

# Differential Operators on Graphs and Waveguides

## CONFERENCE PROGRAM

February 25 – March 1, 2019  
Graz University of Technology, Austria





# Program at a glance

|               | February, 25       | February, 26 | February, 27 | February, 28      | March, 1     |
|---------------|--------------------|--------------|--------------|-------------------|--------------|
| 08:30 – 09:20 | Registration       |              |              |                   |              |
| 09:20 – 09:30 | Conference opening |              |              |                   |              |
| 09:30 – 10:30 | Bonnet-BenDhia     | Tretter      | Kostenko     | Mugnolo           | Krejčířik    |
| 10:30 – 11:30 | Exner              | Kurasov      | Plum         | Pankrashkin       | Post         |
| 11:30 – 12:00 | Coffee break       | Coffee break | Coffee break | Coffee break      | Coffee break |
| 12:00 – 12:30 | Briet              | Woess        | Wood         | Saburova          | Cassano      |
| 12:30 – 13:00 | Grubišić           | Harrison     | Rohleder     | Popov             | Holzmann     |
| 13:00 – 14:30 | Lunch              | Lunch        | Lunch        | Lunch             |              |
| 14:30 – 15:00 | Woracek            | Sarafanov    | Maier        | Cardone           |              |
| 15:00 – 15:30 | Kutsenko           | Barseghyan   | Becker       | Dębowska          |              |
| 15:30 – 16:00 | Royer              | Lotoreichik  | Lipovský     | Sukhtaiev         |              |
| 16:00 – 16:30 | Coffee break       | Coffee break | Excursion    | Coffee break      |              |
| 16:30 – 17:00 | Muranova           | Nicolussi    |              | Plümer            |              |
| 17:00 – 17:30 | Jex                | Kerner       |              | Simmer            |              |
| 17:30 – 18:00 | Pruckner           | Serio        |              | Franceschi        |              |
| 18:00 – 19:00 | Welcome party      |              |              |                   |              |
| 19:00 – 21:00 |                    |              |              | Conference dinner |              |

# Monday, February 25

|               |                                                                                                                                                 |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| 8:30 – 9:20   | <i>Registration</i>                                                                                                                             |
| 9:20 – 9:30   | <i>Conference opening</i>                                                                                                                       |
| 9:30 – 10:30  | <b>Anne-Sophie Bonnet-Ben Dhia</b><br>A new complex frequency spectrum for the analysis of transmission efficiency in waveguide-like geometries |
| 10:30 – 11:30 | <b>Pavel Exner</b><br>Spectra of periodic quantum graphs: more than one would expect                                                            |
| 11:30 – 12:00 | <i>Coffee break</i>                                                                                                                             |
| 12:00 – 12:30 | <b>Philippe Briet</b><br>Absence of the singular spectrum in a twisted Dirichlet-Neumann waveguide                                              |
| 12:30 – 13:00 | <b>Luka Grubišić</b><br>Constrained evolution problems on a metric graph                                                                        |
| 13:00 – 14:30 | <i>Lunch time</i>                                                                                                                               |
| 14:30 – 15:00 | <b>Harald Woracek</b><br>On a problem of Louis de Branges                                                                                       |
| 15:00 – 15:30 | <b>Anton Kutsenko</b><br>Application of matrix-valued integral continued fractions to spectral problems on periodic graphs with defects         |
| 15:30 – 16:00 | <b>Julien Royer</b><br>Local energy decay for the wave equation in a dissipative waveguide                                                      |
| 16:00 – 16:30 | <i>Coffee break</i>                                                                                                                             |
| 16:30 – 17:00 | <b>Anna Muranova</b><br>On the notion of effective impedance via ordered fields                                                                 |
| 17:00 – 17:30 | <b>Michal Jex</b><br>Trace Hardy inequality for Euclidean space with cut                                                                        |
| 17:30 – 18:00 | <b>Raphael Pruckner</b><br>Estimate for the Weyl coefficient of a two-dimensional canonical system                                              |
| 18:00 – 19:00 | <i>Welcome party</i>                                                                                                                            |

