Asymptotic perturbation theory for extensions of symmetric operators

Yuri Latushkin[1,*], **Selim Sukhtaiev**[2,*]

[1] *University of Missouri, Columbia Missouri, USA*
[2] *Auburn University, Auburn Alabama, USA*
[*] Email: szs0266@auburn.edu

This talk concerns asymptotic perturbation theory for varying self-adjoint extensions of symmetric operators. First, we will discuss a symplectic version of the celebrated Krein formula for resolvent difference. Then we will switch to an asymptotic analysis of resolvent operators via first order expansion for the path of Lagrangian planes associated with perturbed operators. This asymptotic perturbation theory yields an Hadamard–Rellich-type variational formula for multiple eigenvalue curves bifurcating from an eigenvalue of the unperturbed operator. Applications will be given to quantum graphs, periodic Kronig–Penney model, elliptic second order partial differential operators with Robin boundary conditions, and heat equations with thermal conductivity. This talk is based on various joint projects with G. Berkolaiko (Texas A&M) and Y. Latushkin (Missouri/NYU).