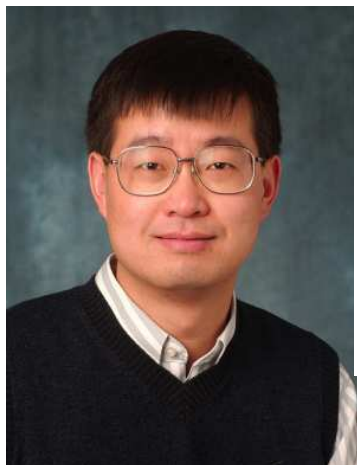


*Colloquium*  
*Physics Department*  
*Temple University*



*Making the world's best atomic clock*  
**Prof. Jun Ye**

*JILA, National Institute of Standards and  
Technology and University of Colorado,  
Boulder*

The relentless pursuit of spectroscopy resolution has been a key drive for many scientific and technological breakthroughs over the past century, including the invention of laser and the creation of ultracold matter. Our state-of-the-art laser now maintains optical phase coherence over multiple seconds and provides this piercing resolution across the entire visible spectrum. The new capability in control of light has enabled us to create and probe novel quantum matter via manipulation of dilute atomic and molecular gases at ultralow temperatures. For the first time, we control the quantum states of more than 1000 atoms so precisely that we achieve a more stable and accurate atomic clock than any existing atomic clocks, with both key clock characteristics reaching the  $10^{-18}$  level. We are also on the verge of integrating novel many-body quantum states into the frontiers of precision metrology, ready to advance the measurement precision beyond the standard quantum limit. Such advanced clocks will allow us to test the fundamental laws of nature and find applications among a wide range of technological frontiers.

*January 11, 2016, 3pm in SERC 110B*