Non-perturbative Cavity QED

Title: Non-perturbative Cavity QED. When: Thursday, September 27, (2018), 11:00.

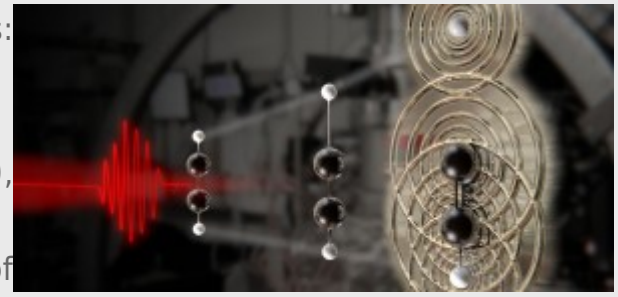
Place: Department of Theoretical Condensed Matter Physics, Faculty of Sciences, Module 5, Seminar Room (5th Floor).
Speaker: Peter Rabl, Vienna University of Technology, Austria.

In quantum optical systems the coupling between a single dipole and a single cavity mode is always much smaller than the absolute energy scales involved, which allows us to understand and model light-matter interactions in terms of well-defined atomic and photonic excitations. With recent advances in the field of circuit QED it is now possible to go beyond this well-established paradigm and enter a fully non-perturbative regime, where the coupling between a single artificial atom (e.g. a superconducting qubit) and a microwave photon exceeds the energy of the photon itself. Such conditions can be associated with an effective finestructure constant of order unity and in this talk I will give a brief introduction about the basics models and novel effects that govern the physics of light-matter interactions in this previously unaccessible regime.

Lightwave Driven Quantum Dynamics: from molecular movies to Bloch waves

INC COLLOQUIUM – OFFICIAL ANNOUNCEMENT

Title: Lightwave Driven Quantum Dynamics: from molecular movies to Bloch waves.
When: 17 September, 2018, 12h30
Where: Sala de Conferencias, Módulo 00, Faculty of Sciences, UAM.
Speaker: Jens Biegert, ICFO – The Institute of Photonic Sciences, Barcelona – Spain.



Electron recollision in an intense laser field gives rise to a variety of phenomena, ranging from electron diffraction to coherent soft X-ray emission. We have, over the years, developed intense sources of waveform-controlled mid-IR light to exploit the process with respect to ponderomotive scaling, quantum diffusion and quasi-static photoemission. I will describe how we leverage these aspects to “teach” molecules to take a selfie while undergoing structural change. This permits visualizing for the first time, with combined attosecond temporal and atomic spatial resolution, molecular bond breaking and deprotonation. Furthermore, we achieve isolated attosecond pulses in the soft X-ray water window across the oxygen edge at 534 eV. Accomplishing ultrafast temporal resolution in combination with the soft X-ray’s element specificity now provides an entirely new view on the combined electronic and nuclear dynamics in real time. I will show first results in which we resolve the carrier dynamics in a quantum material in real time and within the material’s unit cell.
These results provide first comprehensive insight into the dynamics of molecules and condensed matter, with the future possibility to address fundamental and long-standing questions such as molecular isomerization, phase transitions and superconductivity.

