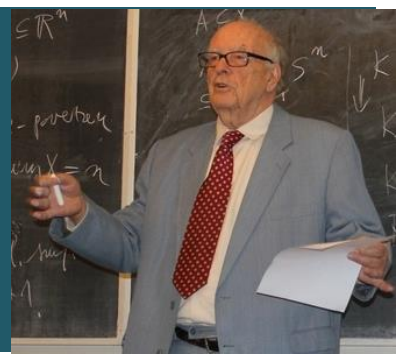
Kolokvij Matematičkog odsjeka "Sibe Mardešić"



POZIV
na predavanje

10. srpnja 2019. u 12 h

u predavaonici A101 Bijenička cesta 30

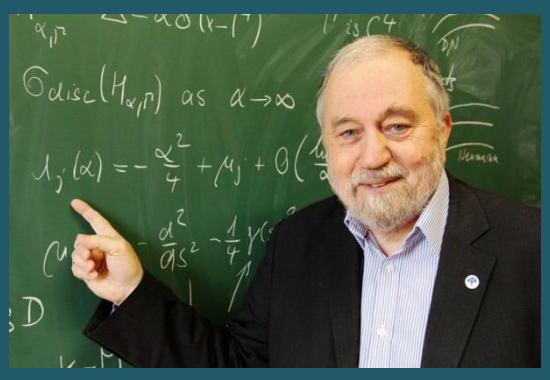
SPECTRA OF PERIODIC QUANTUM GRAPHS

Pavel Exner

Doppler Institute for Mathematical Physics and Applied Mathematics, Prague

ABSTRACT

This talk deals with relations between topology and spectra with the aim to show that a nontrivial topology of the configuration space can lead to a variety of spectral types. We focus on second-order equations used to describe periodic quantum systems. Such a PDE in a Euclidean space has typically the spectrum which is absolutely continuous, consisting of bands and gaps, the number of the latter being determined by the dimensionality. If analogous second-order operators on metric graphs are considered, a number of different situations may arise. Using simple examples, we show that the spectrum may then have a pure point or a fractal character, and also that it may have only a finite but nonzero number of open gaps. Furthermore, motivated by recent attempts to model the anomalous Hall effect, we investigate a class of vertex couplings that violate the time reversal invariance. We find spectra of lattice graphs with the simplest coupling of this type and demonstrate that it depends substantially on the parity of the vertices, and discuss some consequences of this property.



Pavel Exner is the scientific director at the Doppler Institute, Prague, Czech Republic.

He graduated from the Charles University and obtained a DrSc degree from the JINR Dubna institute in 1990. He worked at the Charles University, Joint Institute for Nuclear Research, Dubna and is currently employed at the Czech Academy of Sciences.

His research is concerned with spectral and scattering properties of quantum waveguides, quantum mechanics on graphs and manifolds, decay and resonance effects.

He held the following offices in the international organizations:

European Math. Society: Vice-president 2005-10, President 2015-18. International Association of Mathematical Physics: Secretary 2006-08, President 2009-11 IUPAP: Commission Secr. and Chair 2002-08, Vice-president 2005-08. European Research Council: Scientic Council Member since 2005, Vice-president 2011-14 Academia Europaea, Section Vice chair 2012-18, Chair since 2018.

Selected awards include: JINR First Prize 1985, elected member of Academia Europaea 2010, Neuron Prize 2016.