

**Bolte, Jens; Egger, Sebastian; Keppeler, Stefan**

**A Gutzwiller trace formula for large Hermitian matrices.** (English) Zbl 1375.81104

Rev. Math. Phys. 29, No. 8, Article ID 1750027, 41 p. (2017).

**MSC:**

- 81Q20 Semiclassical techniques, including WKB and Maslov methods applied to problems in quantum theory
- 81S30 Phase-space methods including Wigner distributions, etc. applied to problems in quantum mechanics
- 39A12 Discrete version of topics in analysis
- 47B39 Linear difference operators

**Keywords:**

Gutzwiller trace formula; Weyl quantization; semiclassical approximations; toroidal phase space; difference operators

**Full Text:** [DOI](#) [arXiv](#)

**References:**

- [1] Bouzouina, A.; De Bièvre, S., Equipartition of the eigenfunctions of quantized ergodic maps on the torus, *Comm. Math. Phys.*, 178, 83-105, (1996) · [Zbl 0876.58041](#)
- [2] Boutet de Monvel, L.; Guillemin, V., *The Spectral Theory of Toeplitz Operators*, 99, (1981), Princeton University Press, Princeton, NJ · [Zbl 0469.47021](#)
- [3] Boutet de Monvel, L.; Sjöstrand, J., Journées: Équations aux Dérivées Partielles de Rennes, Sur la singularité des noyaux de Bergman et de Szegő, 123-164, (1976), Soc. Math. France, Paris · [Zbl 0344.32010](#)
- [4] Bodmann, B. G.; Klauder, J. R., Path integral quantization for a toroidal phase space, *Coherent States, Quantization and Gravity, Proceedings of the XVIIth Workshop on Geometric Methods in Physics*, 3-10, (2001), Warsaw University Press
- [5] Borthwick, D.; Paul, T.; Uribe, A., Semiclassical spectral estimates for Toeplitz operators, *Ann. Inst. Fourier (Grenoble)*, 48, 1189-1229, (1998) · [Zbl 0920.58059](#)
- [6] Colin de Verdière, Y., Spectre du laplacien et longueurs des géodésiques périodiques. I, *Compos. Math.*, 27, 83-106, (1973) · [Zbl 0272.53034](#)
- [7] Colin de Verdière, Y., Spectre du laplacien et longueurs des géodésiques périodiques. II, *Compos. Math.*, 27, 159-184, (1973) · [Zbl 0281.53036](#)
- [8] Charles, L., Quasimodes and Bohr-Sommerfeld conditions for the Toeplitz operators, *Comm. Partial Differential Equations*, 28, 1527-1566, (2003) · [Zbl 1038.53086](#)
- [9] Esposti, M. D.; Graffi, S., *The Mathematical Aspects of Quantum Maps*, 618, (2003), Springer-Verlag, Berlin
- [10] Dixon, A. L.; Ferrar, W. L., On the summation formulae of voronoï and Poisson, *Quart. J. Math.*, 8, 66-74, (1937) · [Zbl 63.0134.04](#)
- [11] de Faria, E.; de Melo, W., *Mathematical Aspects of Quantum Field Theory*, 127, (2010), Cambridge University Press, Cambridge · [Zbl 1200.81001](#)
- [12] Duistermaat, J. J.; Guillemin, V. W., The spectrum of positive elliptic operators and periodic bicharacteristics, *Invent. Math.*, 29, 39-79, (1975) · [Zbl 0307.35071](#)
- [13] Duistermaat, J. J., Oscillatory integrals, Lagrange immersions and unfolding of singularities, *Comm. Pure Appl. Math.*, 27, 207-281, (1974) · [Zbl 0285.35010](#)
- [14] Duistermaat, J. J., On the Morse index in variational calculus, *Adv. Math.*, 21, 173-195, (1976) · [Zbl 0361.49026](#)
- [15] Duistermaat, J. J., *Fourier Integral Operators*, 130, (1996), Birkhäuser Boston, Inc., Boston, MA · [Zbl 0841.35137](#)
- [16] Folland, G. B., *Harmonic Analysis in Phase Space*, 122, (1989), Princeton University Press, Princeton, NJ · [Zbl 0682.43001](#)
- [17] Faure, F.; Tsujii, M., Prequantum transfer operator for symplectic Anosov diffeomorphism, *Astérisque*, 375, ix+222, (2015) · [Zbl 1417.37012](#)
- [18] Gat, O.; Avron, J. E., Semiclassical analysis and the magnetization of the Hofstadter model, *Phys. Rev. Lett.*, 91, 186801, (2003)
- [19] Grafakos, L., *Classical Fourier Analysis*, 249, (2008), Springer, New York · [Zbl 1220.42001](#)
- [20] Grigis, A.; Sjöstrand, J., *Microlocal Analysis for Differential Operators*, 196, (1994), Cambridge University Press, Cambridge · [Zbl 0804.35001](#)

