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## Publications

1. A Relativistic Feynman-Kac Formula, *Nuclear Physics* **B52** (1973), 608-614.
2. The  $\lambda\phi_3^4$  Field Theory in a Finite Volume, *Commun. Math. Phys.* **37**(1974), 93-120.
3. On the Absence of Bound States in the  $\lambda\phi_3^4$  Quantum Field Model Without Symmetry Breaking, *Canad. J. Phys.* **52**(1974), 1583-1587.
4. The Wightman Axioms and the Mass Gap for Weakly Coupled  $\phi_3^4$  Quantum Field Theories, in *International Symposium on Mathematical Problems in Theoretical Physics*, Kyoto, Japan, ed. H. Araki, Springer Lecture Notes in Physics, **39**(1975), 151-160. (with K. Osterwalder)
5. The Construction of  $\lambda\phi_3^4$  Quantum Field Models, in *Proceedings of the International Colloquium on Mathematical Methods of Quantum Field Theory*, Marseille, ed. F. Guerra, D. W. Robinson and R. Stora (1975), 101-110. (with K. Osterwalder)
6. The Non-perturbative Renormalization of  $(\lambda\phi^4)_3$ , in *Renormalization Theory*, ed. G. Velo and A. Wightman, Springer Lecture Notes in Physics (1975), 435-460.
7. The Wightman Axioms and the Mass Gap for Weakly Coupled  $(\phi^4)_3$  Quantum Field Theories, *Ann. Physics* **97**(1976), 80-135. (with K. Osterwalder)
8. The Relativistic Field Equation of the  $\lambda\phi_3^4$  Quantum Field Theory, *Ann. Physics* **108**(1977), 212-229. (with Ryszard Rączka)
9. Legendre Transforms and r-Particle Irreducibility in Quantum Field Theory: The Formalism for r=1,2, *Ann. Phys. (N.Y.)* **137**(1981), 146-209. (with A. Cooper and L. Rosen)
10. Legendre Transforms and r-Particle Irreducibility in Quantum Field Theory: The Formal Power Series Framework, *Ann. Phys. (N. Y.)* **137**(1981), 213-261. (with A. Cooper and L. Rosen)
11. Higher Legendre Transforms and their Relationship to Bethe-Salpeter Kernels and r-Field Projectors, *J. Math. Phys.* **23**(1982), 846-868. (with A. Cooper and L. Rosen)
12. Cluster Irreducibility of the Third and Fourth Legendre Transforms in Quantum Field Theory, *Phys. Rev.* **D25**(1982), 1565-1578. (with A. Cooper and L. Rosen)
13. The Second Legendre Transform for the Weakly Coupled  $P(\phi)_2$  Model, *J. Math. Phys.* **23**(1982), 1899-1916. (with A. Cooper and L. Rosen)
14. Méthodes pour la théorie constructive des champs renormalisables, asymptotiquement libres, *Proceedings of RCP 25*, Strasbourg, France, **34**(1984), 67-90. (with J. Magnen, V. Rivasseau and R. Sénéor)
15. Legendre Transforms and r-Particle Irreducibility in Quantum Field Theory: The Formalism for Fermions, *Annales de l'Institut Henri Poincaré*, **43**(1985), 29-106. (with A. Cooper and L. Rosen)
16. Bounds on Completely Convergent Euclidean Feynman Graphs, *Commun. Math. Phys.* **98** (1985), 273-288. (with J. Magnen, V. Rivasseau and R. Sénéor)

17. Bounds on Renormalized Feynman Graphs, *Commun. Math. Phys.* **100** (1985), 23-55. (with J. Magnen, V. Rivasseau and R. Sénéor)
18. The Massive Gross-Neveu Model: A Rigorous Perturbative Construction, *Phys. Rev. Lett.* **54** (1985), 1479-1481. (with J. Magnen, V. Rivasseau and R. Sénéor)
19. A Renormalizable Field Theory: The Massive Gross-Neveu Model in Two Dimensions, *Commun. Math. Phys.* **103** (1986), 67-103. (with J. Magnen, V. Rivasseau and R. Sénéor)
20. Existence of an Instanton Singularity in  $\Phi_3^4$  Euclidean Field Theory, *Annales de l'Institut Henri Poincaré* **44** (1986), 427-442. (with V. Rivasseau)
21. Bounds on Euclidean Feynman Graphs, in *Critical Phenomena, random systems, gauge theories, Les Houches XLIII*, eds. K. Osterwalder and R. Stora, North Holland (1986), 493-503. (with J. Magnen, V. Rivasseau and R. Sénéor)
22. Infrared  $\Phi_4^4$ , in *Critical Phenomena, random systems, gauge theories, Les Houches XLIII* eds. K. Osterwalder and R. Stora, North Holland (1986), 505-537. (with J. Magnen, V. Rivasseau and R. Sénéor)
23. Instanton Singularities in Euclidean  $\Phi^4$  Quantum Field Theories, *Proceedings of RCP 25, Strasbourg, France*, **37**(1986), 65-76.
