



UNIVERSITY OF OREGON



Physical Chemistry Seminar Series

Matt Graham
The Micro-Femto Energetics Lab
OSU—Department of Physics

October 22, 2018 ~ 2:00—3:00 Klamath Hall 331

Filming Nanoelectronics in the Twinkling of an Eye

How can we best harvest photoexcited electrons in emerging nanomaterials to enable higher solar efficiencies and faster optoelectronics?

The Micro-Femto Energetics Lab at Oregon State develops novel spectroscopy and transport methods that resolve photoexcited electron dynamics with both micron ($\sim 10^{-6}$ m) spatial resolution and femtosecond (10^{-15} s) time-resolution. By creating these ultrafast movies at single crystal grain level, we can resolve the journey of photocurrent generation; from light absorption to electron extraction. Specifically, we develop ‘on-chip’ microscopy movies that use femtosecond-photocurrent and transient absorption responses from individual crystal grains of bilayer 2D materials. By twisting the layer stacking orientation and applying *E*-field, we show how long-range interlayer electronic coupling of both graphene and other 2D semiconducting materials fundamentally alter the material photophysics. This new approach further enables us to selectively image the rate-limiting electron-hole dissociation bottleneck processes which intrinsically control new material’s potential for next-generation solar and optoelectronic applications.

BIO: Matt Graham is an Assistant Professor of Physics at Oregon State University. He received his Hon.B.Sc. degree from the University of Toronto, and his Ph.D. from University of California, Berkeley and Lawrence Berkeley Labs. He was then a Kavli Postdoctoral Fellow at Cornell University until moving to Oregon State to start his fully independent career at the end of 2013. Matt studies the energetics and spectroscopy of electrons in a 2D materials and other low-dimensional materials and devices. Matt currently also represents the Optical Society of America (OSA) as one of their 8 Ambassadors and shares the OSA message wherever he travels.

Refreshments served at 1:45 pm, 331 Klamath Hall

Hosted by Cathy Wong