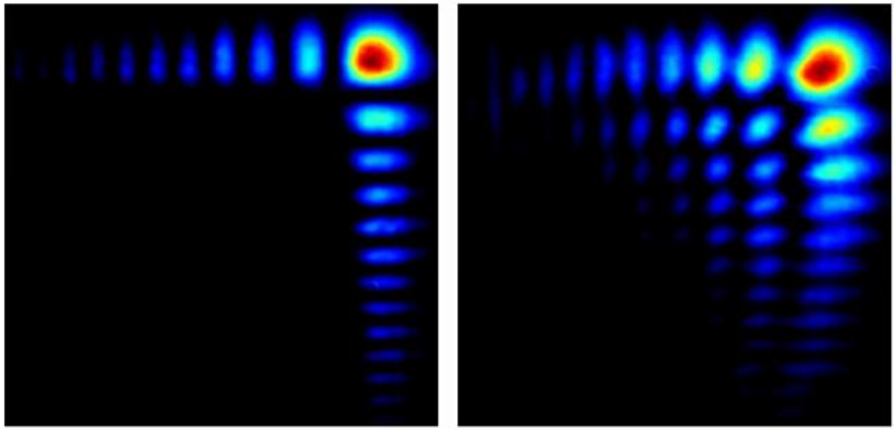
Why non-diffracting, self-bending Airy beams are important?

Commercial Airy microscopy



500x faster than confocal microscopy

Self-healing



Robust even in biological tissue

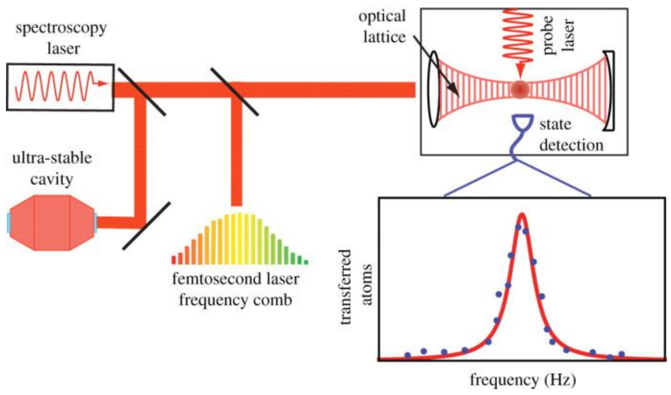
D. Christodoulides, A. Dogariu, and **G. Siviloglou** United States Patent US 8,101,929 B1 (2012)

