

Atto-FEL 2022
University College London



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Organizing Committee

Chair: Prof. Agapi Emmanouilidou
Prof. Paul Corkum
Prof. Eleftherios Goulielmakis
Dr. Boris Bergues

Ultra-Short and Intense Laser pulses offer the means to observe, control and probe multi-electron effects during ionization and break-up of strongly-driven atoms and molecules. Moreover, Free Electron Laser facilities is a route to delivering XUV and X-ray pulses with intensities orders of magnitude larger than those provided by conventional synchrotron radiation sources. Ultra-fast and intense X-ray pulses open-up new horizons for probing and controlling the attosecond motion of inner-shell electrons in multi-photon multi-ionization processes. The Atto-FEL international conference aims to bring together theorists from the FEL and Attosecond-Strong Field Science communities to discuss and present recent advances in theoretical techniques developed to tackle multi-electron effects in ionization of atoms and molecules. Another goal of this meeting is to draw together theorists and experimentalists in order to identify the most interesting challenges that both communities will face in the future.

Program Atto-FEL 2022

Monday 27th June

8:45-9:00 am Introductory remarks Agapi Emmanouilidou

Session I

Chair: Agapi Emmanouilidou

9:00-9:40 am P. Corkum, University of Ottawa, Canada

“Probing Attosecond Time Delays Via Recollision”

9:40-10:20 am M. Vrakking, Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy, Germany

“Control of attosecond entanglement and coherence”

10:20-11:00 am E. Goulielmakis, University of Rostock, Germany

“Attosecond metrology of the optical field emission”

Coffee Break 11:00-11:30 am

Session II

Chair: Bernd Schuette

11:30-12:10 am I. Ben-Itzhak, J. R. Macdonald Laboratory, Kansas State University, USA

“Coincidence momentum imaging of photo-induced multi-body fragmentation: a path toward understanding molecular dynamics with increasing complexity”

12:10-12:50 am V. Majety, Indian Institute of Technology Tirupati, India

“Molecular Strong field ionization using the hybrid coupled channels approach”

Lunch Break 12:50-2:20 pm

Session III

Chair: Nora Berrah

2:20-3:00 pm S. Hooker, University of Oxford, UK

“Laser-driven plasma accelerators”

3:00-3:40 pm B. Bergues, Max Planck Institute for Quantum Optics, Germany

“Nanoscale Optical Control of Molecular Reactions Yields on Nanoparticles”

3:40-4:20 pm M. Schultze, Graz University of Technology, Austria

“Light-wave driven charge- and spin-dynamics”

Coffee Break 4:20-4:50 pm

Session IV

Chair: Thomas Pfeiffer

4:50-5:20 pm E. Appi, Lund University, Sweden and Leibniz University Hannover, Germany, and C. Papadopoulou, DESY, Germany

“Synchronized high-order harmonic source at FLASH”

5:20-5:40 pm M. Seitz, DESY, Germany

“Time-resolved spectroscopy of photo-induced electron dynamics in nuclear transitions”

5:40-6:00 pm L. Colaizzi, University of Hamburg and DESY, Germany

“Ultrafast molecular dynamics induced by few-femtosecond ultraviolet excitation”

6:00-6:20 pm A. Jain, University of Ottawa, Canada

“Dichroism in solids with helical light”

6:20-6:40 pm D. Rivas, European XFEL, Germany

“High-temporal-resolution soft X-ray photoelectron spectroscopy of small quantum systems”

Tuesday June 28th

Session I

Chair: Eva Lindroth

9:00-9:40 pm C. Vozzi, Institute for Photonics and Nanotechnologies of the NRC, Italy

“XUV generation in microfluidic glass devices for ultrafast x-ray spectroscopy”

9:40-10:00 pm J. Peschel, Lund University, Sweden

“Ultrafast dynamics of multi-channel single photon ionization”

10:00-10:20 pm P. Rosenberger, Ludwig-Maximilians-University and Max Planck Institute for Quantum Optics, Germany

“Soft ionization of propanediol nanodroplets in intense laser fields”

10:20-11:00 pm O. Smirnova, Max Born Institute and Technical University Berlin, Germany

“Ultrafast chirality: twisting light to twist electrons”

Coffee Break 11:00-11:30 am

Session II

Chair: Mark Vrakking

11:30-12:10 pm E. Lindroth, Stockholm University, Sweden

“Photoionization delay in heavy atoms: spin dynamics and angular dependence”

12:10-12:50 pm G. Katsoulis, University College London, UK

“Magnetic field effects and correlated electron dynamics in triple ionization of strongly driven atoms”

12:50-1:10 pm M. Petters, University College London, UK
“*A new model for addressing three and more electron ionization in strongly-driven atoms*”
1:10-1:50 pm M. Moiseyev, Technion Institute of Technology, Israel
“*The physics of NHQM (non-Hermitian quantum mechanics) in the studies of electron scattering and high harmonic generation experiments*”