# Tuesday, February 26

- 9:30 – 10:30 **Christiane Tretter**  
Spectral problems on star graphs
- 10:30 – 11:30 **Pavel Kurasov**  
Quantum graphs and almost periodic functions
- 11:30 – 12:00 *Coffee break*
- 12:00 – 12:30 **Wolfgang Woess**  
Boundary representations of  $\lambda$ -harmonic and polyharmonic functions on trees
- 12:30 – 13:00 **Jon Harrison**  
Quantum graph properties via pseudo orbits and Lyndon words
- 13:00 – 14:30 *Lunch time*
- 14:30 – 15:00 **Oleg Sarafanov**  
Asymptotic and numerical study of resonant tunneling in a 2D quantum waveguide with several resonators
- 15:00 – 15:30 **Diana Barseghyan**  
Spectral geometry in a rotating frame: properties of the ground state
- 15:30 – 16:00 **Vladimir Lotoreichik**  
Spectral gap for graphene quantum dots
- 16:00 – 16:30 *Coffee break*
- 16:30 – 17:00 **Noema Nicolussi**  
Quantum graphs on radially symmetric antitrees
- 17:00 – 17:30 **Joachim Kerner**  
Spectral theory of an interacting two-particle system on the half-line
- 17:30 – 18:00 **Andrea Serio**  
Optimal potentials on quantum graphs with  $\delta$ -couplings

## Wednesday, February 27

|               |                                                                                              |
|---------------|----------------------------------------------------------------------------------------------|
| 9:30 – 10:30  | <b>Aleksey Kostenko</b><br>Infinite quantum graphs                                           |
| 10:30 – 11:30 | <b>Michael Plum</b><br>TM-mode spectrum created by waveguides in photonic bandgap structures |
| 11:30 – 12:00 | <i>Coffee break</i>                                                                          |
| 12:00 – 12:30 | <b>Ian Wood</b><br>Weak localization results for TE-modes                                    |
| 12:30 – 13:00 | <b>Jonathan Rohleder</b><br>Hot spots of quantum graphs                                      |
| 13:00 – 14:30 | <i>Lunch time</i>                                                                            |
| 14:30 – 15:00 | <b>Daniela Maier</b><br>Breather solutions on periodic necklace graphs                       |
| 15:00 – 15:30 | <b>Simon Becker</b><br>Periodic quantum graphs in homogeneous magnetic fields                |
| 15:30 – 16:00 | <b>Jiří Lipovský</b><br>A Gelfand-Levitan trace formula for generic quantum graphs           |
| 16:15 – 18:00 | <i>Guided walking tour in the center of Graz</i>                                             |

# Thursday, February 28

|               |                                                                                                                             |
|---------------|-----------------------------------------------------------------------------------------------------------------------------|
| 9:30 – 10:30  | <b>Delio Mugnolo</b><br>Spectral partitions of quantum graphs                                                               |
| 10:30 – 11:30 | <b>Konstantin Pankrashkin</b><br>Robin eigenvalues on domains with peaks                                                    |
| 11:30 – 12:00 | <i>Coffee break</i>                                                                                                         |
| 12:00 – 12:30 | <b>Natalia Saburova</b><br>Schrödinger operators with guided potentials on periodic graphs                                  |
| 12:30 – 13:00 | <b>Igor Popov</b><br>Weyl asymptotics of resonances and resonance states completeness for quantum graphs                    |
| 13:00 – 14:30 | <i>Lunch time</i>                                                                                                           |
| 14:30 – 15:00 | <b>Giuseppe Cardone</b><br>Norm-resolvent convergence for elliptic operators in a planar waveguide perforated along a curve |
| 15:00 – 15:30 | <b>Kamila Dębowska</b><br>Direct and inverse problems for one-dimensional Dirac operators with non-local potentials         |
| 15:30 – 16:00 | <b>Selim Sukhtaiev</b><br>Localization for Anderson models on tree graphs                                                   |
| 16:00 – 16:30 | <i>Coffee break</i>                                                                                                         |
| 16:30 – 17:00 | <b>Marvin Plümer</b><br>An eigenvalue bound for the Kirchhoff-Laplacian on planar quantum graphs                            |
| 17:00 – 17:30 | <b>Jan Simmer</b><br>Approximation of the Laplacian on the Sierpinski Gasket: norm resolvent and spectral convergence       |
| 17:30 – 18:00 | <b>Valentina Franceschi</b><br>Point interactions for 3D sub-Laplacians                                                     |
| 19:00 – 21:00 | <i>Conference dinner</i>                                                                                                    |

# Friday, March 1

- 9:30 – 10:30    **David Krejčiřík**  
Waveguides with asymptotically diverging twisting
- 10:30 – 11:30    **Olaf Post**  
Perturbations of manifolds and spectral convergence
- 11:30 – 12:00    *Coffee break*
- 12:00 – 12:30    **Biaggio Cassano**  
Self-adjointness and spectral properties for the Dirac operator with Coulomb-type perturbations
- 12:30 – 13:00    **Markus Holzmann**  
The Landau Hamiltonian coupled with an electric  $\delta$ -potential