- [21] Guillemin, V.; Sternberg, S., *Semi-Classical Analysis*, (2013), International Press, Boston, MA · [Zbl 1298.58001](#)
- [22] Gutzwiller, M. C., Periodic orbits and classical quantization conditions, *J. Math. Phys.*, 12, 343-358, (1971)
- [23] Harper, P. G., The general motion of conduction electrons in a uniform magnetic field, with application to the diamagnetism of metals, *Proc. Phys. Soc. London Sect. A*, 68, 879-892, (1955) · [Zbl 0065.23707](#)
- [24] Hannay, J. H.; Berry, M. V., Quantization of linear maps on a torus — fresnel diffraction by a periodic grating, *Phys. D*, 1, 267-290, (1980) · [Zbl 1194.81107](#)
- [25] Hörmander, L., *The Analysis of Linear Partial Differential Operators. III — Pseudodifferential Operators*, 274, (1985), Springer-Verlag, Berlin
- [26] Hörmander, L., *The Analysis of Linear Partial Differential Operators. IV — Fourier Integral Operators*, 275, (1985), Springer-Verlag, Berlin · [Zbl 0612.35001](#)
- [27] Lancaster, P., *Theory of Matrices*, (1969), Academic Press, New York-London · [Zbl 0186.05301](#)
- [28] Lee, J. M., *Introduction to Smooth Manifolds*, (2013), Springer, New York · [Zbl 1258.53002](#)
- [29] Ligabò, M., Torus as phase space: Weyl quantization, dequantization and Wigner formalism, *J. Math. Phys.*, 57, 082110, (2016) · [Zbl 1351.81066](#)
- [30] Meinrenken, E., Semiclassical principal symbols and gutzwiller's trace formula, *Rep. Math. Phys.*, 31, 279-295, (1992) · [Zbl 0794.58046](#)
- [31] Meinrenken, E., Trace formulas and the Conley-Zehnder index, *J. Geom. Phys.*, 13, 1-15, (1994) · [Zbl 0791.53040](#)
- [32] E. Meinrenken, *Symplectic geometry*, Lecture Notes, University of Toronto (2000); <http://www.math.toronto.edu/mein/teaching/LectureNotes/sym>
- [33] Paoletti, R., Local asymptotics for slowly shrinking spectral bands of a Berezin-Toeplitz operator, *Int. Math. Res. Not. IMRN*, 2011, 5, 1165-1204, (2011) · [Zbl 1230.47055](#)
- [34] R. Paoletti, Local scaling asymptotics for the Gutzwiller trace formula in Berezin-Toeplitz quantization (2016); [arXiv:1601.02128](https://arxiv.org/abs/1601.02128). · [Zbl 1398.32023](#)
- [35] Petkov, V.; Popov, G., Semi-classical trace formula and clustering of eigenvalues for Schrödinger operators, *Ann. Inst. H. Poincaré Phys. Théor.*, 68, 17-83, (1998) · [Zbl 0919.35095](#)
- [36] Rothe, H. J., *Lattice Gauge Theories*, (2012), World Scientific Publishing, Hackensack, NJ · [Zbl 1255.81001](#)
- [37] Reed, M.; Simon, B., *Methods of Modern Mathematical Physics. II. Fourier Analysis, Self-Adjointness*, (1975), Academic Press, New York-London · [Zbl 0308.47002](#)
- [38] Schlichenmaier, M., Berezin-Toeplitz quantization for compact Kähler manifolds, A review of results, *Adv. Math. Phys.*, 2010, 927280, (2010) · [Zbl 1207.81049](#)
- [39] Sadovskii, D. A.; Zhilinski, B. I., Quantum monodromy and its generalizations and molecular manifestations, *Mol. Phys.*, 104, 2595-2615, (2006)
- [40] Zelditch, S., Index and dynamics of quantized contact transformations, *Ann. Inst. Fourier (Grenoble)*, 47, 305-363, (1997) · [Zbl 0865.47018](#)
- [41] Zelditch, S., *The Breadth of Symplectic and Poisson Geometry*, 232, Quantum maps and automorphisms, 623-654, (2005), Birkhäuser Boston, Boston, MA · [Zbl 1077.53076](#)
- [42] Zworski, M., *Semiclassical Analysis*, 138, (2012), American Mathematical Society, Providence, RI · [Zbl 1252.58001](#)

This reference list is based on information provided by the publisher or from digital mathematics libraries. Its items are heuristically matched to zbMATH identifiers and may contain data conversion errors. It attempts to reflect the references listed in the original paper as accurately as possible without claiming the completeness or perfect precision of the matching.