Citation for Sabine Bögli (Whitehead Prize)

Short citation

Dr Sabine Bögli of Durham University is awarded a Whitehead Prize for her outstanding contributions to computational spectral theory and to spectral analysis of non-self-adjoint operators, in particular for laying theoretical foundations for a novel numerical method and for answering several long-standing questions concerning the spectra of non-self-adjoint Schrödinger operators.

Long citation

Dr Sabine Bögli of Durham University is awarded a Whitehead Prize for her outstanding contributions to computational spectral theory and to spectral analysis of non-self-adjoint operators, in particular for laying theoretical foundations for a novel numerical method of approximating the spectra of linear operators and for answering several long-standing questions concerning the behaviour of eigenvalues of non-self-adjoint Schrödinger operators.

Bögli and her collaborators introduced and developed new notions of essential numerical ranges of unbounded linear operators and of linear operator pencils, and showed that they can provide much better enclosures for the spectrum than the known methods and that they can help one to address the ubiquitous problem of spectral pollution when using projection and domain truncation methods. Their recent paper on domain truncation for Maxwell's system demonstrates the power of their new method.

In the 1960s, Pavlov proved that for a Schrödinger operator on a half-line, with real-valued potential but complex boundary condition, complex eigenvalues may accumulate at any point of the real axis. Since then, it had been an open question whether these results could be modified so that this behaviour of eigenvalues would be caused not by the boundary condition but by a complex-valued potential. Bögli answered this question by producing a completely unexpected example of a multidimensional Schrödinger operator on the whole space with an arbitrarily small potential whose eigenvalues in the complex plane accumulate at every point of the positive semi-axis.

Bögli and her collaborators achieved spectacular progress in the study of eigenvalues of non-self-adjoint Schrödinger operators. The sharp estimates obtained by them answer several long-standing questions on Lieb–Thirring type inequalities and disprove a conjecture by Laptev and Safronov. These results raise our understanding of the spectral properties of non-self-adjoint Schrödinger operators to a new level, and they will have a lasting impact on the field.