## List of participants

|                    |             |                                                                     |
|--------------------|-------------|---------------------------------------------------------------------|
| Barseghyan         | Diana       | Ostrava University and Nuclear Physics Institute of CAS, Czechia    |
| Becker             | Simon       | University of Cambridge, UK                                         |
| Behrndt            | Jussi       | Graz University of Technology, Austria                              |
| Bonnet-Ben Dhia    | Anne-Sophie | ENSTA ParisTech, France                                             |
| Briet              | Philippe    | Aix-Marseille University and University of Toulon, France           |
| Brown              | Malcolm     | Cardiff University, UK                                              |
| Cardone            | Giuseppe    | University of Sannio, Benevento, Italy                              |
| Cassano            | Biagio      | Nuclear Physics Institute of CAS, Czechia                           |
| Castaneira Ramirez | Reynaldo    | University of Bath, UK                                              |
| Dębowska           | Kamila      | AGH University of Science and Technology, Krakow                    |
| Exner              | Pavel       | Nuclear Physics Institute of CAS, Czech Republic                    |
| Franceschi         | Valentina   | University Paris Sud, Orsay, France                                 |
| Freiberg           | Uta         | University of Stuttgart, Germany                                    |
| Grubišić           | Luka        | University of Zagreb, Croatia                                       |
| Harrison           | Jon         | Baylor University, US                                               |
| Holzmann           | Markus      | Graz University of Technology, Austria                              |
| Jex                | Michal      | Karlsruhe Institute of Technology, Germany                          |
| Kerner             | Joachim     | University of Hagen, Germany                                        |
| Khrabustovskyi     | Andrii      | Graz University of Technology, Austria                              |
| Kostenko           | Aleksey     | University of Vienna, Austria and University of Ljubljana, Slovenia |
| Krejcirik          | David       | Czech Technical University in Prague, Czech Republic                |
| Kurasov            | Pavel       | Stockholm University, Sweden                                        |
| Kutsenko           | Anton       | Jacobs University, Bremen, Germany                                  |
| Langer             | Heinz       | Vienna University of Technology, Austria                            |
| Léna               | Corentin    | Stockholm University, Sweden                                        |
| Lipovský           | Jiří        | University of Hradec Králové, Czechia                               |
| Lotoreichik        | Vladimir    | Nuclear Physics Institute of CAS, Czechia                           |
| Maier              | Daniela     | University of Stuttgart, Germany                                    |
| Mugnolo            | Delio       | University of Hagen, Germany                                        |
| Muller             | Jacob       | Stockholm University, Sweden                                        |
| Muranova           | Anna        | Bielefeld University, Germany                                       |
| Nicolussi          | Noema       | University of Vienna, Austria                                       |
| Pankrashkin        | Konstantin  | University of Paris-Sud, France                                     |
| Plum               | Michael     | Karlsruhe Institute of Technology, Germany                          |

|              |            |                                                           |
|--------------|------------|-----------------------------------------------------------|
| Plümer       | Marvin     | University of Hagen, Germany                              |
| Popov        | Igor       | ITMO University, St. Petersburg, Russia                   |
| Post         | Olaf       | Trier University, Germany                                 |
| Pruckner     | Raphael    | Vienna University of Technology, Austria                  |
| Reiffenstein | Jakob      | Vienna University of Technology, Austria                  |
| Rohleder     | Jonathan   | Stockholm University, Sweden                              |
| Royer        | Julien     | University of Toulouse                                    |
| Saburova     | Natalia    | Northern (Arctic) Federal University, Arkhangelsk, Russia |
| Sarafanov    | Oleg       | Saint Petersburg State University, Russia                 |
| Schlosser    | Peter      | Graz University of Technology, Austria                    |
| Serio        | Andrea     | Stockholm University, Sweden                              |
| Simmer       | Jan        | University of Trier, Germany                              |
| Sukhtaiev    | Selim      | Rice University, US                                       |
| Tretter      | Christiane | University of Bern, Switzerland                           |
| Woess        | Wolfgang   | Graz University of Technology, Austria                    |
| Wood         | Ian        | University of Kent                                        |
| Woracek      | Harald     | Vienna University of Technology, Austria                  |