24. Construction and Borel Summability of Infrared  $\Phi_4^4$  by a Phase Space Expansion, *Commun. Math. Phys.* **109** (1987), 437-480. (with J. Magnen, V. Rivasseau and R. Sénéor)
25. Appendix to D. Iagolnitzer and J. Magnen, Asymptotic Completeness and Multiparticle Structure in Field Theories II. Theories with Renormalization: the Gross-Neveu Model, *Commun. Math. Phys.* **111** (1987), 81-100.
26. Renormalizability of  $\text{QED}_4$  in *Proceedings of the 8<sup>th</sup> International Congress on Mathematical Physics*, ed. M. Mebkhout and R. Sénéor, World Scientific Publishing, (1987) 614-621. (with T. Hurd, L. Rosen and J. Wright)
27. Phase Space Expansions in Quantum Field Theory, in *Proceedings of 26<sup>th</sup> Internationale Universitätswochen für Kernphysik*, Schladming, Austria, ed. H. Mitter and L. Pittner, Springer-Verlag (1987), 160-183.
28. On the Large Order Behaviour of  $\Phi_4^4$ , *Commun. Math. Phys.* **116** (1988), 215-233. (with F. David and V. Rivasseau)
29. The Large Order Behaviour of  $\Phi^4$  Perturbation Theory, in *Mathematical Quantum Field Theory and Related Topics- Montreal 1987*, ed. J. Feldman and L. Rosen, CMS Conference Series (of the AMS) **9**(1988) 47-54.
30. CQFT 100: An Introduction to Constructive Field Theory, in *Proceedings of the IX<sup>th</sup> IAMP Congress*, Swansea, eds. B. Simon, I. M. Davies and A. Truman, Adam Hilger (1989) 458-461.
31. The Perturbatively Stable Spectrum of a Periodic Schrödinger Operator, *Invent. math.* **100** (1990) 259-300. (with H. Knörrer and E. Trubowitz)
32. Perturbation Theory for Many Fermion Systems, *Helvetica Physica Acta* **63** (1990) 156-260. (with E. Trubowitz)
33. Introduction to Constructive Quantum Field Theory, in *Proceedings of the International Congress of Mathematicians*, Kyoto, Japan, ed. H. Araki (1990) 1335-1341.
34. Perturbatively Unstable Eigenvalues of a Periodic Schrödinger Operator, *Commentarii Mathematici Helvetici*, **66** (1991) 557-579. (with H. Knörrer and E. Trubowitz)
35. The Flow of an Electron-Phonon System to the Superconducting State, *Helvetica Physica Acta*, **64** (1991) 214-357. (with E. Trubowitz)

36. A Remark on Anisotropic Superconducting States, *Helvetica Physica Acta*, **64** (1991) 694-699. (with H. Knörrer and E. Trubowitz)
37. There is No Two-dimensional Analogue of the Lamé Equation, *Mathematische Annalen*, **294** (1992) 295-324. (with H. Knörrer and E. Trubowitz)
38. An Infinite Volume Expansion for Many Fermion Green's Functions, *Helvetica Physica Acta*, **65** (1992) 679-721. (with J. Magnen, V. Rivasseau and E. Trubowitz)
39. Renormalization in Classical Mechanics and Many Body Quantum Field Theory, *Journal d'Analyse Mathématique*, **58**(1992) 213-247. (with E. Trubowitz)
40. Ward Identities and a Perturbative Analysis of a U(1) Goldstone Boson in a Many Fermion System, *Helvetica Physica Acta*, **66** (1993) 498-550. (with J. Magnen, V. Rivasseau and E. Trubowitz).
