

# Bibliography

## A. Publication list

- [1] J. Blaschke, Diploma thesis,  
*Untersuchungen zu Theorie der periodischen Orbitale für den Fall einer Kreisscheibe im homogenen Magnetfeld*,  
Universität Regensburg (1995), published under  
<http://www.Joachim-Blaschke.de>.
- [2] S. M. Reimann, M. Brack, A. G. Magner, J. Blaschke, and M. V. N. Murthy,  
*Circular quantum billiard with a singular magnetic flux line*,  
Phys. Rev. A **53**, 39 (1996).
- [3] M. Brack, J. Blaschke, S. C. Creagh, A. G. Magner, P. Meier, and S. Reimann,  
*On the role of classical orbits in mesoscopic electronic systems*,  
Z. Phys. D **40**, 276 (1997).
- [4] J. Blaschke and M. Brack,  
*Periodic orbit theory of a circular billiard in homogeneous magnetic fields*,  
Phys. Rev. A **56**, 182 (1997).
- [5] J. Blaschke and M. Brack,  
*Quantum corrections to the semiclassical level density of the circular disk in homogeneous magnetic fields*,  
Physica E **1**, 288 (1997).
- [6] J. Blaschke and M. Brack,  
*Classical orbit bifurcation and quantum interference in mesoscopic magnetoconductance*,  
preprint cond-mat/9906387 (1999).
- [7] J. Blaschke, in preparation.

**B. Articles and letters**

- [8] A. M. Ozorio de Almeida and J. H. Hannay, *J. Phys. A* **20**, 5873 (1987).
- [9] T. Ando, *J. Phys. Soc. Japan* **37**, 1233 (1974).
- [10] K. Arita, A. Sugita, and K. Matsuyanagi, *Prog. Theor. Phys. (Japan)* **100**, 1223 (1998), and earlier Refs. quoted therein.
- [11] R. Balian and C. Bloch, *Ann. Phys. (N.Y)* **69**, 76 (1972); **85**, 514 (1974).
- [12] H. U. Baranger and A. D. Stone, *Phys. Rev. B* **40**, 8169 (1989).
- [13] M. V. Berry and M. Tabor, *Proc. R. Soc. London, Ser. A.* **349**, 101 (1976); **356**, 375 (1977).
- [14] M. V. Berry and K. T. Mount, *Rep. Prog. Phys.* **35**, 315 (1972).
- [15] E. N. Bogachek and G. A. Gogadze, *Zh. Eksp. Teor. Fiz.* **63**, 1839 (1973) [*Sov. Phys. JETP* **36**, 973 (1973)].
- [16] E. B. Bogomolny, *Nonlinearity* **5**, 805 (1992).
- [17] M. Brack and P. Quentin, *Nucl. Phys. A* **361**, 35 (1981).
- [18] M. Brack and S. R. Jain, *Phys. Rev. A* **51**, 3462 (1995).
- [19] M. Brack, S. M. Reimann, and M. Sieber, *Phys. Rev. Lett* **79**, 1817 (1997).
- [20] M. L. Brillouin, *J. phys. radium* **6**, 353 (1926).
- [21] M. Büttiker, *Phys. Rev. Lett* **57**, 1761 (1986).
- [22] S. C. Creagh, J. M. Robbins, and R. G. Littlejohn, *Phys. Rev. A* **42**, 1907 (1990).
- [23] S. C. Creagh and R. G. Littlejohn, *Phys. Rev. A* **44**, 836 (1990); *J. Phys. A* **25**, 1643 (1991).
- [24] D. Darnhofer, M. Suhrke, and U. Rößler, *Europhys. Lett.* **35**, 591 (1993).
- [25] B. Eckhardt and D. Wintgen, *J. Phys. A* **24**, 4335 (1991).
- [26] W. Ekardt, *Phys. Rev. Lett.* **52**, 1925 (1984); *Phys. Rev. B* **29**, 1558 (1984).
- [27] J. Eroms *et al.*, *Physica B* **256**, 409 (1998); *Phys. Rev. B* **59**, R7829 (1999).
- [28] G. S. Ezra *et al.*, *J. Phys. B* **17**, L413 (1991); D. Wintgen, K. Richter, and G. Tanner, *Chaos* **2**, 19 (1992).
- [29] H. Friedrich and J. Trost, *Phys. Rev. Lett.* **76**, 4869 (1996), *Phys. Rev. A* **54**, 1136 (1996), *Phys. Rev. A* **59**, 1683 (1999); J. Trost and H. Friedrich, *Phys. Lett. A* **228**, 127 (1997).
- [30] P. Gaspard and D. Alonso, *Phys. Rev. A* **47**, R3468.
- [31] F. Geerinckx, M. Peeters, and J. T. Devreese, *J. Appl. Phys.* **68**, 3435 (1990).
- [32] O. Genzken and M. Brack, *Phys. Rev. Lett.* **67**, 3286 (1991).
- [33] C. Gould *et al.*, *Phys. Rev. B* **51**, 11213 (1995).
- [34] C. Gould *et al.*, *Can. J. Phys.* **74**, S207 (1996).
- [35] C. Gould *et al.*, *Phys. Rev. Lett.* **77**, 5272 (1996).
- [36] M. C. Gutzwiller, *J. Math. Phys* **8**, 1979 (1967).
- [37] M. C. Gutzwiller, *J. Math. Phys* **10**, 1004 (1969).
- [38] M. C. Gutzwiller, *J. Math. Phys* **11**, 1791 (1970).
- [39] M. C. Gutzwiller, *J. Math. Phys* **12**, 343 (1971).
- [40] M. C. Gutzwiller, *J. Math. Phys* **14**, 139 (1973).
- [41] G. Hackenbroich and F. von Oppen, *Europhys. Lett.* **29**, 151 (1995).
- [42] G. Hackenbroich and F. von Oppen, *Z. Phys. B.* **97**, 157 (1995).
- [43] F. J. Harris, *Proceedings of the IEEE* **66**, 51 (1978).

