

**January 31, 4 pm****Skoltech, room 402**

**We are happy to invite you to the upcoming  
SKOLTECH COLLOQUIUM!**

This time it is a joint event with Energy Colloquium!  
Check out their current schedule here.

**Dmitri Basov,**

Professor of Physics in the Department of Physics at Columbia University, will talk about

## **QUANTUM MATERIALS: INSIGHTS FROM NEAR FIELD NANO-OPTICS**



In 1944 Hans Bethe reported on “the diffraction of electromagnetic radiation by a hole small compared with the wave-length” [Physical Review 66, 163 (1944)]. This seminal paper was among the early precursors to a new and vibrant area of research: near field nano-optics. Prof Basov will discuss recent nano-optical experiments on quantum materials including: transition metal oxides undergoing the insulator to metal transition and graphene.

Central to the nano-optical exploration of quantum materials is the notion of polaritons: hybrid light matter modes that are omnipresent in polarizable media. Infrared nano-optics allows one to directly image polaritonic standing waves [Nature 487, 82 (2012); Nature Materials 14, 1217 (2015)] yielding rich insights into the electronic phenomena of the host material supporting polaritons [Science 354, 195 (2016)]. I will give a progress report on the search for the role of the Berry phase in the properties of graphene via polaritonic imaging [Nature Photonics 10, 244 (2016)]. In a parallel development, we harnessed near field optics to uncover the elusive electronic and magnetic phases that occur only at the nano-scale in the vicinity of the insulator to metal transition in transition metal oxides [Nature Physics 13, 80 (2016) and Nature Materials 15, 956 (2016)].

You can find more information about the speaker here  
[infrared.cni.columbia.edu/](http://infrared.cni.columbia.edu/)

FOR FURTHER INFORMATION  
OR QUESTIONS, PLEASE CONTACT  
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**LOOKING FORWARD  
TO SEEING YOU!**