J. Broky, **G. A. Siviloglou**, A. Dogariu, and D. N. Christodoulides, **Opt. Express** 16, 12880 (2008) (cited 378)

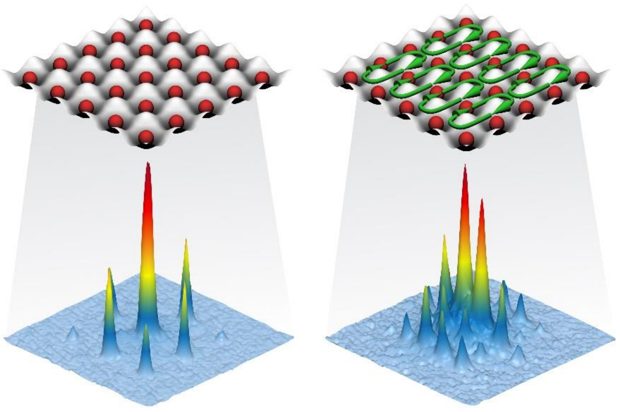
From optics to ultracold quantum gases

Applications and quantum simulation with ultracold atoms

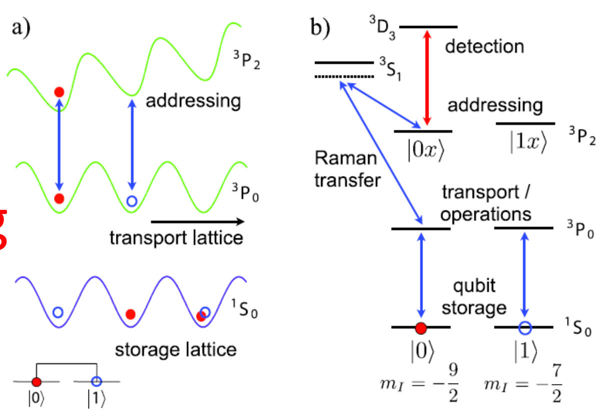
Lattice clocks



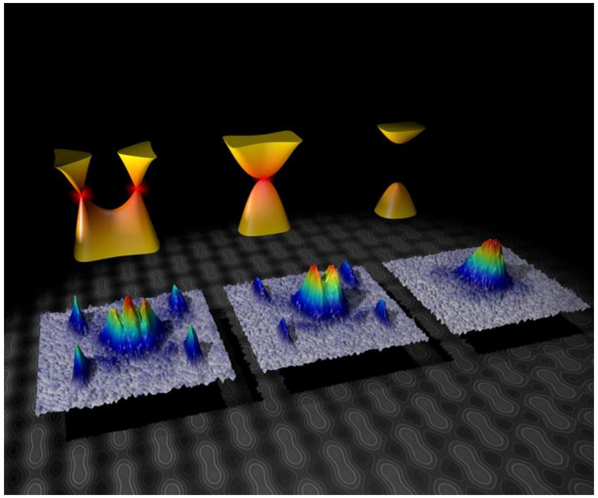
Strong magnetic fields



Quantum computing

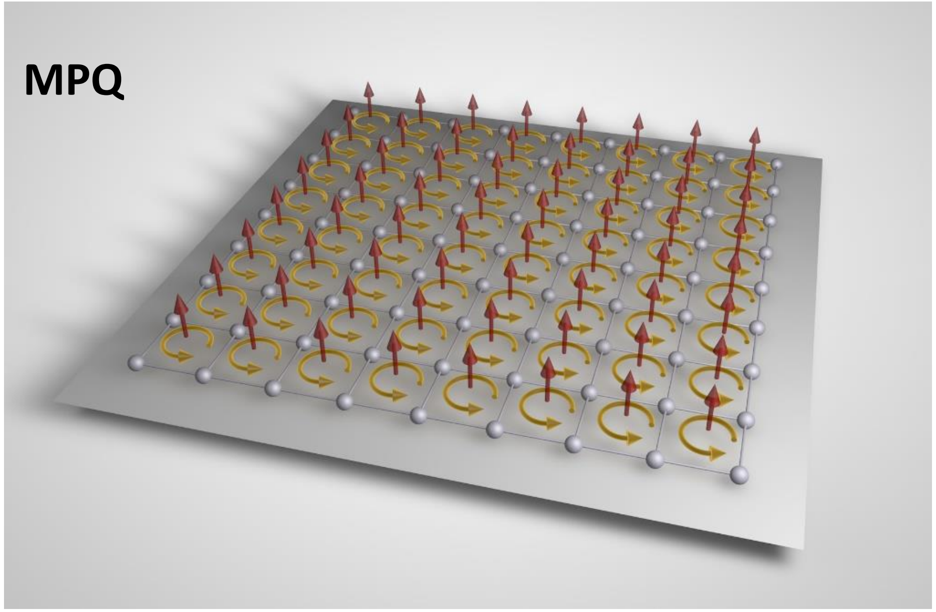


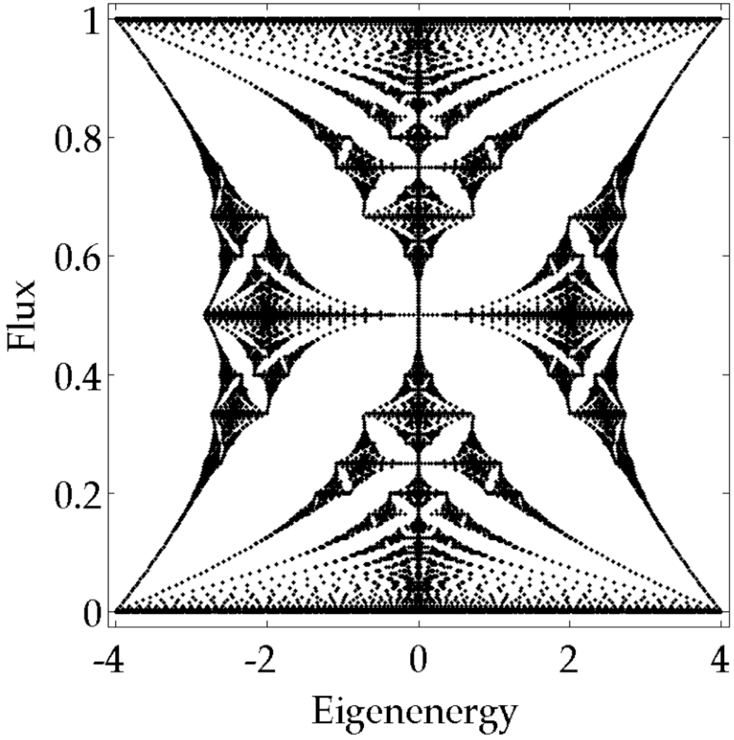
Graphene physics



The Hofstadter-Harper Hamiltonian

Created for the first time the Hofstadter Hamiltonian in an atomic system

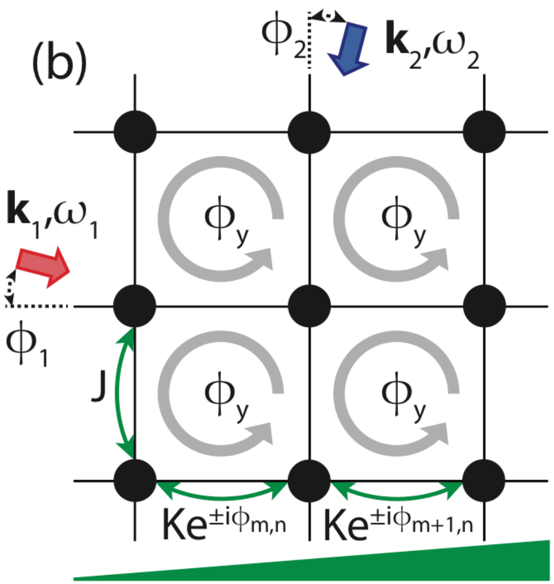


