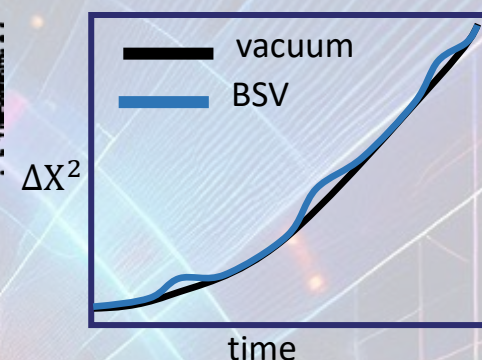
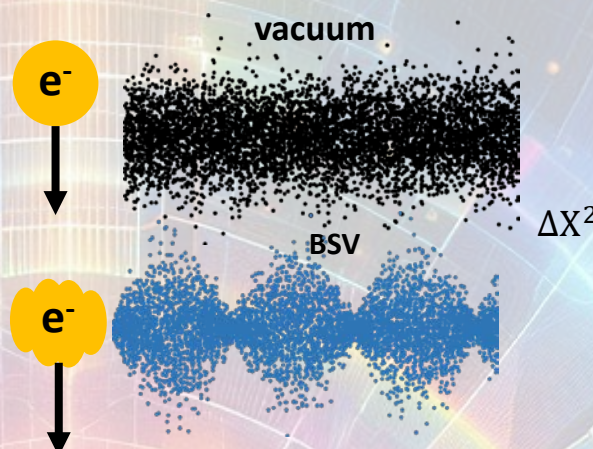


Joint PhD position proposal:

Free Electrons in Bright Squeezed Vacuum


We propose a joint Julich RC/Technion position for an experimentalist PhD student to investigate the interaction between free electrons and squeezed vacuum photonic states. Following breakthroughs in recent years, high intensity bright squeezed vacuum (BSV) is within experimental reach. The interaction of free electrons with squeezed light is amplifying the electron interaction with vacuum by millions of times.



The manifestation of the squeezed vacuum can be measured using photoexcitation techniques: the spread of electron wavefunction differs from its spread in vacuum.

Thus, interaction of free electrons with BSV can reveal to us the properties of the photonic vacuum and its fluctuations. This discovery will not only provide the first evidence of the impact of vacuum fluctuations on an electron – which is at the very foundations of quantum electrodynamics (QED) – but will also broaden our understanding of how BSV light can amplify strong field processes like high harmonic generation and above threshold ionization.

The Laser Dynamics in Solids group in  is one of the most advanced experimental facilities worldwide in generating ultrafast, extreme-intensity light pulses, and in generation of high harmonics: [Laser Dynamics in Solids](#)

The AdQuanta group at the  is one of the world leaders in ultrafast electron microscopy. The group develops unique theoretical capabilities for exploring the physics of novel kinds of electron-photon interactions: [AdQuanta](#)

Research highlights:

- The first interaction of a free electron with quantum light [[Science 373, 6561 \(2021\)](#)]
- Bright squeezed vacuum changes high-harmonic generation [[Nature Physics 19, 1689 \(2023\)](#)]
- Bright squeezed vacuum influences attosecond electron dynamics [[Nature Photonics 17, 501 \(2023\)](#)]

Reach out to interview for this PhD program and get to work in leading laboratories in Israel and Germany. On top of a full PhD fellowship, the position includes a special housing allowance and substantial support for frequent international travels between Germany and Israel.

To apply, kindly forward your CV and a cover letter to kaminer@technion.ac.il and r.adam@fz-juelich.de. Please note: acceptance to the program necessitates successful interviews at both Technion and the Jülich Research Center.