

ION HOLE, EVELINA DOMNITCH & DMITRY GELFAND

1/ FROM THE RESIDENCY

Building the *Ion Trap*, Knowledge and Conversations

2/ SLICES OF REALITY: ION TRAP & QUANTUM LATTICE

Conversation between Evelina Domnitch, Dmitry Gelfand and Annick Bureauud (podcast)

3/ EXPERIENCING THE TANGIBILITY OF A SINGLE ATOM

Conversation between Tommaso Calarco and Annick Bureauud (podcast)

4/ « TRAPPING THE OBJECTLESS »

Evelina Domnitch, Dmitry Gelfand, Tommaso Calarco, *Leonardo*, MIT Press

1/ FROM THE RESIDENCY: BUILDING THE ION TRAP, KNOWLEDGE AND CONVERSATIONS

(Compiled from Evelina Domnitch & Dmitry Gelfand's report)

APRIL 2016

After the match-making process between the artists and the scientists that took place in Amsterdam, Domnitch and Gelfand went to the Johannes Gutenberg University in Mainz, part of the RySQ consortium, where they met with quantum pioneer, Ferdinand Schmidt-Kaler. Under his guidance, they constructed what is known as a Paul trap - an electrodynamic ion trap named after Wolfgang Paul, who won the 1989 Nobel Prize in physics for this invention.

Afterwards in their studio in Amsterdam, in order to magnify the subtle micro-motion of trapped particles, they started developing a purely optical (non-digital) laser projection system.

JULY 2016

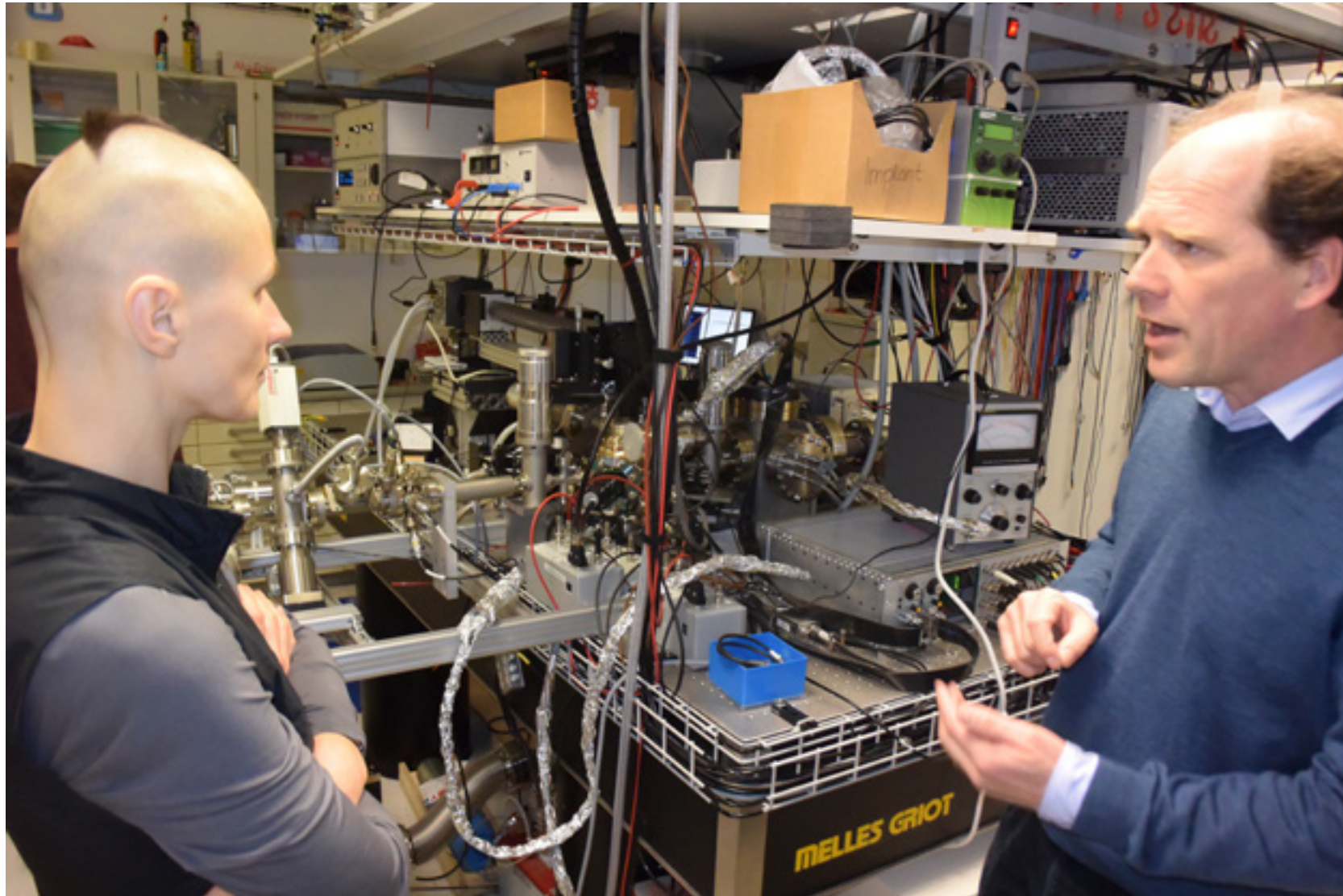
After Mainz, Domnitch and Gelfand went to Ulm. At the Institute for Complex Quantum Systems of Ulm University they collaborated with the director of RySQ, theorist Tommaso Calarco, as well as with Ferdinand Schmidt-Kaler. On this occasion, they constructed a 30-centimeter long linear ion trap, which gives rise to completely different modes of particle behavior. Moving along square-shaped orbits that had never before been reported in quantum optics literature, hollow glass microspheres hovered back and forth through the trap. This would lead to another artwork *Quantum Lattice*.