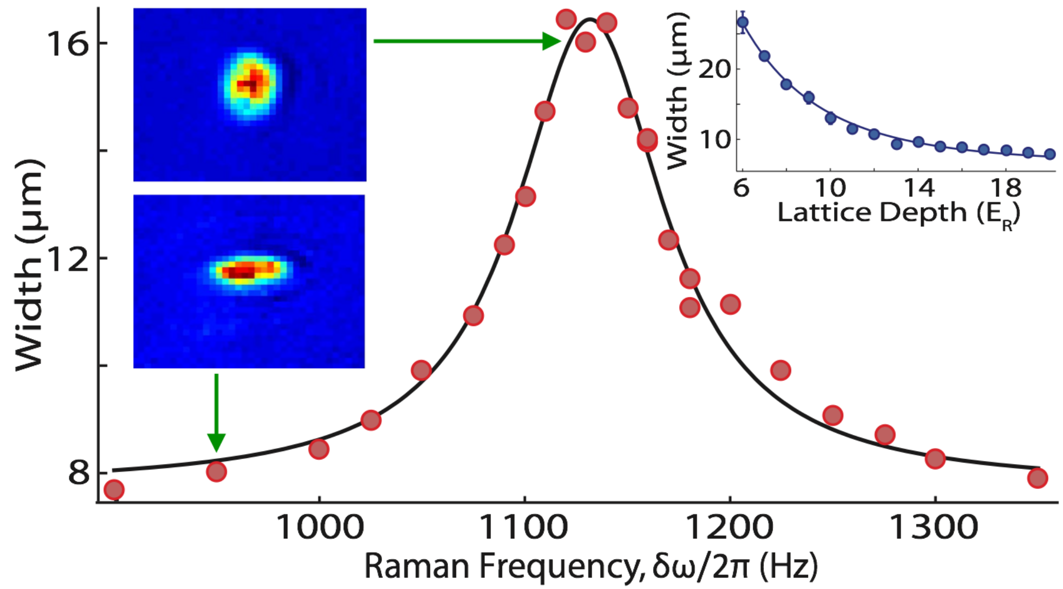


P. G. Harper, Proceedings of the Physical Society. Section A 68, 874 (1955)
D. R. Hofstadter, Phys. Rev. B 14, 2239 (1976)

Strong synthetic fields for neutral atoms

$$\alpha = \phi_y / 2\pi$$





When $\omega_2 - \omega_1 = \Delta$ resonant tunneling is established

M. Aidelsburger, M. Atala, M. Lohse, J. T. Barreiro, B. Paredes, and I. Bloch, Phys. Rev. Lett. 111, 185301 (2013)
H. Miyake, **G. A. Siviloglou**, C. J. Kennedy, W. C. Burton, and W. Ketterle, **Phys. Rev. Lett.** 111, 185302 (2013) (cited 431)
C. J. Kennedy, **G. A. Siviloglou**, H. Miyake, W. C. Burton, and W. Ketterle, **Phys. Rev. Lett**. 111, 225301 (2013) (cited 75)