41. Constructive Many-Body Theory, *Rev. Math. Phys.*, **6** (1994) 1095-1126, (with J. Magnen, V. Rivasseau and E. Trubowitz)
42. Two Dimensional Many Fermion Systems as Vector Models, *Europhysics Letters*, **24** (1993) 521-526 (with J. Magnen, V. Rivasseau and E. Trubowitz).
43. An Intrinsic  $1/N$  Expansion for Many Fermion Systems, *Europhysics Letters*, **24** (1993) 437-442 (with J. Magnen, V. Rivasseau and E. Trubowitz).
44. Fermionic Many-Body Models, in *Mathematical Quantum Theory I: Field Theory and Many-Body Theory*, CRM Proceedings and Lecture Notes, Vol 7, ed. J. Feldman, R. Froese and L. Rosen, AMS (1994) 29-56. (with J. Magnen, V. Rivasseau and E. Trubowitz)
45. Un développement en  $1/N$  intrinsèque en physique des solides, *Prépublications de l'IRMA, RCP 25, Strasbourg Vol. 45* (1993) (with J. Magnen, V. Rivasseau and E. Trubowitz).
46. A Class of Fermi Liquids, in *"Particles and Fields '94"*, edited by G. Semenoff and L. Vinet, Springer 35-62 (1999). (with H. Knörrer, D. Lehmann and E. Trubowitz)
47. Fermi Liquids in Two Space Dimensions, in *Constructive Physics. Results in Field Theory, Statistical Mechanics and Solid State Physics*, ed. V. Rivasseau, Springer Verlag (1995) 267-300. (with H. Knörrer, D. Lehmann and E. Trubowitz)
48. Are There Two Dimensional Fermi Liquids? in *Proceedings of the XIth International Congress of Mathematical Physics*, D. Iagolnitzer ed., 440-444 (1995). (with H. Knörrer, D. Lehmann and E. Trubowitz)
49. Perturbation Theory around Non-nested Fermi Surfaces, I: Keeping the Fermi Surface Fixed, *Journal of Statistical Physics*, **84** (1996) 1209-1336. (with M. Salmhofer and E. Trubowitz)
50. Le programme constructif en physique du solide, *Prépublications de l'IRMA, RCP 25, Strasbourg* (1993) (with J. Magnen, V. Rivasseau and E. Trubowitz).
51. Rigorous Analysis of the Superconducting Phase of an Electron-Phonon System, in *Les Houches 62: Fluctuating Geometries in Statistical Mechanics and Field Theory* edited by F. David, P. Ginsparg and J. Zinn-Justin (1996) (with J. Magnen, V. Rivasseau and E. Trubowitz).
52. Infinite Genus Riemann Surfaces, in *Canadian Mathematical Society/ Société mathématique du Canada 1945-1995 Volume/Tome 3, Invited Papers/ Articles sollicités* edited by James B. Carrell and Ram Murty, Canadian Mathematical Society, Ottawa (1996) 91-112 (with H. Knörrer and E. Trubowitz)
53. Superconductivity in a Repulsive Model, *Helvetica Physica Acta*, **70** (1997) 154-191. (with H. Knörrer, R. Sinclair and E. Trubowitz)
54. An Improved Moser-Aubin-Onofri Inequality for Radially Symmetric Functions on  $S^2$ , *Calculus of Variations and Partial Differential Equations*, **6**, 95-104 (1998). (with R. Froese, N. Ghoussoub and C. Gui)

55. Evaluation of fermion loops by higher residues, in *Singularities, Festschrift in honour of Prof. E. Brieskorn's 60th birthday*, Progress in Mathematics **162** (1998) 361-398. (with H. Knörrer, R. Sinclair and E. Trubowitz)
56. The Temperature Zero Limit, Journal of Statistical Physics, **94** (1999), 113-157. (with H. Knörrer, M. Salmhofer and E. Trubowitz)
57. Regularity of the Moving Fermi Surface: RPA Contributions, Communications on Pure and Applied Mathematics, **LI**, 1133-1246 (1998). (with M. Salmhofer and E. Trubowitz)
58. A Nonperturbative Representation for Fermionic Correlation Functions, Communications in Mathematical Physics, **195**, 465-493 (1998). (with H. Knörrer and E. Trubowitz)
