Departments of Physics Colloquium

LIGO, squeezed states of light, and nonlinear light-atom interactions

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Friday, April 1, 2016
1:30 – 2:30 PM
Venue: GL100A, MMC

Abstract: In the first part of the talk, I will talk about the Laser Interferometer Gravitational-Wave Observatory (LIGO) detector, recent detection of the gravitational wave and its source. In the second part of the talk, I will discuss fundamental limits on LIGO performance: optical measurements are intrinsically limited by the quantum shot noise, which is the manifestation of the optical equivalent of the Heisenberg uncertainty principle. I will talk about "squeezed" quantum states of light which allow performing measurements beyond the standard quantum limit. I will introduce methods for squeezed light generation via the nonlinear light-atoms interaction and outline several applications of the squeezed light, such as boosting the sensitivity of the gravitational wave antenna such as the LIGO, and other optical measurements which can be boosted by nonlinear light-atom interactions.

Biography: Dr. Eugeniy Mikhailov is an assistant professor in the Department of Physics at College of William & Mary. He received his PhD in Physics in 2003 from Texas A&M University and was a postdoc researcher at MIT's Kavli Institute for Astrophysics and Space Research / LIGO Laboratory. His research group at William & Mary is an official member of the LIGO Scientific Collaboration (LSC). He and his students are coauthors on the groundbreaking paper documenting the gravitational waves discovery [*PRL 116, 061102 (2016)*]. His research interests are in the quantum enhanced measurements including generation and application of squeezed states of light, gravitational wave detectors, magnetometry, atomic clocks, optical gyroscopes, and nonlinear light atom interaction.

The event is free and open to the public.
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