Lunch Break 1:50-3:00 pm

Session III

Chair: Boris Bergues

3:00-3:20 pm A. Hadjipittas, University College London, UK
“*Sequential versus Direct processes in XUV ionization of atoms*”
3:20-3:40 pm M. Mountney, University College London, UK
“*Controlling angle of ionization of electrons using IR+XUV pulses*”
3:40-4:00 pm D. Ayuso, Imperial College London, UK
“*Exploiting the new opportunities enabled by synthetic chiral light: from imaging ultrafast chiral nuclear dynamics to “bending” the nonlinear optical response of chiral molecules*”
4:00-4:20 pm S. Carlstrom, Max-Born Institute, Germany and Lund University, Sweden
“*Spin-Polarized Photoelectrons in Linearly Polarized Light*”
4:20-6:30 pm **Poster Session with Pizza and Beer**
7:00-11:00 pm Conference Dinner

Wednesday June 29th

Session I

Chair: Eleftherios Goulielmakis

9:00-9:40 am M. Nisoli, Politecnico of Milano, Italy
“*Attosecond Exciton Dynamics*”
9:40-10:20 am N. Berrah, University of Connecticut, USA
“*Resonance-enhanced multiphoton ionization in the x-ray regime*”
10:20-11:00 am J. Cryan, Stanford Pulse Institute, SLAC National Accelerator Laboratory, USA
“*Using X-ray Free Electron Lasers to Study Attosecond Electron Motion*”

Coffee Break 11:00-11:30 am

Session II

Chair: Paul Corkum

11:30-12:10 am L. Cederbaum, University of Heidelberg, Germany
“*Is an efficient intermolecular energy transfer from vibrations to electronic motion possible?*”

12:10-12:50 pm T. Brabec, University of Ottawa, Canada

“Mechanisms of high harmonic generation in solids”

12:50-1:30 pm T. Boolakee, Friedrich-Alexander University, Erlangen-Nürnberg, Germany

“Lightwave electronics in a graphene heterojunction”

Lunch Break 1:30-3:00 pm

Session III

Chair: Caterina Vozzi

3:00-3:40 pm R. Bhardwaj, University of Ottawa, Canada

“Chiral light-matter interactions”

3:40-4:20 pm B. Schuette, Max Born Institute, Germany

“Attosecond control of XUV multiphoton ionization”

4:20-5:00 pm D. Charalambidis, FORTH and University of Crete, Greece

“Multiphoton and strong field processes at intense laser driven harmonic XUV sources”

5:00-5:20 pm Y. Shakya, DESY, Germany

“Capturing electronic decoherence in quantum-classical dynamics using the ring polymer surface hopping – density matrix approach”

Small Wine Reception for Talk by Paul Corkum 5:20-6:00 pm

6:00-7:00 pm P. Corkum, University of Ottawa, Canada

“The Complementarity of High-Harmonic Generation and Free-Electron Laser Science”

Thursday June 30th

Session I

Chair: Simon Hooker

9:00-9:40 pm T. Pfeifer, Max Planck Institute for Nuclear Physics, Germany

“Fundamental electronic and internuclear quantum dynamics probed and steered by intense (free-electron) laser fields”

9:40-10:00 am C. Juers, University of Rostock, Germany

“Edge state contributions to high-order harmonic generation in topological insulators”

10:00-12:20 pm A. Magunia, Max Planck Institute for Nuclear Physics, Germany

“FEL-induced dissociation of oxygen molecules probed by high harmonics (HHG) in XUV-pump-XUV-probe transient absorption spectroscopy”

10:20-11:00 pm A. Zair, King’s College London, UK

“On the nature of quantum paths observed in high harmonic generation”

Coffee Break 11:00-11:30 am

Session II

Chair: Emma Springate

11:30-12:10 am J. M. Rost, Max Planck Institute for the Physics of Complex Systems, Germany

“Multi-harmonic pulses interacting with small-gapped materials”

12:10-12:50 pm H. Van Der Hart, Queen’s University Belfast, UK
“RABITT calculations in time-dependent R-matrix theory”

12:50-1:30 pm R. Moshhammer, Max Planck Institute for Nuclear Physics, Germany
“HHG and FEL based experiments on molecular fragmentation”

Lunch Break 1:30-2:20 pm

Session III

Chair: Gilad Marcus

2:20-3:00 pm E. Springate, STFC Central Facility, UK
“Time-resolved photoelectron spectroscopy with high harmonics at the Artemis facility”

3:00-3:40 pm S. Hogan, University College London, UK
“Time-domain measurements and calculations of excited-state tunnel ionisation rates in strong electric fields”

3:40-4:00. pm H. Chomet, University College London, UK
“Controlling strong-field ionization with machine learning techniques”

Coffee Break 4:00-4:30 pm

Chair: Agapi Emmanouilidou

4:30-5:10 pm G. Doumy, Argonne National Laboratory, USA
“Attosecond x-ray induced phenomena from the linear to the nonlinear regime”