- 
- [44] A. Isihara and K. Ebina, *J. Phys. C* **21**, L1079 (1988).
- [45] J. B. Keller, *Ann. of Phys.* **4**, 180 (1958).
- [46] J. B. Keller and S. I. Rubinov, *Ann. of Phys.* **9**,24 (1960).
- [47] G. Kirczenow *et al.*, *Phys. Rev. Lett.* **72**, 2069 (1994).
- [48] G. Kirczenow *et al.*, *Phys. Rev. B* **56**, 7503 (1997).
- [49] S. Klama and U. Rößler, *Ann. Phys. (Leipzig)* **1**, 460 (1992).
- [50] W. D. Knight *et al.*, *Phys. Rev. Lett.* **52**, 2141 (1984).
- [51] H. A. Kramers, *Zeits. f. Physik* **39**, 828 (1926).
- [52] B. Hüpper, J. Main, G. Wunner, *Phys. Rev. Lett.* **74**, 2650 (1995); *Phys. Rev. A* **53**, 744 (1996).
- [53] M. Kus, F. Haake, and D. Delande, *Phys. Rev. Lett.* **71**, 2167 (1993).
- [54] R. Landauer, *IBM J. Res. Dev.* **1**, 223 (1957); **32**, 306 (1988).
- [55] A. Lorke and J. P. Kotthaus, *Phys. Rev. B* **44**, 4447 (1991).
- [56] E. Madelung, *Z. Phys.* **40**, 322 (1926).
- [57] A. G. Magner *et al.*, *Prog. Theor. Phys. (Japan)* (1999), submitted.
- [58] B. Mehlig and K. Richter, *Phys. Rev. Lett.* **80**, 1936 (1998).
- [59] P. Meier, M. Brack, and S. C. Creagh, *Z. Phys. D* **41**, 281 (1997).
- [60] A. D. Mirlin and P. Wölfle, *Phys. Rev. B* **58**, 12986 (1998).
- [61] H. Nishioka, K. Hansen, and B. R. Mottelson, *Phys. Rev. B* **42**, 9377 (1990).
- [62] S. M. Reimann, M. Persson, P. E. Lindelof, and M. Brack, *Z. Phys. B* **101**, 377 (1996).
- [63] K. Richter, *Europhys. Lett.* **29**, 7 (1995).
- [64] K. Richter, D. Ullmo, and R. A. Jalabert, *J. Math. Phys.* **37**, 5087 (1996).
- [65] K. Richter, D. Ullmo, and R. A. Jalabert, *Phys. Rev. B* **54**, R5219 (1996).
- [66] J. Robbins, *Chaos* **2**, 145 (1992).
- [67] A. Sachrajda, *Physica E* **1**, 248 (1997).
- [68] S. D. Sarma and F. Stern, *Phys. Rev. B* **32**, 8442 (1988).
- [69] H. Schomerus, *Europhys. Lett.* **38**, 423 (1997).
- [70] H. Schomerus and M. Sieber, *J. Phys. A* **30**, 4537 (1997).
- [71] H. Schomerus, *J. Phys. A* **31**, 4167 (1998).
- [72] M. Sieber, *J. Phys. A.* **29**, 4715 (1996).
- [73] M. Sieber and H. Schomerus, *J. Phys. A.* **31**, 165 (1998).
- [74] A. M. Song *et al.*, *Superlattices and Microstructures* **25**, 269 (1999).
- [75] P. Stréda, *J. Phys. C* **15**, L717 (1982).
- [76] V. M. Strutinsky, *Nukleonik* **20**, 679 (1975); A. M. Strutinsky and A. G. Magner, *Elem. Part. & Nucl. (Atomizdat, Moscow)* **7**, 365 (1976) [*Sov. J. Part. Nucl.* **7**, 138 (1976)].
- [77] K. Tanaka, S. C. Creagh, and M. Brack, *Phys. Rev. B* **53**, 16050 (1996).
- [78] K. Tanaka, *Ann. Phys.* **268**, 31 (1998).
- [79] B. Tatievski, P. Stampfli, and K. H. Bennemann, *Comput. Mater. Sci.* **2**, 459 (1994); B. Tatievski, *Diplomarbeit, Freie Universität Berlin*, (1993) (unpublished).
- [80] N. Trivedi and D. A. Browne, *Phys. Rev. B* **38**, 9581 (1988).
- [81] D. Ullmo, K. Richter, and R. A. Jalabert, *Phys. Rev. Lett.* **74**, 383 (1995).

