Centre de Nanosciences et de Nanotechnologies

Séminaire

Lundi 18 septembre

11 heures
Salle 44 (P. Grivet) du C2N site Orsay

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" Nanoscale contact as a source of plasmons for plasmonic nanocircuits"

Résumé:
Electrically driven optical antennas are attracting much attention, in particular, due to necessity to develop integrated electrical source of surface plasmons for future plasmonic nanocircuitries. By default, this term denotes a metal nanostructure, in which electromagnetic oscillations at optical frequencies are excited by electrons, *tunneling* between metallic parts of the structure when a bias voltage is applied between them.

Instead of relying on an inefficient inelastic light emission in a tunnel gap, we are suggesting to use ballistic nanoconstrictions as the *feed element* of an optical antennas in order to excite electromagnetic plasmonic modes. Similarly to tunneling structures, the voltage applied at the constriction falls over the contact of nanoscale length. Electron passing through the contact *ballistically* can gain the energy provided by the bias ~1*e*V and exchange it into an mode of the optical antenna. We discussed the underlying mechanisms responsible for the optical emission, and show that with nanoscale contact, one can reach quantum efficiency orders of magnitude larger than with standard tunneling structures.

Alexander Uskov received his MS degree in Theoretical Physics from Moscow Engineering Physics Institute (MIFI), and obtained his PhD in Quantum Electronics from P.N.Lebedev Physical Institute of Russian Academy of Sciences in 1980. At the present, he has permanent position of leading scientist in N.G.Basov Quantum RadioPhysics Division of P.N.Lebedev Physical Institute of Russian Academy of Sciences. During almost 30 years, he has been a visiting researcher fellow/professor in various research centers, private companies and universities in Denmark, USA, Germany, Italy, Ireland, France, Japan. Main field of his scientific activity are physics of optoelectronic devices and adjacent areas of semiconductor physics, nonlinear optics, laser physics and so.