

**Simon, Barry**

**Trace ideals and their applications. 2nd ed.** (English) Zbl 1074.47001

*Mathematical Surveys and Monographs* 120. Providence, RI: American Mathematical Society (AMS) (ISBN 0-8218-3581-5/hbk). viii, 150 p. (2005).

This is the second edition of the well-known book [*B. Simon*, “Trace ideals and their applications” (London Mathematical Society Lecture Note Series 35) (Cambridge University Press) (1979; [Zbl 0423.47001](#))], stemming from the author’s lectures on the theory of trace ideals in the algebra of operators in a Hilbert space. For this edition, the author has added four new chapters on the closely related theory of rank one perturbations of self-adjoint operators.

The first of the new chapters (Chapter 11) presents the general theory of rank one perturbations in a new systematic way, including the discussion of the Borel transform of positive measures, basic formulae of the theory of rank one perturbations, and the Krein spectral shift. Chapter 12 discusses the absolutely continuous spectrum, the Aronszajn–Donoghue theory, and the results of the author on the singular spectrum. Chapter 13 presents the approach of Aizenman–Molchanov to the problem of localization in the Anderson model. Chapter 14 is devoted to the trace formulae and the inverse spectral problems for one-dimensional Schrödinger operators and Jacobi matrices.

The book contains a comprehensive index and an addendum describing some developments since the original notes were published. This book can certainly be a vital source of information for those interested in the theory of trace ideals and its applications to various areas of mathematical physics.

Reviewer: [Dmitry Shepelsky \(Kharkov\)](#)

**MSC:**

- [47-02](#) Research exposition (monographs, survey articles) pertaining to operator theory
- [47L30](#) Abstract operator algebras on Hilbert spaces
- [47B10](#) Linear operators belonging to operator ideals (nuclear,  $p$ -summing, in the Schatten-von Neumann classes, etc.)
- [47L20](#) Operator ideals
- [47A40](#) Scattering theory of linear operators
- [47A55](#) Perturbation theory of linear operators
- [81Qxx](#) General mathematical topics and methods in quantum theory
- [81U99](#) Quantum scattering theory
- [81T99](#) Quantum field theory; related classical field theories

Cited in <b>2</b> Reviews Cited in <b>405</b> Documents
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**Keywords:**

[Fredholm theory](#); [trace](#); [determinant](#); [scattering](#); [bound states](#); [ideals of operators](#); [rank one perturbations](#); [localization](#); [inverse spectral problems](#)