59. Regularity of Interacting Nonspherical Fermi Surfaces: The Full Self-Energy, Communications on Pure and Applied Mathematics, **LII**, 273-324 (1999). (with M. Salmhofer and E. Trubowitz)
60. Renormalization of the Fermi Surface, *XII<sup>th</sup> International Congress of Mathematical Physics*, 24-34 (1999). (with M. Salmhofer and E. Trubowitz)
61. Asymmetric Fermi Surfaces for Magnetic Schrödinger Operators, Communications in Partial Differential Equations **25** (2000), 319-336. (with H. Knörrer and E. Trubowitz)
62. An inversion theorem in Fermi surface theory, Communications on Pure and Applied Mathematics, **LIII**, 1350-1389 (2000). (with M. Salmhofer and E. Trubowitz)
63. Single Scale Analysis of Many Fermion Systems, Part 1: Insulators, Reviews in Mathematical Physics, **15** (2003), 949-994. (with H. Knörrer and E. Trubowitz)
64. Single Scale Analysis of Many Fermion Systems, Part 2: The First Scale, Reviews in Mathematical Physics, **15** (2003), 995-1038. (with H. Knörrer and E. Trubowitz)
65. Single Scale Analysis of Many Fermion Systems, Part 3: Sectorized Norms, Reviews in Mathematical Physics, **15** (2003), 1039-1120. (with H. Knörrer and E. Trubowitz)
66. Single Scale Analysis of Many Fermion Systems, Part 4: Sector Counting, Reviews in Mathematical Physics, **15** (2003), 1121-1169. (with H. Knörrer and E. Trubowitz)
67. A Two Dimensional Fermi Liquid, Part 1: Overview, Commun. Math. Phys. **247** (2004), 1-47. (with H. Knörrer and E. Trubowitz)
68. A Two Dimensional Fermi Liquid, Part 2: Convergence, Commun. Math. Phys. **247** (2004), 49-111. (with H. Knörrer and E. Trubowitz)
69. A Two Dimensional Fermi Liquid, Part 3: The Fermi Surface, Commun. Math. Phys. **247** (2004), 113-177. (with H. Knörrer and E. Trubowitz)
70. Particle-Hole Ladders, Commun. Math. Phys. **247** (2004), 179-194. (with H. Knörrer and E. Trubowitz)
71. Particle-Hole Ladders, Commun. Math. Phys. <http://dx.doi.org/10.1007/s00220-004-1038-2>. Extended online version. (with H. Knörrer and E. Trubowitz)
72. Convergence of Perturbation Expansions in Fermionic Models, Part I: Nonperturbative bounds, Commun. Math. Phys. **247** (2004), 195-242. (with H. Knörrer and E. Trubowitz)
73. Convergence of Perturbation Expansions in Fermionic Models, Part II: Overlapping loops, Commun. Math. Phys. **247** (2004), 243-319. (with H. Knörrer and E. Trubowitz)
74. Construction of a 2-d Fermi Liquid, *XIV<sup>th</sup> International Congress of Mathematical Physics*, ed. Jean-Claude Zambrini, World Scientific (2006), 245-260. (with H. Knörrer and E. Trubowitz)
75. A Proof of Luttinger's Theorem, Europhysics Letters **72** (2005), 49-54. (with A. Praz, H. Knörrer and E. Trubowitz)
76. Singular Fermi Surfaces I. General Power Counting and Higher Dimensional Cases, Reviews in Mathematical Physics **20** (2008), 233-274. (with M. Salmhofer)

77. Singular Fermi Surfaces II. The Two-Dimensional Case, *Reviews in Mathematical Physics* **20** (2008), 275–334. (with M. Salmhofer)
78. A Functional Integral Representation for Many Boson Systems I: The Partition Function, *Annales Institut Poincaré* **9** (2008), 1229–1273. (with T. Balaban, H. Knörrer and E. Trubowitz)
79. A Functional Integral Representation for Many Boson Systems II: Correlation Functions, *Annales Institut Poincaré* **9** (2008), 1275–1307. (with T. Balaban, H. Knörrer and E. Trubowitz)
80. Power Series Representations for Bosonic Effective Actions, *Journal of Statistical Physics* **134** (2009), 839–857. (with T. Balaban, H. Knörrer and E. Trubowitz)