- [82] D. Ullmo, K. Richter, and R. A. Jalabert, Phys. Rep. **276**, 1 (1996).
- [83] D. Weiss *et al.*, Phys. Rev. Lett. **66**, 2790 (1991).
- [84] D. Weiss *et al.*, Phys. Rev. Lett. **70**, 4118 (1993).
- [85] G. Wentzel, Zeits. f. Physik **38**, 518 (1926).
- [86] J. H. Van Vleck, Proc. Natl. Acad. Sci. USA **14**, 178 (1928).

### C. Reviews

- [87] T. Ando, A. B. Fowler, and F. Stern, Rev. Mod. Phys. **54**, 437 (1982).
- [88] G. Bergmann, Phys. Rep. **107**, 1 (1984).
- [89] M. Brack, Rev. Mod. Phys. **65**, 677 (1993).
- [90] S. Chakravarty and A. Schmid, Phys. Rep. **140**, 193 (1986).
- [91] T. Dittrich, Phys. Rep. **271**, 267 (1996).
- [92] H. Friedrich and D. Wintgen, Phys. Rep. **183**, 37 (1992).
- [93] B. Kramer and A. MacKinnon, Rep. Prog. Phys. **56**, 1469 (1993).
- [94] P. A. Lee and T. V. Ramakrishnan, Rev. Mod. Phys. **27**, 287 (1985).
- [95] R. G. Littlejohn, Phys. Rep. **138**, 193 (1986).
- [96] K. Richter, D. Ullmo, and R. A. Jalabert, Phys. Rep. **276**, 1 (1996).

