Foreword

The spectral theory of Schrödinger operators is a highly developed field and has given rise to many new mathematical techniques. Some of these find applications in the scattering theory in quantum mechanics. The scattering theory involves the study of the wave operators and the scattering matrices associated with pairs of self adjoint operators. One of them is often the perturbation of the other by a potential to model the physical scattering of particles. In the last decade there has been a lot of activity in the scattering theory, especially in the understanding of the models of scattering of several particles, analysis of the scattering matrices together with a fine-tuning of the theory for the two particle case. Usually this is done on an Euclidean configuration space. But one can equally well ask similar questions when the configuration space is a Riemannian manifold, in particular a hyperbolic space. In such a case many of the spectral properties of the associated Laplacian (free Hamiltonian) are closely related to the geometry of the manifold and representations of the associated fundamental group. One can also look at the problem from the other end, specifically when the spectral structure is given and one is asked to find the potential in the Schrödinger operator whose spectrum will coincide with the given one. This problem has an analogue in the discretized Schrödinger operator on a lattice. Another interesting problem is the abstract theory of Krein's spectral shift function and the trace formula, which has found many applications in analysis including some results on the index of a pair of operators.

Some of these problems were discussed and a set of solutions were presented in the workshop "Spectral and Inverse Spectral Theory", organized by the Indian Academy of Sciences, Bangalore, during August 24–30, 1993, at the Kodaikanal Observatory of the Indian Institute of Astrophysics. This volume is a result of that effort. Attempts have been made to make this into a kind of review volume, with a few new proofs. It is intended to give an introduction suitable for advanced graduate students and also to serve as a convenient reference for researchers in the area.

We would like to thank the Indian Academy of Sciences for the financial support and encouragement in the concept of a Special Issue, the Institute of Mathematical Sciences, Madras, for help in assembling the participants from different corners of the world, the Indian Institute of Astrophysics for making the pretty and peaceful campus of the Kodaikanal Observatory in the hills of the southern state of Tamil Nadu, available for such an enjoyable meeting. We also wish to put on record our appreciation of the efforts of the contributors in preparing the manuscripts and of the Editor and the staff of the Academy in bringing out this volume in reasonable time.

The year 1994 is also the Diamond Jubilee year of the Academy and it is only appropriate that this volume is christened a Diamond Jubilee special issue of the Proceedings of the Academy (Mathematical Sciences).

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