Preface

The present volume is dedicated to Ari Laptev at the happy occasion of his seventieth birthday.

Ari Laptev was born on August 10, 1950, in the city then called Leningrad, USSR. The place where he studied gave him the opportunity to join one of the best schools of mathematical physics; he defended his PhD in 1978 prepared under the supervision of Mikhael Solomyak and subsequently kept working at Leningrad University.

From the outset one might naively expect the beginning of a bright – and smooth – career. However, Ari's life took a very indirect path toward his ultimate profession. In 1982 he lost his job for reasons that nowadays someone half his age would have difficulties to comprehend. He had met Marilyn, his future wife, abroad and that is why the Soviet regime forced him to make his living as a construction worker in the following five years, who could do mathematics in his spare time only. Fortunately for Ari, the end of the system which put him into this plight was nearing. Another break came in 1987 when he left Russia for Sweden; in the new environment his multiple talents began to flourish. He became a lecturer at the Linköping university, followed by a move to KTH Stockholm, where he became professor in 1999; since 2007 he has held a professorship at the Imperial College, London.

Forging new paths in the territory of mathematics was always Ari's first priority. In particular, he has made fundamental contributions to the area of spectral theory for Schrödinger-type operators. One of his main focuses was the question of sharp constants and, using the elegant idea of "lifting in dimension," he has verified the Pólya conjecture for product domains and, in joint work with one of his students, proved the optimal version of the Lieb–Thirring inequality in higher dimensions for a large range of exponents. He has also written a series of influential papers on Hardy inequalities in various (geometrical) settings, including magnetic field situations. Recently, he has been one of the driving forces in the emerging field of eigenvalue inequalities for Schrödinger operators with complex-valued potentials. His papers in these and other areas continue to have a profound impact on the field.

Ari's research work has been appreciated in many ways. Among notable awards, let us mention the Royal Society Wolfson Research Merit Award he received in 2007. He was elected member of the Royal Swedish Academy of Sciences in 2012, and fellow of the European Academy of Sciences in 2020.

The impact of one's research work on the profession is made even more lasting when the talent is combined with the ability to pass the torch. Ari is an excellent educator as hundreds of young people who attended his courses will attest. He supervised over twenty PhD students, most at the KTH in Stockholm and later at Imperial College. Several of them have remained in academia and continue their research in the general area of mathematical physics in the spirit of their teacher.

Besides research and education, Ari served the community at large in numerous other ways, and we mention here only the most important of those achievements.

After chairing the Swedish Mathematical Society in 2001–2003, and successfully organizing the 4th European Mathematical Congress in Stockholm in 2004, he was elected president of the European Mathematical Society for the period of 2007–2010. In this context his unique ability to interact with people from many different countries came to full fruition. European collaboration is not always easy, but Ari naturally has great success in bringing people together. Moreover, even after the end of his term, the EMS could still rely on him in many matters of great importance.

He also had a fundamental impact on the life of the mathematical community through his exemplary work as director of the Mittag-Leffler Institute for the period of 2011–2018, especially, as he brought new life to this century-old institution. For instance, he was able to secure funds to build a new lecture hall, and provide a more secure storage facility for the old and precious book collection. Furthermore, the apartments got a much needed refurbishing. (Since the director also had a background in carpentry, it was not easy to fool him during the construction work!) This modernization has further solidified the position of the Mittag-Leffler Institute as a leading research center worldwide. During that period he was also Editor-in-Chief of Acta Mathematica. Simultaneously, he provided editorial service for a number of additional journals, in particular, he was one of the principal founders of the Journal of Spectral Theory (JST).

This brief portrait of Ari's life would not be complete if we did not return to mention his family, his wife Marilyn, the meeting with whom forty years ago caused a sharp turn in his destiny, and his children, Ekaterina, Eugenia, and Ivan, who are very proud of their father.

The present volume collects contributions from Ari's colleagues and collaborators resonating his varied scientific interests. They include, in short, topics such as Friedrichs, Hardy, and Lieb–Thirring inequalities, Feshbach–Schur maps and perturbation theory, eigenvalue bounds and asymptotics, scattering theory and orthogonal polynomials, stability of matter, electron density estimates, Bose–Einstein condensation, Wehrl-type entropy inequalities, Bogoliubov theory, wave packet evolution, heat kernel estimates, homogenization, d-bar problems, Brezis–Nirenberg problems, NLS in magnetic fields, classical discriminants, 2D Euler–Bardina equation, and Ari's fundamental role in starting JST.

Presenting this collection, we wish Ari good health and numerous fruitful years to come in mathematics and in life in general.

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