### D. Books

- [97] A. A. Abrikosov *et al.*, *Methods of Quantum Field Theory in Statistical Physics*, Prentice-Hall, Englewood Cliffs (1963).
- [98] H. P. Baltes and E. R. Hilf, *Spectra of Finite Systems* (Bibliographisches Institut, Mannheim, 1972).
- [99] C. W. J. Beenakker and H. van Houten, *Quantum transport in semiconductor nanostructures* (Solid state physics **44**), Academic press 1991.
- [100] M. Brack and R. K. Bhaduri, *Semiclassical Physics*, (Frontiers in Physics, Vol. 96) Addison Wesley 1997.
- [101] P. Citanović *et al.*, *Classical and quantum chaos: A Cyclist Treatise*, published under <http://www.nbi.dk/ChaosBook>.
- [102] H. Geiger, *Quantenmechanik ohne Paradoxa: Meßprozeß und Chaos aus der Sicht der Bohmschen Quantenmechanik*, Dissertation, Universität Regensburg (1997); published by Mainz, Aachen 1997.
- [103] R. Kubo, M. Toda and N. Hashitsume, *Statistical Physics II* (Springer, Berlin, 1985).
- [104] W. H. Press *et al.*, *Numerical Recipes in Fortran : The Art of Scientific Computing; (Fortran Numerical Recipes, Vol 1 and 2)*, Cambridge University Press (1992).
- [105] K. Richter, *Semiclassical Theory of Mesoscopic Quantum Systems*, Habilitation Thesis Universität Augsburg (1997), Springer, Berlin (in print).
- [106] U. Smilansky in *Mesoscopic Quantum Physics*, edited by E. Akkermans *et al.*, Elsevier, New York (1995).
- [107] J. Stoer and R. Bulirsch, *Introduction to numerical analysis*, Springer (New York, 1980).

### E. Literature to specific topics

- [108] For a possible solution to the chirality problem using a logarithmic extension of the Schrödinger equation see, e. g., I. Bialynicki-Birula and J. Mycielsky, Ann. Phys. **100**, 62 (1976), and the references cited therein.

- 
- [109] For another than the Kopenhagen interpretation of quantum mechanics see, e. g., D. Bohm and B. Hiley, *Found. Phys.* **14**, 255 (1984), and the references cited therein.
  - [110] For experimental evidence of coulomb ordering see, e. g., E. Buks, M. Heiblum, and H. Shtrikman, *Phys. Rev. B* **49**, 14790 (1994); P. Sobkowicz, Z. Wilamowski, and J. Knossut, *Semicond. Sci. Technol.* **7**, 1155 (1992).
  - [111] For resummation schemes for trace formulae see contributions in *Chaos* **2**, (1992).
  - [112] For the discussion on including finite temperature in transport linear response see, e. g., G. Czycholl and B. Kramer, *Solid state Commun.* **32**, 945 (1979); Y. Imry and N. S. Shrien, *Phys. Rev. B* **33**, 7992 (1986); D. J. Thouless and S. Kirkpatrick, *J. Phys. C* **14**, 235 (1981).
  - [113] For theoretical work on coulomb ordering see, e. g., A. L. Efros, *Solid State Comm.* **65**; T. Suski *et al.*, *Phys. Rev. B* **50**, 2723 (1994); M. Stopa, *Phys. Rev. B* **54**, 13767 (1996), *Superlattices and Microstructures* **21**, 493 (1997).
  - [114] For recent semiclassical approaches to the resonant tunneling diode see, e. g., E. E. Narimanov, A. D. Stone, and G. S. Boebinger, *Phys. Rev. Lett.* **80**, 4024 (1998); D. S. Sarga and T. S. Monteiro, *Phys. Rev. E* **57**, 5252 (1998); T. S. Monteiro *et al.*, *Phys. Rev. B* **56**, 3913 (1997); E. B. Bogomolny and D. C. Rouben, *Europhys. Lett.* **43**, 111 (1998); and the references cited therein.
  - [115] For an explanation of the stable classical chirality using a coupling to the radiation field see P. Pfeifer, *Chiral molecules – a superselection rule induced by the radiation field*, dissertation Zürich (1980).
  - [116] For works related with the consistent interpretation of the quantum measurement process see, e. g. H. Primas: *The measurement process in the individual interpretation of quantum mechanics* in *Quantum theory without reduction*, Adam Hilder, Bristol (1990); R. Omnès, *Rev. Mod. Phys.* **64**, 339 (1992).
  - [117] For an overview on nuclear shapes and shell see, e. g., I. Ragnarsson, S. G. Nilsson, and R. K. Sheline, *Phys. Rep.* **45**, 1 (1978).