Artificial magnetic fields in an optical lattice

Physics

Viewpoint: Looking for Hofstadter's Butterfly in Cold Atoms

Cheng Chin, James Franck Institute, Enrico Fermi Institute, and Department of Physics, University of Chicago, Chicago, IL 60637, USA
Erich J. Mueller, Laboratory of Atomic and Solid State Physics, Cornell University, Ithaca, NY 14853, USA
October 28, 2013 • *Physics* 6, 118

physicsworld

ULTRACOLD MATTER | RESEARCH UPDATE

Ultracold atoms set the stage for Hofstadter's butterfly

28 Oct 2013

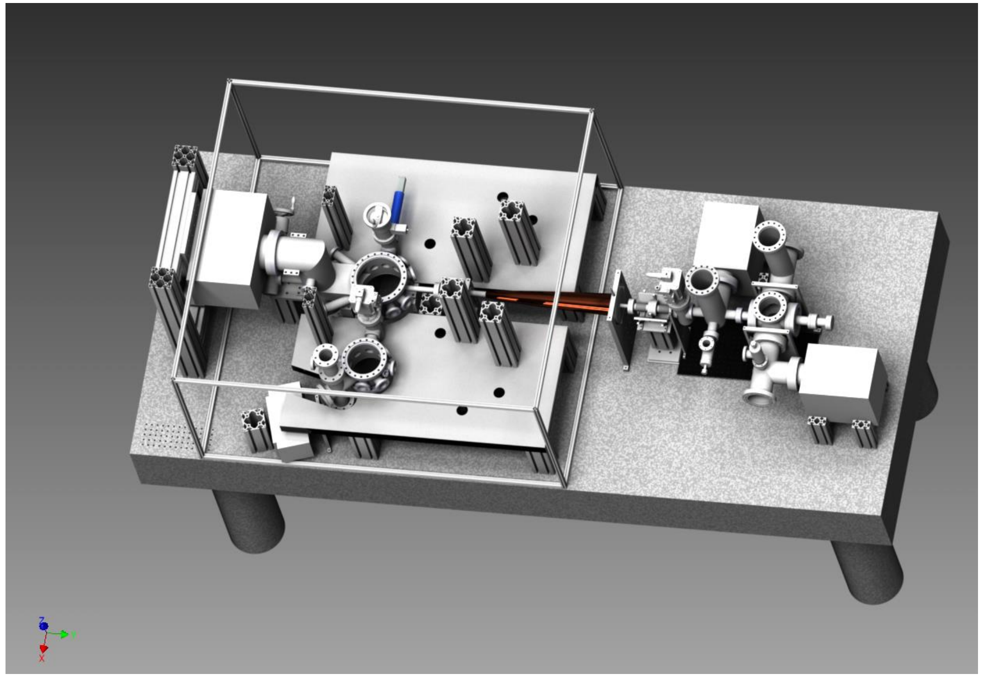
nature

Physicists net fractal butterfly

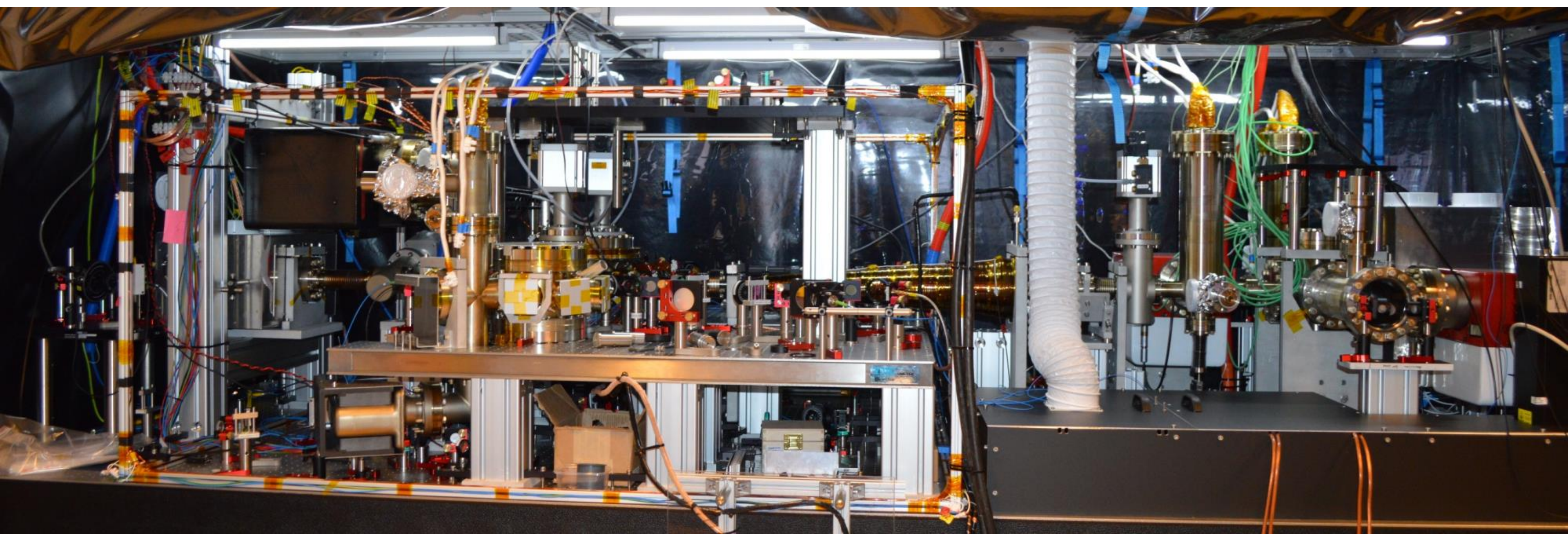
Decades-old search closes in on recursive pattern that describes electron behaviour.