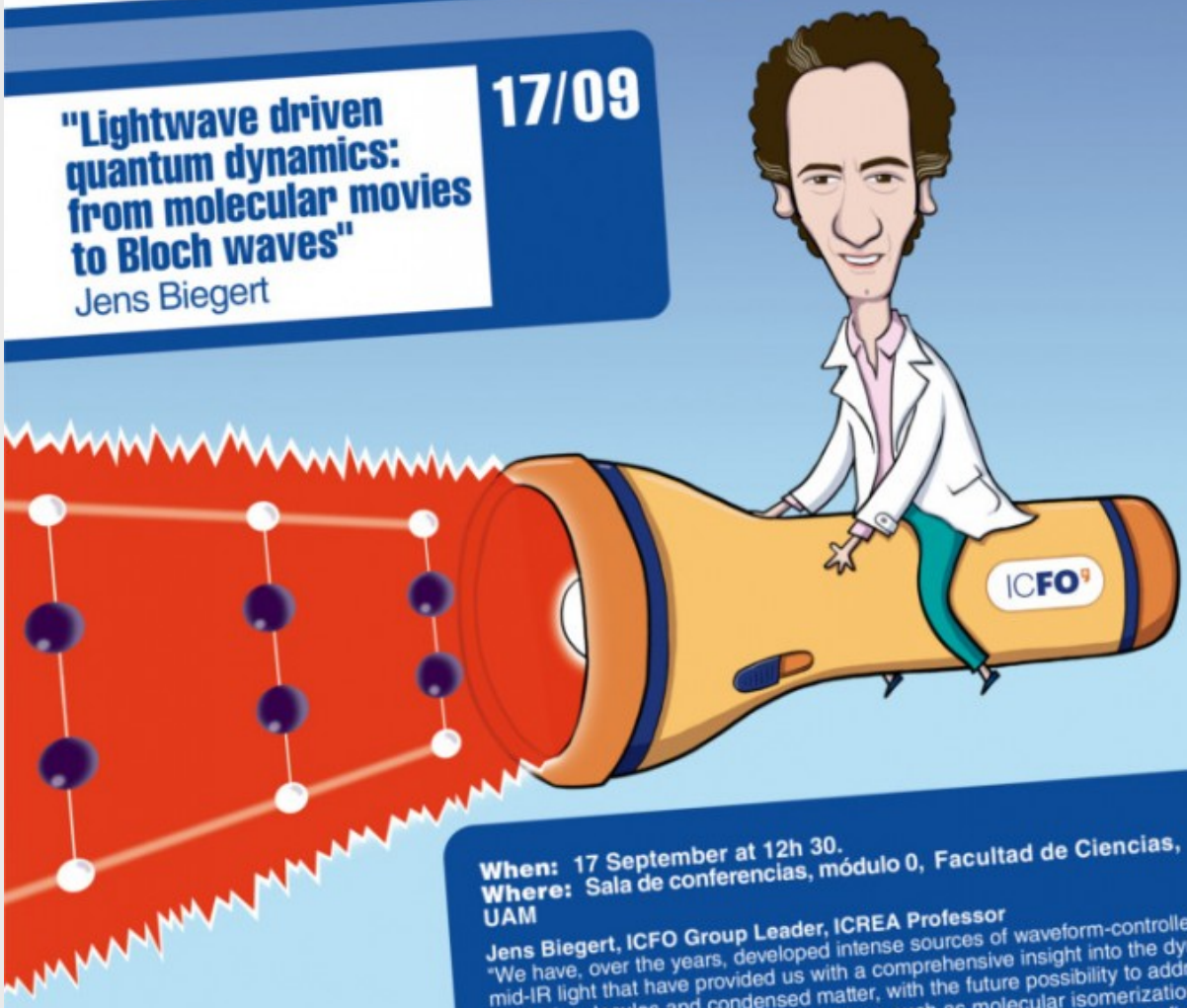
Colloquium Frontiers of Condensed Matter Physics 2018

Dedicated to Prof. Nicolás Cabrera (1913-1989)

"Lightwave driven quantum dynamics: from molecular movies to Bloch waves"

Jens Biegert

17/09



When: 17 September at 12h 30.
Where: Sala de conferencias, módulo 0, Facultad de Ciencias, UAM

Jens Biegert, ICFO Group Leader, ICREA Professor

"We have, over the years, developed intense sources of waveform-controlled mid-IR light that have provided us with a comprehensive insight into the dynamics of molecules and condensed matter, with the future possibility to address fundamental and long-standing questions such as molecular isomerization, phase transitions and superconductivity. By way of example I will show first results in which we resolve the carrier dynamics in a quantum material in real time and within the material's unit cell."

Instituto Nicolás Cabrera

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