

OSA (Optical Society) Purdue Student Chapter 2014 Seminar Sessions



Title: Optomechanics of levitated dielectric particles

Speaker: Prof. Tongcang Li (Purdue University)

About the lecture:

I will first introduce basic concepts in cavity optomechanics, which explores the interaction between photons and mechanical motion. Then, I will review recent works in optomechanics of levitated particles, including our own contributions. Optically trapped microspheres and nanoparticles in vacuum provide an ideal system for ultrasensitive force detection and studying macroscopic quantum mechanics. An optically trapped particle in vacuum has an ultrahigh mechanical quality factor as it is well-isolated from the thermal environment. Its oscillation frequency can be tuned in real time by changing the power of the trapping laser. Furthermore, an optically trapped particle in vacuum may rotate freely, a unique property that does not exist in clamped mechanical oscillators.

Brief bio:



Tongcang Li is an assistant professor of physics and astronomy, and assistant professor of electrical and computer engineering at Purdue University. He did his PhD at the University of Texas at Austin, and postdoc at the University of California, Berkeley before joining the Purdue University in 2014. His main contributions include the measurement of the instantaneous velocity of a Brownian particle for the first time, a task that was said to be impossible by Albert Einstein in 1907. He has also cooled the center-of-mass motion of an optically trapped microsphere in vacuum from room temperature to about 1.5 mK, and proposed and initiated the ongoing experiment to create space-time crystals of trapped ions. Tongcang has published one book and more than 20 papers in *Science*, *Nature Physics*, *Nature Communications*, *Physical Review Letters* and other leading journals. His work has been highlighted by *Nature* and *Nature Photonics* on four occasions and has been widely reported by major media and professional magazines, including NBC News, Fox News, Science Channel, *Physics World*, and *Materials Today*.

September 22nd, 5-6pm @ BRK 1001

Food and beverages will be provided.

Send us your questions or suggestions concerning this event to osa.purdue@gmail.com. Find us on [facebook.com](https://www.facebook.com/osa.purdue)

