

Abstract:

Atom chip group –Ben-Gurion University of the Negev

Group head: Ron Folman

Our group deals with the theoretical and experimental study of atom physics, many body physics, material science and quantum phenomena. We utilize ultra-cold atoms (BECs), cold atoms, hot atoms and even atoms within a solid lattice. Half of our work volume is focused on fundamental physics and half on quantum technology. We are an international group with students and post-docs from around the world, and collaborations with numerous groups world-wide.

Our web site is www.bgu.ac.il/atomchip, where one may find among other things a brief account of our experiments, copies of our student theses, a description of our latest news, a collection of our papers, a list of our visitors, and the group head CV (may also be found here: [link](#)).

In recent years, we have received several awards including: The MRS (International Material Research Society) graduate excellence award, the Zabey prize for an excellent MSc work (twice), the Willis E. Lamb award ([link](#)), the Miller visiting professor award (Berkeley), and the rector prize for excellent PhD work. In addition, our students received several best-poster awards in Israel and abroad.

A popular account of the atom chip and our vision is given in: [link](#) See also an animated film about our work on quantum clocks and general relativity ([link](#)).

Our fundamental studies include interferometry, coherent control, atomic structure, light-matter, atom-surface interactions and atom-atom interactions. We are very much interested in noise and its relation to dephasing of quantum states, atopic related to the border between the quantum and the classical worlds. We are very much interested in foundations of quantum mechanics (QM) and the interplay between QM and general relativity. We are a part of several international collaborations including a European collaboration aimed at realizing compact interferometers and a collaboration with Germany to realize hybrid quantum devices. We are also a part of a European consortium aimed at making the optical-frequency atomic clock, the standard for the second. Recently we initiated an international collaboration aimed at creating and trapping anti-hydrogen on an atom chip.

Aside from fundamental studies, we have numerous collaborations with the industry such as projects with the IAI and NATO concerning magnetic sensing, and a project to realize a compact cold atomic clock with AccuBeat. Another project was awarded to us for constructing a miniature cold atom source. We also have contracts to assist the US Air Force and the US Navy with their quantum technology.

Finally, for the purposes of making advanced atom chips, we have constructed at BGU a cutting-edge fabrication facility ([link](#)) which is now being used not only by numerous BGU researchers, but also by researchers in other universities in Israel and around the world, as well as by many Israeli industries. Our unique knowhow in chips for quantum optics has led groups around the world to request samples from us. Our atom chips were sent to Germany, England, Italy, the US and the Netherlands.