

NC Optics & Electronics Young Scientists School, Kaliningrad, July 2016

Title:

Raman Spectroscopy as a Fundamental Analytical Tool to Understand Nanocarbon Optics and Electronics

Abstract:

Raman scattering (RS) is extremely successfully used to analyze optical, electronic, and structural properties of nanocarbons (NC). This is possible since it is an optical method on the one hand but also probes mechanical properties like phonons and, indirectly, structure and bonding.

In my tutorial report I will at first introduce the concepts and experimental requirements for this analytical technique. This will include not only conventional RS but also concern several special techniques such as resonance RS, tip enhanced RS, Raman imaging, or Fourier transform RS. It will also include some theoretical concepts for the interpretation of the experimental results. In the next section I will summarize some fundamental results from Raman scattering for NC such as fullerenes, carbon nanotubes and graphene. In the second part of my talk I will present some results which demonstrate the usefulness of RS for the understanding of NC optics and electronics. This will be concerned amongst others with applications of isotope substitutions, double resonance scattering, and intercalation effects. At the end I will present some results from our very recent work on double-walled carbon nanotubes.