81. Power Series Representations for Complex Bosonic Effective Actions I: A Small Field Renormalization Group Step, *Journal of Mathematical Physics* **51** (2010), 053305 (30 pages). (with T. Balaban, H. Knörrer and E. Trubowitz)
82. Power Series Representations for Complex Bosonic Effective Actions. II: A Small Field Renormalization Group Flow, *Journal of Mathematical Physics* **51** (2010), 053306 (20 pages). (with T. Balaban, H. Knörrer and E. Trubowitz)
83. The Temporal Ultraviolet Limit for Complex Bosonic Many-body Models, *Annales Institut Poincaré* **11** (2010), 151–350. DOI: 10.1007/s00023-010-0028-5 (with T. Balaban, H. Knörrer and E. Trubowitz)
84. The Temporal Ultraviolet Limit, in *Quantum Theory from Small to Large Scales, Ecole de Physique des Houches, 2010* edited by J. Fröhlich, M. Salmhofer, V. Mastropietro, W. De Roeck, L. F. Cugliandolo, 99–170 (2012). (with T. Balaban, H. Knörrer and E. Trubowitz)
85. Complex Bosonic Many-body Models: Overview of the Small Field Parabolic Flow, *Annales Institut Poincaré* **18** (2017), 2873–2903. arXiv:1609.00968 (with T. Balaban, H. Knörrer and E. Trubowitz)
86. The Small Field Parabolic Flow for Bosonic Many-body Models: Part 1 — Main Results and Algebra, *Annales Institut Poincaré* **20** (2019), 1–62. DOI 10.1007/s00023-018-0750-y arXiv:1609.01745, (with T. Balaban, H. Knörrer and E. Trubowitz)
87. The Small Field Parabolic Flow for Bosonic Many-body Models: Part 2 — Fluctuation Integral and Renormalization, *Annales Institut Poincaré* **20** (2019), 63–124. DOI 10.1007/s00023-018-0748-5 arXiv:1609.01746, (with T. Balaban, H. Knörrer and E. Trubowitz)
88. The Small Field Parabolic Flow for Bosonic Many-body Models: Part 3 - Nonperturbatively Small Errors arXiv:1609.01747, 16 pages (with T. Balaban, H. Knörrer and E. Trubowitz)
89. The Small Field Parabolic Flow for Bosonic Many-body Models: Part 4 - Background and Critical Field Estimates arXiv:1609.01748, 43 pages (with T. Balaban, H. Knörrer and E. Trubowitz)
90. Operators for Parabolic Block Spin Transformations, arXiv:1609.00971, 64 pages (with T. Balaban, H. Knörrer and E. Trubowitz)
91. Bloch Theory for Periodic Block Spin Transformations, arXiv:1609.00964, 21 pages (with T. Balaban, H. Knörrer and E. Trubowitz)
92. The Algebra of Block Spin Renormalization Group Transformations arXiv:1609.00966, 18 pages (with T. Balaban, H. Knörrer and E. Trubowitz)
93. Power Series Representations for Complex Bosonic Effective Actions. III. Substitution and Fixed Point Equations, *Annales Institut Poincaré Comb. Phys. Interact.* **6** (2019), 43–71. DOI 10.4171/AIHPD/64 arXiv:1609.00961. (with T. Balaban, H. Knörrer and E. Trubowitz)

## Books

94. QED: A Proof of Renormalizability, *Springer Lecture Notes in Physics* **312**(1988), 176 pages. (with T. Hurd, L. Rosen and J. Wright)
95. *Mathematical Quantum Field Theory and Related Topics - Montreal 1987*, CMS Conference Series (of the AMS) **9**(1988). (edited with L. Rosen)

96. Mathematical Quantum Theory I: Field Theory and Many-Body Theory, CRM Proceedings & Lecture Notes **7** (1994). (edited with R. Froese and L. Rosen)
97. Mathematical Quantum Theory II: Schrödinger Operators, CRM Proceedings & Lecture Notes **8** (1995). (edited with R. Froese and L. Rosen)
98. Fermionic Functional Integrals and the Renormalization Group, CRM Monograph Series of the American Mathematical Society, **16** (2002), 105 pages. (with H. Knörrer and E. Trubowitz).
99. Riemann Surfaces of Infinite Genus, CRM Monograph Series of the American Mathematical Society, **20** (2003), 296 pages. (with H. Knörrer and E. Trubowitz)