Shortly afterward, they visited the lab of Robert Loew who researches quantum entangled Rydberg gases at the Physics Institute of Stuttgart University.

AUGUST 2016

In August, they participated in the midterm FEAT

meeting of the RysQ consortium in Ercolano, Italy which led to multiple invitations: from Philippe Grangier, Director of Research at the Charles Fabry Laboratory of the Institute of Optics, CNRS; from theoretical physicist, Juan P. Garrahan, to visit the RysQ group at the University Nottingham, and from Matthias Weidemüller, Dean of the Department of Physics and Astronomy at the University of Heidelberg.



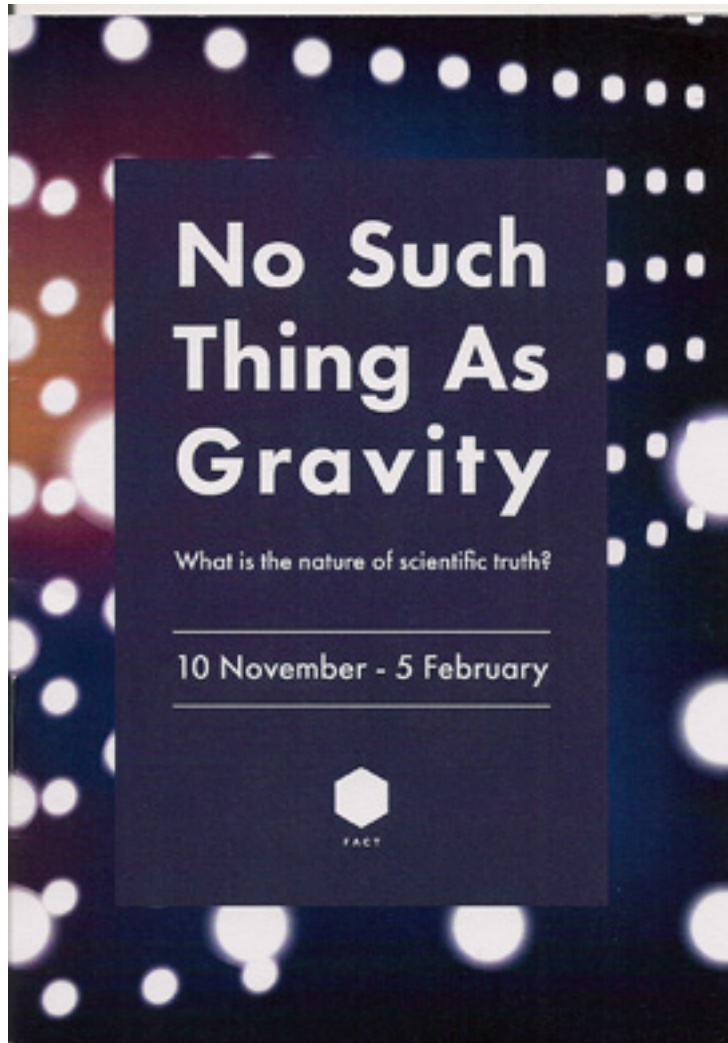
Evelina Domnitch and Ferdinand Schmidt-Kaler, head of the Cold Ions and Experimental Quantum Information Processing group at Mainz University. Ferdinand Schmidt-Kaler helped Domnitch and Gelfand build the two prototypes that would lead to the artworks *Ion Hole* and *Quantum Lattice*.
Photo: Dmitry Gelfand



