Physics AT QUEENS COLLEGE

Colloquium Notice

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Materials and structures for nonlinear photonics

Rapid development of nanofabrication has stimulated the growth of the field of nonlinear photonics. Nonlinear photonic devices are finding their applications in more and more areas, including (but not limited to) classical and quantum communications, sensors, nonlinear spectroscopy. The material platforms used for nonlinear photonics on-a-chip range from transparent dielectrics with a relatively weak nonlinearity to semiconductor materials with strong nonlinear interactions. The established nanofabrication techniques also allow to produce artificial nanostructured materials (metamaterials) with tailored linear and nonlinear optical responses.

Among the materials for nonlinear photonics on-a-chip, III-V semiconductors stand out due to the large variety of compounds suitable for different spectral ranges. There is, however, very little information available on the nonlinear optical performance of various III-V semiconductor compounds. There are very few isolated representatives of this group of materials that have been assessed for their nonlinear optical performances (e.g., AlGaAs), while there exist many other material representatives of this group of semiconductors, offering a variety of operation ranges and applications, that have never been studied for that role.

In this presentation, I propose an approach towards identifying interesting material candidates suitable for nonlinear photonics, and present the results of some experimental studies performed in this direction. More specifically, I will talk about our studies of GaN waveguides with wide electronic bandgap, suitable for the applications in the visible and near-infrared spectral ranges. I will also present the results of our experimental realization of passive InGaAsP waveguides that have potentials of being used for wavelength conversion to beyond 2 micrometers, thus expanding the operation range of well-established InGaAsP laser sources to the longer wavelengths. In addition, I will briefly describe our collaborative projects focused on nonlinear metamaterials and nonlinear optical interactions at the Terahertz frequencies.

Monday
March 30, 2020
Starts at 12:15 PM
Coffee at 12:00 PM
Physics Conference Room, SB B326