I designed and built a strontium quantum gas experiment

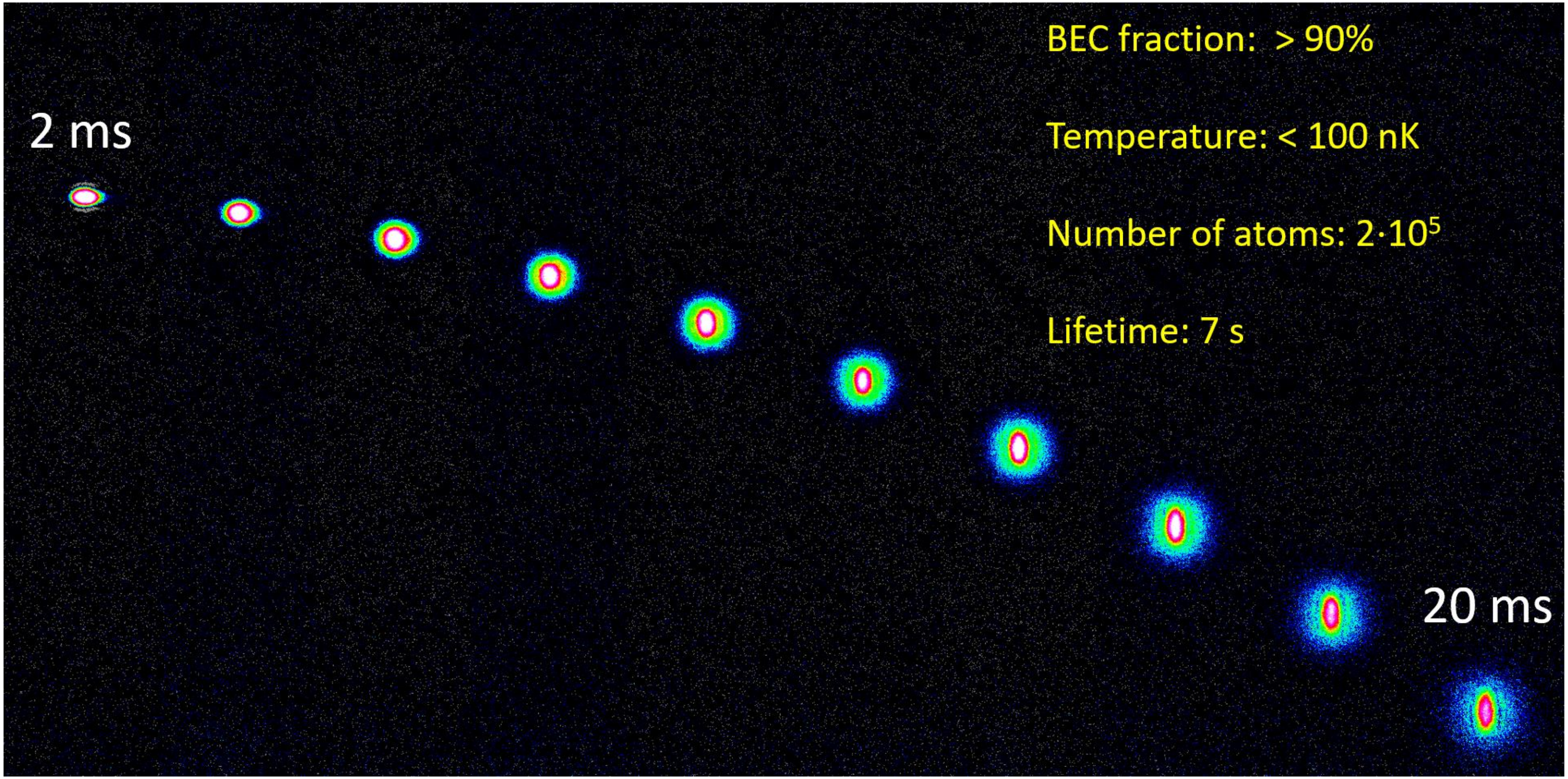
UNIVERSITEIT VAN AMSTERDAM



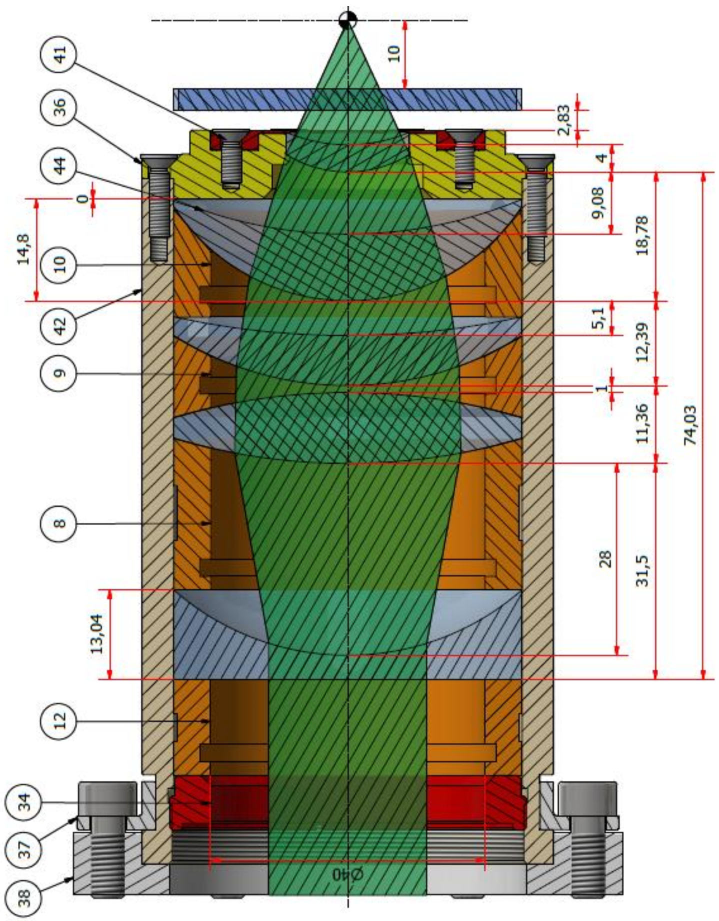
MARIE CURIE ACTIONS

