

The study of differential and difference operators with periodic, almost periodic, or random coefficients is motivated by applications in physics, especially in quantum mechanics and materials science, and in recent years there have been significant advances using methods specific to each of the three classes of operators. However all three types of operator are contained in a more general class, the ergodic operators, and may be studied in the context of that larger framework. This extended point of view has led to insights on problems in one area motivating new lines of enquiry and discoveries in another. In particular, the theory of almost periodic operators has benefited significantly from the wider perspective. This programme was conceived to nurture this interplay of ideas by establishing opportunities for cross-fertilization and collaboration across the area boundaries.

The programme began with a two-week instructional school with seven mini-courses during which leading experts made advanced material on the general framework, ergodic, periodic, almost periodic and random operators, and on orthogonal polynomials, accessible to junior researchers and non-experts. Subsequently there were three, more advanced workshops:

- *Periodic and other Ergodic Problems* focused on the relation between periodic, quasi-periodic and random operator and included discussion of their relevance to nonlinear equations, dynamical systems and topology.
- *Quasi-periodic and other Ergodic Problems* highlighting recent breakthroughs in the theory of quasi-periodic operators and their relation to other fields. Over one half of the talks were given by graduate students and recent PhDs.
- *Random and other Ergodic Problems* concerned ergodic (more specifically random) operators.

In addition there were weekly seminars, informal presentations and lively dialogues continued throughout the programme. A large number of working groups were organised, including those on point scatterers, discrete quasi-periodic operators, delocalization and the Bethe-Sommerfeld conjecture for multi-dimensional continuous quasi-periodic operators, the behavior of Bloch surfaces near spectral edges, homogenization for time-dependent Schrödinger equation, and Wiener-Hopf operators and entanglement entropy. The interactions between experts from different subareas have led to new research directions and proofs of results using tools from adjacent areas. There was an especially fruitful exchange between the periodic and almost periodic communities, in both directions, and questions about almost periodic models were answered using methods from the theory of random operators.

Leonid Pastur, the Programme's Rothschild Distinguished Visiting Fellow, gave a special lecture on *Disordered Systems and Related Spectra*. Barry Simon gave a public lecture *Tales of our Forefathers* on personalities from the history of mathematics that, in addition to programme participants, attracted a large audience from the wider community.

The programme received additional financial support from the ERC (European Research Council). Following the success of the programme there are plans to organise further research activity, including a session at the AMS Fall Western Sectional Meeting in 2015, a workshop in London in 2016, and one or two follow-up meetings at the INI.