Abstract:
I will propose a novel way to obtain high thermoelectric figure of merit ZT in topological insulators. The work is based on the fact that the dislocations in certain 3D topological insulators have topologically protected 1D conducting channels. We predict that at high densities of the dislocations ZT can be dominated by these 1D states which can reduce the thermal conductivity on one hand and increase the conductivity and thermopower on the other. I will show that in principle this system can have very high ZT of order 10, hence making it a uniquely strong candidate for applications in heat management of nanodevices.

Short biography:
Oleg Tretiakov is currently a Postdoctoral Research Associate in the Department of Physics and Astronomy at Texas A&M University and a member of the Condensed Matter Theory group. His research is in diverse areas of condensed matter physics and materials science. In particular, he focuses on topics such as spintronics, nanomagnetism, topological insulators, thermoelectrics, and dynamics of topological textures in nanostructures. Oleg’s academic career began at Moscow Institute of Physics and Technology where he received his B.S. with Honors in Physics and Mathematics in 1998. He received his M.A. in Physics (2002) and later his Ph.D. in Physics (2005) at Duke University. After his Ph.D. he worked as a postdoctoral fellow at the Johns Hopkins University until 2007 and then as a research scientist at New York University until 2009. He is the recipient of Fritz London Fellowship (2005) at Duke University, LIT Fellowship for Academic Excellence (1997) at MIPT, and Moscow Government Scholarship (1995).