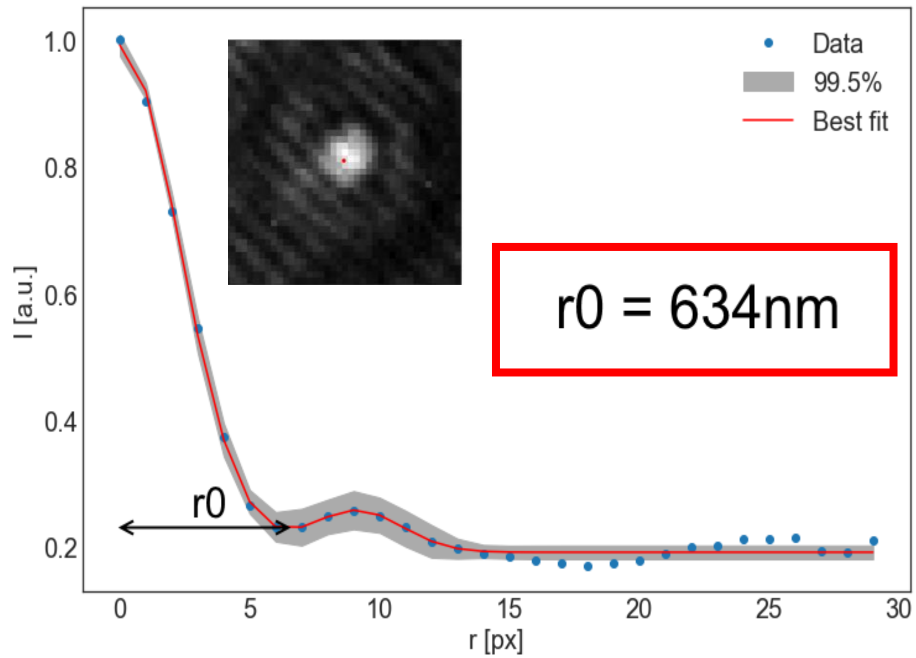


Free fall expansion of a ^{84}Sr BEC

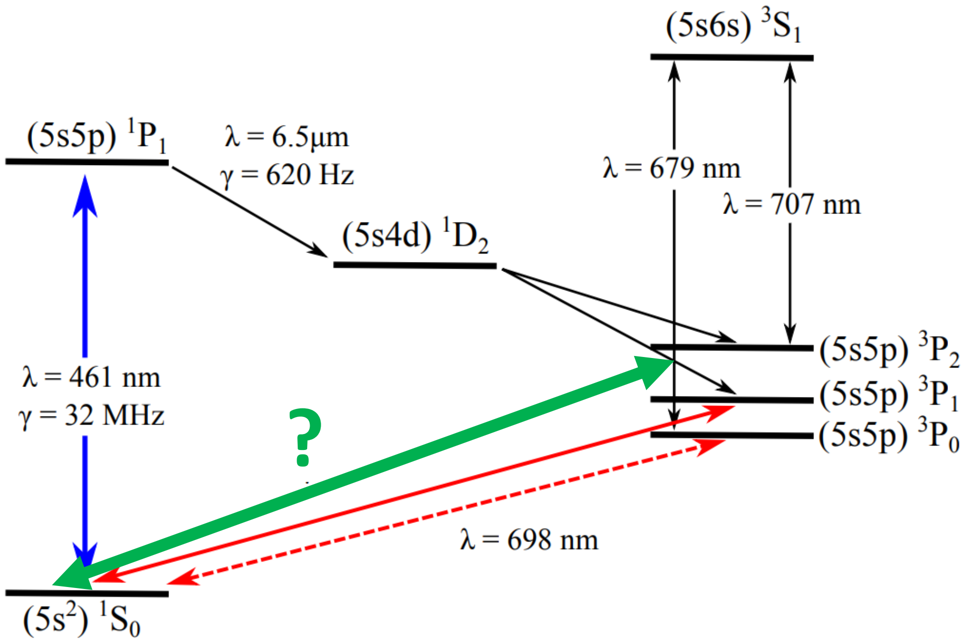


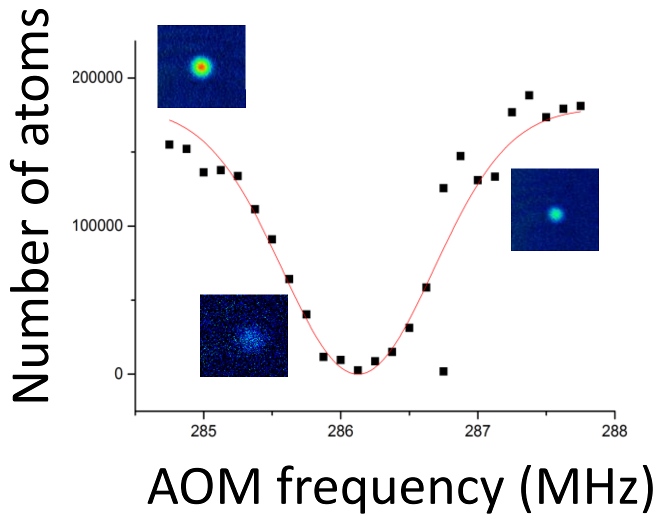
Microscope objective to resolve individual atoms in a lattice

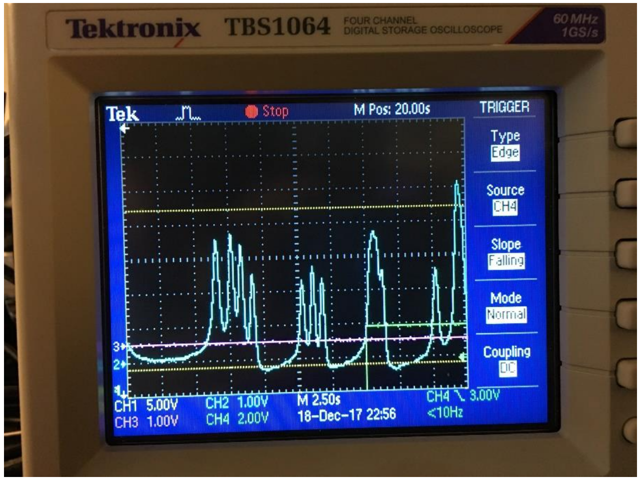




Spectroscopy for the ultranarrow transition ${}^1S_0 \rightarrow {}^3P_2$ of ^{87}Sr