## F. Miscellaneous

- [118] M. Brack *et al.*, in preparation.
- [119] See, e. g., the example of the triangular billiard in Sect. 6.1.2. of Ref. [100].
- [120] B. Mehlig and K. Richter, in preparation (1998).
- [121] P. Meier, Diploma thesis, Universität Regensburg (1995) (unpublished).
- [122] P. Meier, Dissertation, Universität Regensburg (1999) (unpublished).
- [123] F. von Oppen, Dissertation, University of Washington (1993) (unpublished).
- [124] S. Pedersen *et al.*, cond-mat/9905033 (1999).
- [125] D. Weiss, private communication.



# An Euch,

Matthias, meinem Doktorvater. Für Forderung und Förderung. Und für seine Begeisterung, die mich immer wieder angesteckt hat.

Fritz, Tom und Marc, die mir bei meinen Kämpfen gegen die Windmühlen der EDV immer wieder in den Sattel geholfen haben.

Anja. Für körperliche, geistige und seelische Rücken-  
deckung.

J. Eroms and S. Pedersen for handing out experimental data.

G. Kirzenow for the quantum data of the channel.

Heather, Sven, Merideth and Monika. I apologize for torturing you with all this physics (not to mention my very special interpretation of English grammar).

Stephan. Für seine Neugierde und seine ansteckend klare Art zu denken. Außerdem soll er gefälligst Professor werden ...

## ein dickes

K. Richter, S. Creagh, H. Schomerus, M. Sieber, K. Tanaka, J. Eroms, S. Jobst, O. Steffens, U. Rößler und M. Suhrke, die sich Zeit genommen haben, meine Fragen zu beantworten.

Anja, Didi und Stephan für die Durchsicht des Manuskriptes.

Der Arbeitsgruppe. Es hat nicht nur Spaß gemacht, mit Euch zu arbeiten, sondern auch mit Euch nicht nur zu arbeiten!

Meinen Eltern.

Didi, Caren,  
Anna und Joscha.  
Bonsoir, mes  
amis ...

Floh und Burkhard von der Chaostruppe. Für physikalische und ausserphysikalische Begleitung.

A. Sachrajda, C. Gould and P. J. Kelly from the Institute of Microstructural sciences, Ottawa. Not only for providing me with the experimental data of the channel system, but also for their continued interest in this work and for their patience explaining experimental details to a theoretist.

# Dankeschön!

This work was very much stimulated by the discussion with other workers in the field. In addition to the contacts mentioned on the last page, many informal conversations had been helpful for the research presented here. Especially the conferences and workshops which I had the possibility to attend and where I could present parts of this work, gave rise to plenty of these valuable opportunities. In this context, I gratefully acknowledge the financial support of the Universität Regensburg and the grant CHRX-CT94-0612 of the European Community. I am additionally indebted to the Niels Bohr Institute, Copenhagen, the Université Paris Sud and the Max Planck Institut “Physik komplexer Systeme”, Dresden for their kind invitations.

---

#### ANNOUNCEMENT

Part of the work started out in the context of this thesis did not reach maturity. Some of these projects were just too low on the priority list to get finished within the limited time of my Ph.D. Among these, there is quite some pioneering work on the Aharonov-Bohm ring experiment mentioned above [124], including a first numerical estimation of the depletion width. Another project aimed for a semiclassical calculation of the potential steepness of an antidot lattice. For this project, I already performed analytical calculations for the shortest orbits of the corresponding billiard system. The next step would be to include finite slopes within semiclassical perturbation theory. Comparing the results to measured data might allow a statement on the smoothness of the physical potential. This analysis should also be applicable to the experiment on antidot lattices with large antidots performed in the group of D. Weiss [27]. Furthermore, I worked on classical conductivities of inhomogeneous system. Special focus was directed on rectangular antidot lattices. First numerical and analytical results indicate that there is interesting physics to reveal, namely that there might be an classical effect leading to anisotropic conductivities in these systems.

I really liked these projects, and I really like to see them finished. If someone else is attracted to any of these problems, he is seriously invited to contact me:

`mail@joachim-blaschke.de`

I will be happy to communicate my preliminary findings as a starting point for further investigations to anyone who is interested in the related questions.



...and trust me on the sunscreen.