5:10-5:50 pm R. Minns, University of Southampton, UK
“Time-Resolved Extreme Ultraviolet Photoelectron Spectroscopy of Molecular Dynamics”

5:50-6:20 pm G. Marcus, Hebrew University of Jerusalem, Israel
“Polarization Dependence of Laser Induced inner-shell excitations”

Concluding remarks 6:20 pm A. Emmanouilidou

Participants

Mattias Ammitzböll, Lund University, Sweden

Elisa Appi, Lund University, Sweden

Christopher Arrell, Paul Scherrer Institute, Switzerland

David Ayuso, Imperial College London, UK

Jean-Luc Bégin, University of Ottawa, Canada

Itzik Ben-Itzhak, J. R. Macdonald Laboratory, Kansas State University, USA

Boris Bergues, Ludwig-Maximillan University in Munich and Max Planck Institute of Quantum Optics, Germany

Nora Berrah, University of Connecticut, USA

Ravi Bhardwaj, University of Ottawa, Canada

Johannes Blöchl, Ludwig-Maximillan University in Munich and Max Planck Institute of Quantum Optics, Germany

Thomas Brabec, University of Ottawa, Canada

T. Boolakee, Friedrich-Alexander University, Erlangen-Nürnberg, Germany

Stefanos Carlström, Max Born Institute, Germany, and Lund University, Sweden

Lorenz Cederbaum, University of Heidelberg, Germany

Dimitris Charalambidis, FORTH-IESL and University of Crete, Greece

Zekai Chen, King's College London, UK

Heloise Chomet, University College London, UK

Lorenzo Colaizzi, CFEL-DESY, Germany

Paul Corkum, University of Ottawa

James Cryan, Stanford Pulse Institute, USA

Diptech Dey, University College London, UK

Gilles Doumy, Argonne National Laboratory, USA

Agapi Emmanouilidou, University College London, USA

Gaia Giovannetti, DESY, Germany

Alexander Guggenmos, Ultrafast Innovations GmbH

Antonis Hadjipittas, University College London, UK

Stephen Hogan, University College London, UK

Simon Hooker, University of Oxford, UK

Ashish Jain, University of Ottawa, Canada

Sohail Abdul Jalil, University of Ottawa, Canada

Christoph Jueress, University of Rostock, Germany

Gabriel Karras, STFC-RAL, UK

Georgios-Petros Katsoulis, University College London, UK

Sylvia Kendi, ASI

Margarita Khokhlova, Max Born Institute, Germany

Katarzyna Kowalczyk, Imperial College London, UK

Eva Lindorth, Stockholm University, Sweden

Alexander Magunia, Max Planck Institute for Nuclear Physics, Germany

Gilad Marcus, Hebrew University of Jerusalem, Israel

Hugo Marroux, CEA-Saclay, France

Mary Matthews, Imperial College London, UK

Nicola Mayer, Max Born Institute Berlin, Germany

Russell Minns, University of Southampton, UK

Nimrod Moiseyv, Technion Institute of Technology, Israel

Robert Moshhammer, Max Planck Institute for Nuclear Physics, Germany

Miles Mountney, University College London

Saikat Nandi, CNRS Institut Lumière Matière, France

Mauro Nisoli, Politecnico di Milano, Italy

Edwin Olofsson, Lund University, Sweden

Gaurav Pandey, Indian Institute of Science Education and Research Kolkata, India

Christina Papadopoulou, DESY, Germany

Jasper Peschel, Lund University, Sweden

Mathew Petters, University College London, UK

Thomas Pfeifer, Max Planck Institute for Nuclear Physics, Germany

Rose Picciuto, Imperial College London, UK

Emilio Pisanty, King's College London, UK

Laura Rego, Imperial College London, UK

Marvin Reuner, University of Hamburg, Germany

Sergei Riabchuk, University of Hamburg, Germany

Daniel Rivas, European XFEL, Hungary

Thomas Rook, University College London, UK

Philipp Rosenberger, Ludwig-Maximilian University in Munich, Germany

Jan Michael Rost, Max Planck Institute for the Physics of Complex Systems, Germany

Martin Schultze, Graz Technical University, Austria

Bernd Schütte, Max Born Institute, Germany

Marc Seitz, DESY, Germany

Yashoj Shakya, DESY, Germany

Nikolay Shvetsov-Shilovskiy, Leibniz University Hannover, Germany

Laura Silletti, DESY, Germany

Olga Smirnova, Max Born Institute, Germany

Emma Springate, STFC Central Laser Facility, UK

James Tarrant, Imperial College London, UK

Victor Thachenko, Polish Academy of Sciences, UK

Atia Tul Noor, DESY, Germany

Hugo Van Der Hart, Queen's University Belfast

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Joshua Vogwell, Imperial College London, UK

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Vincent Wanie, DESY, Germany

Anne Weber, King's College London, UK

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Yingxuan Wu, Politecnico Di Milano, Italy

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Felipe Zapata Abelián, Lund University, Sweden

Cong Zhao, King's College London, UK

Xiaozhou Zou, King's College London, UK