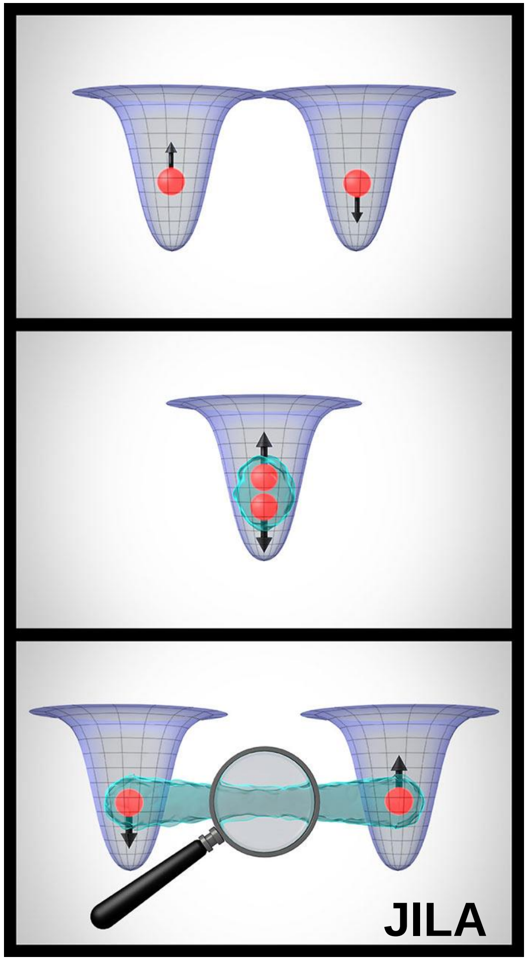
Iodine spectroscopy

Observation of the ultranarrow doubly-forbidden transition in a Fermi gas of strontium (**in preparation**)

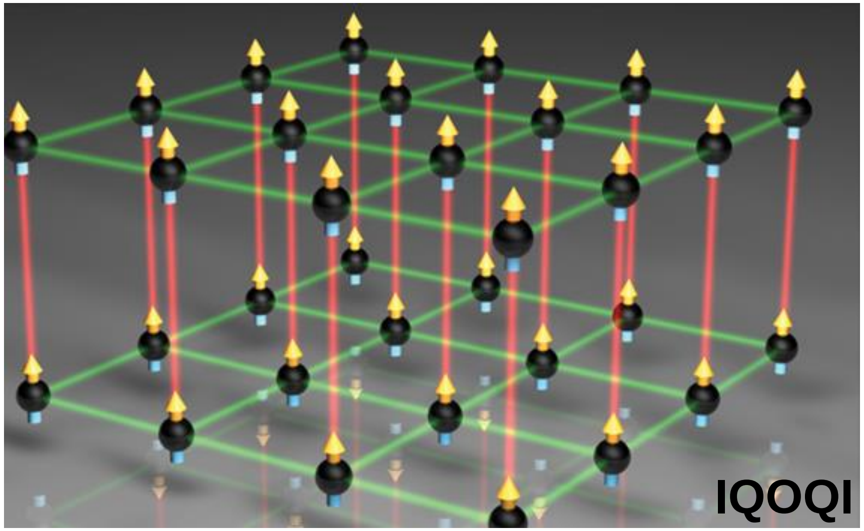
What I want to achieve next

My plan for a quantum physics and quantum engineering lab

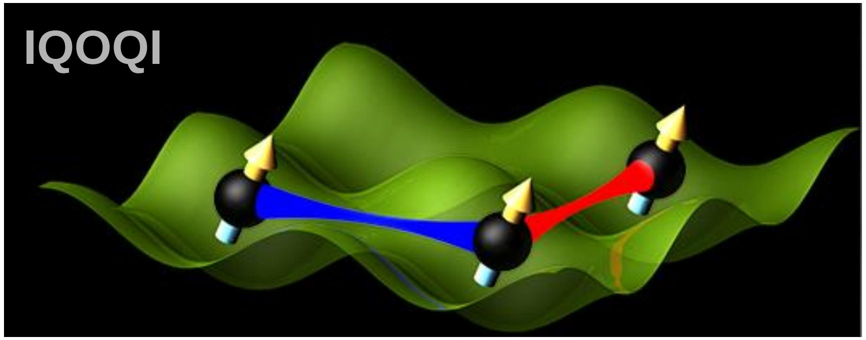
A few-atom quantum assembler



A quantum gas experiment



Why erbium?



- Only **3 experiments in the world** have BEC of erbium (Innsbruck, Bonn, Paris)
- It has several stable **fermionic** and **bosonic** isotopes with **high abundancy** (>25%)
- It is **highly magnetic** $\mu = 7\mu_B$ and thus **strongly dipolar**
- A transition at 401 nm can lead to **submicrometer** resolution

How can I achieve that at Nankai University

- Form a team with strong physics and engineering skills (4-5 team members)
- Collaborate with the Nankai teams and former international colleagues
- Standard optics lab space (100-200 m^2)
- Apply actively for (university, national, local) start-up funding (5-10 million RMB)

Thank you!