Stanford

Adi Natan

Staff Scientist, Energy Sciences

Bio

BIO

Dr Natan leads the Non-Periodic ultrafast X-ray Imaging group at the Stanford PULSE Institute, where the research focuses on imaging ultrafast atomic motion in systems that interact with complex fields and environments, mostly using ultrafast X-ray FEL pulses. The purpose of this research is to study light-matter interaction in the shortest length and timescales, to uncover the interplay between correlated electronic motion and relaxation, nuclear motion, and photo-absorption processes. The research team develops experimental and computational tools to image quantum dynamics at the atomic scale, with the aim to overcome the limits of current approaches that rely on modeling and simulation. The research also leverages recent advances in ultrafast x-ray lasers, like the LCLS at SLAC National Accelerator Laboratory, and helps develop effective protocols, new modalities, detection schemes, and demonstrates important new capabilities as soon as they become feasible. Previously, Dr Natan was the co-PI of the Strong Field AMO physics task at PULSE, where he studied strong-field light-matter interaction in atoms and molecules, in particular, light-induced conical intersections, imaging strong-field ionization dynamics, and attosecond electronic delays.

Dr Natan received his PhD in Physics from the Weizmann Institute of Science, where he worked with Prof. Yaron Silberberg on coherent control, strong field interaction, nonlinear spectroscopy, and quantum optics. He was later a postdoctoral fellow at PULSE under the supervision of Prof. Phil Bucksbaum working on strong field AMO physics, and ultrafast X-ray science.

CURRENT ROLE AT STANFORD

Principal investigator, Stanford PULSE Institute

INSTITUTE AFFILIATIONS

- Principal Investigator, Stanford PULSE Institute

EDUCATION AND CERTIFICATIONS

- PhD, Weizmann Institute of Science , Physics

LINKS

- NPI Group website: https://ultrafast.stanford.edu/npi-non-periodic-ultrafast-x-ray-imaging

Publications

PUBLICATIONS

- **Ultrafast x-ray imaging of coherently controlled molecular dynamics in real space and time** *PHYSICAL REVIEW A*
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- **Reconciling the Different Apparent Decay Pathways for Iron(III) Tetraphenylporphyrin Chloride: Evidence for Excited State Branching.** *The journal of physical chemistry. A*
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- **Characterization of Deformational Isomerization Potential and Interconversion Dynamics with Ultrafast X-ray Solution Scattering.** *Journal of the American Chemical Society*
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- **Disentangling the subcycle electron momentum spectrum in strong-field ionization** *PHYSICAL REVIEW RESEARCH*
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- **Resolving multiphoton processes with high-order anisotropy ultrafast X-ray scattering.** *Faraday discussions*
  Natan, A., Schori, A., Owolabi, G., Cryan, J. P., Glownia, J. M., Bucksbaum, P. H.
  2021

- **Electronic Population Transfer via Impulsive Stimulated X-Ray Raman Scattering with Attosecond Soft-X-Ray Pulses.** *Physical review letters*
  O'Neal, J. T., Champenois, E. G., Oberli, S., Obaid, R., Al-Haddad, A., Barnard, J., Berrah, N., Coffee, R., Duris, J., Galinis, G., Garratt, D., Glownia, J. M., Haxton, et al
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- **Electronic Population Transfer via Impulsive Stimulated X-Ray Raman Scattering with Attosecond Soft-X-Ray Pulses** *PHYSICAL REVIEW LETTERS*
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- **Characterizing Multiphoton Excitation Using Time-Resolved X-ray Scattering** *PHYSICAL REVIEW X*
  Bucksbaum, P. H., Ware, M. R., Natan, A., Cryan, J. P., Glownia, J. M.
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- **Tunable isolated attosecond X-ray pulses with gigawatt peak power from a free-electron laser** *NATURE PHOTONICS*
  Duris, J., Li, S., Driver, T., Champenois, E. G., MacArthur, J. P., Lutman, A. A., Zhang, Z., Rosenberger, P., Aldrich, J. W., Coffee, R., Coslovich, G., Decker, F., Glownia, et al
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- **Attosecond transient absorption spooktroscopy: a ghost imaging approach to ultrafast absorption spectroscopy.** *Physical chemistry chemical physics : PCCP*
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- **On the limits of observing motion in time-resolved X-ray scattering.** *Philosophical transactions. Series A, Mathematical, physical, and engineering sciences*
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- **Fourier-transform inelastic x-ray scattering: A new kind of gas-phase vibrational spectroscopy**
  Ware, M., Glownia, J. M., Natan, A., Cryan, J., Bucksbaum, P., IEEE
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- **Imaging the breakdown of molecular-frame dynamics through rotational uncoupling** *PHYSICAL REVIEW A*
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- **Observation of Quantum Interferences via Light-Induced Conical Intersections in Diatomic Molecules** *PHYSICAL REVIEW LETTERS*
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- **Experimental Signature of Light Induced Conical Intersections in Diatomics**
  Natan, A., Ware, M. R., Bucksbaum, P. H.
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- **Probing electron delays in above-threshold ionization** *OPTICA*
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