OCTOBER 2016

Dmitry Gelfand visited the quantum optics lab of Philippe Grangier, where he was shown among the world's most advanced spatial light modulators an instrument which holographically traps individual atoms within a grid.

The artwork *Ion Hole* is premiered at the personal exhibition of the artists «Le vide et la lumière» at Le Lieu Unique in Nantes, France which took place from Octobre 21st 2016 to January 8th 2017.



NOVEMBER 2016

In November, the artists travelled to the University of Nottingham, where they visited several quantum optics and fluid dynamics labs, and gave a talk about their FEAT collaboration for the Department of Physics and Astronomy. Proposals for future collaborations were discussed.

The second artwork *Quantum Lattice* that they have created thanks to the FEAT residency is premiered at the exhibition «No such thing as Gravity» at FACT Liverpool, UK, from November 10th to February 5th.

2/ SLICES OF REALITY: *ION TRAP & QUANTUM LATTICE*

Conversation between Evelina Domnitch, Dmitry Gelfand and Annick Bureauud (podcast)

<https://creativdisturbance.org/podcast/slices-of-reality-ion-trap-quantum-lattice-meeting-with-evelina-domnitch-and-dmitry-gelfand-eng/>

3/ EXPERIENCING THE TANGIBILITY OF A SINGLE ATOM

Conversation between Tommaso Calarco and Annick Bureau (podcast)

Quantum physicist Tommaso Calarco discusses his relation to contemporary art and shares his experience of collaborating with the artist duo Evelina Domnitch and Dmitry Gelfand

<https://creativedisturbance.org/podcast/experiencing-the-tangibility-of-a-single-atom-meeting-with-tommaso-calarco/>

3/ « TRAPPING THE OBJECTLESS »

Leonardo Article about the project

« Trapping the Objectless », Evelina Domnitch, Dmitry Gelfand, Tommaso Calarco, *Leonardo*, MIT Press

Through the epistemological lenses of quantum theory and phenomenological art, the authors describe their collaborative development of several artworks exploring electrodynamic levitation. Comprising diverse ion traps that enable naked-eye observation of charged matter interactions, these artworks question the murky boundaries of perceptibility and objectification.

http://olats.org/feat/Domnitch-Gelfand_eon_a_01465.pdf

CREDITS

«Ion Hole» has been created by Evelina Domnitch and Dmitry Gelfand
in collaboration with Ferdinand Schmidt-Kaler and Tommaso Calarco ;
Cold Ions and Experimental Quantum Information Group, Johannes Gutenberg University, Mainz,
and Institute for Complex Quantum Systems, University of Ulm
<https://www.quantenbit.physik.uni-mainz.de/>
<https://www.uni-ulm.de/nawi/institut-fuer-komplexe-quantensysteme/mitarbeiter/prof-dr-tommaso-calarco/>
RySQ: http://cordis.europa.eu/project/rcn/193719_en.html

«Ion Hole» has been created as part of the FEAT/Future Emerging Art and Technology project, featart.eu

FEAT is an initiative of eutema GmbH (AT), Stichting Waag Society (NL), and youris.com (BE).

FEAT has been funded by the EU backed programme FET (Future and Emerging Technologies) Open.

It has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement
No 686527 (H2020-FETOPEN-2015-CSA).

