

THE DENSITY OF STATES DEPENDS ON THE DOMAIN

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Abstract. In this short note we demonstrate that the definition of the density of states of a Schrödinger operator with bounded potential in general depends on the choice of the domain undergoing the thermodynamic limit.

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REFERENCES

- [1] M. AIZENMAN AND S. WARZEL, *Random Operators: disorder effects on Quantum Spectra and Dynamics*, Graduate Studies in Mathematics, 168. American Mathematical Society, Providence, RI, 2015, xiv+326 pp.
- [2] N. AZAMOV, E. McDONALD, F. SUKOCHEV, D. ZANIN, *A Dixmier trace formula for the density of states*, Commun. Math. Phys. 377, 2597–2628 (2020).
- [3] F. A. BEREZIN, M. A. SHUBIN, *The Schrödinger equation*, Dordrecht, Boston: Kluwer Academic Publishers, 1991.
- [4] R. CARMONA AND J. LACROIX, *Spectral theory of random Schrödinger operators*, Probability and its Applications. Birkhäuser Boston, Inc., Boston, MA, 1990, xxvi+587 pp.
- [5] S. DOI, A. IWATSUKA AND T. MINE, *The uniqueness of the integrated density of states for the Schrödinger operators with magnetic fields*, Math. Z. 237 (2001), no. 2, 335–371.
- [6] I. HERBST, *Spectral and scattering theory for Schrödinger operators with potentials independent of $|x|$* , Am. J. Math. 113(3), 509–565 (1991)
- [7] I. HERBST, E. SKIBSTED, *Quantum scattering for potentials homogeneous of degree zero*, In: Mathematical Results in Quantum Mechanics (Taxco, 2001), Contemp. Math., vol. 307, pp. 163–169, American Mathematical Society, Providence (2002).
- [8] I. HERBST, E. SKIBSTED, *Quantum scattering for potentials independent of $|x|$: asymptotic completeness for high and low energies*, Commun. Partial Differ. Equ. 29 (3–4), 547–610 (2004).
- [9] D. RUELLE, *Statistical mechanics: rigorous results*, W. A. Benjamin, Inc. 1969.
- [10] M. SHUBIN, *The spectral theory and the index of elliptic operators with almost periodic coefficients*, Uspekhi Mat. Nauk, Volume 34, Issue 2 (206), 95–135.
- [11] B. SIMON, *Schrödinger semigroups*, Bull. Amer. Math. Soc. (N.S.) 7 (1982), no. 3, 447–526.
- [12] B. SIMON, *Functional integration and quantum physics*, sec. ed., AMS Chelsea Publishing, Providence, RI, 2005, xiv+306 pp.
- [13] M. ZWORSKI, *Semiclassical analysis*, AMS, Graduate Studies in Mathematics, vol. 138.