AVVISO DI SEMINARI
## Prof. Basant Lal Sharma (IIT- Kanpur, India)

AULA L1
II PIANO – PLESSO DI INGEGNERIA STRUTTURALE, POLITECNICO DI BARI

21 MAGGIO ORE 16:00: Discrete scattering by a crack

23 MAGGIO ORE 16:00: Steady state kinetics of lattice defects: prototype models and energy balance

24 MAGGIO ORE 12:00: Discrete analogues of Sommerfeld planes and nanoscale transport in certain structures: some lessons from elementary mathematical techniques
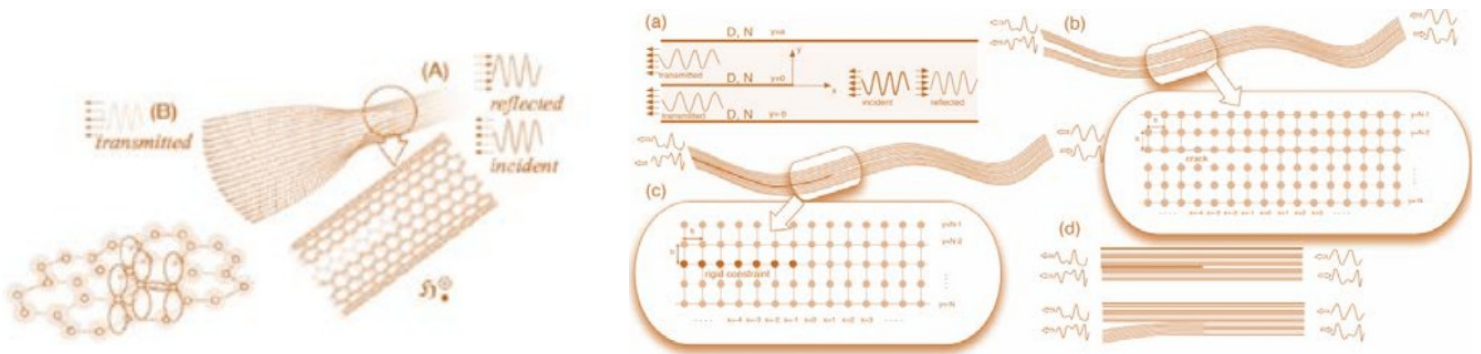
Abstract: A century old problem in optics, its solution, and the method of solution, has been found to be again relevant today. The diffraction of scalar waves by Sommerfeld screens has been studied recently in a discrete framework. Using the method of Wiener and Hopf some of these problems admit remarkably simple form of solutions. A natural extension to waveguide structures is also possible. The issues of reflectance, transmittance, and, in general, the scattering matrix allow application of an elegant analysis that uses Chebyshev polynomials. It is serendipitous that the scalar wave scattering problem, earlier announced within the mechanical paradigm of out-of-plane motion of lattices with cracks (mode III) or rigid constraints, has found an interesting connection with quantum mechanical approximations for electronic transport in graphene ribbons and nanotubes, albeit within certain idealisations. It is a hope that the special solutions will remain relevant for more realistic models whose exact analytical solution may not be possible in practical terms. The talk will give a flavour of the mathematical analysis of discrete Sommerfeld problems as well as bifurcated waveguides besides touching upon a variety of related problems and applications.

Bio: *Basant Lal Sharma received Bachelor of Technology in Mechanical Engineering from the Indian Institute of Technology Bombay, Powai, Mumbai, India in 1999. In 2004 he received Ph.D. in Mechanics (P. Rosakis) from the Cornell University, Ithaca, NY, USA. After post-doctoral positions at Cornell University (S.H. Strogatz) and École Polytechnique, Palaiseau, Paris, France (L. Truskinovsky), he joined the Department of Mechanical Engineering, Indian Institute of Technology Kanpur, Kanpur, Uttar Pradesh, India in January 2007 as a Faculty member. He is interested in studying physical phenomena that occur due to the presence of small length scales, for example, the structure and dynamics of defects in crystal. Since summer 2011, he has been interested in discrete scattering theory.*