

Prof. Dr. habil. Hans-Georg Beyer
FH Vorarlberg University of Applied Sciences
Research Center Business Informatics
A-6850 Dornbirn, Austria

Publications and Patents

As for citation counts and H-index, see Google Scholar¹ and ResearchGate.²
As for ranking at ScholarGPS in Engineering and Computer Science.³

Books

- [1] H.-G. Beyer. *Ein Evolutionsverfahren zur mathematischen Modellierung stationärer Zustände in dynamischen Systemen*. Dissertation, Hochschule für Architektur und Bauwesen, Weimar, Germany, 1989. Reihe: HAB-Dissertationen, Nr. 16.
- [2] H.-G. Beyer. *Zur Analyse der Evolutionsstrategien*. Habilitationsschrift, University of Dortmund, 1996.
- [3] H.-G. Beyer. *The Theory of Evolution Strategies*. Natural Computing Series. Springer, Heidelberg, 2001. <https://doi.org/10.1007/978-3-662-04378-3>.

Chapter in Books

- [1] H.-G. Beyer. Local Performance Measures: Evolution Strategies and Evolutionary Programming. In T. Bäck, D. Fogel, and Z. Michalewicz, editors, *Handbook of Evolutionary Computation*. Oxford University Press, New York, 1997.
- [2] H.-G. Beyer. Design Optimization of a Linear Collider Using ES. In T. Bäck, D. Fogel, and Z. Michalewicz, editors, *Handbook of Evolutionary Computation*. Oxford University Press, New York, 1997.
- [3] H.-G. Beyer and D.V. Arnold. Theory of Evolution Strategies - A Tutorial. In L. Kallel, B. Naudts, and A. Rogers, editors, *2nd EvoNet Summer School on Theoretical Aspects of Evolutionary Computing*, pages 109–133. Springer, Heidelberg, 2001. https://doi.org/10.1007/978-3-662-04448-3_6.
- [4] H.-G. Beyer, E. Brucherseifer, H. Jakob, W. Pohlheim, B. Sendhoff, and T.B. To. VDI/VDE-Richtlinie 3550, Blatt 3: Evolutionäre Algorithmen – Begriffe und Definitionen. In *VDI/VDE-Handbuch Regelungstechnik*. Verein Deutscher Ingenieure, Düsseldorf, 2001. in German.
- [5] B. Sendhoff, H.-G. Beyer, and M. Olhofer. The influence of stochastic quality functions on evolutionary search. In K.C. Tan, M.H. Lim, X. Yao, and L. Wang, editors, *Recent*

¹<https://scholar.google.com/citations?user=WHjIHV4AAAAJ>

²<https://www.researchgate.net/profile/Hans-Georg-Beyer>

³<https://scholargps.com/scholars/26494868914596/hans-georg-beyer>

Advances in Simulated Evolution and Learning, Advances in Natural Computation, pages 152–172. World Scientific, New York, 2004. https://doi.org/10.1142/9789812561794_0009.

- [6] S. Meyer-Nieberg and H.-G. Beyer. Self-Adaptation in Evolutionary Algorithms. In F.G. Lobo, C.F. Lima, and Z. Michalewicz, editors, *Parameter Setting in Evolutionary Algorithms*, pages 47–75. Springer, Berlin, 2007. https://doi.org/10.1007/978-3-540-69432-8_3.
- [7] H.-G. Beyer, J. Edler, M. Herdy, I. Santibanez-Koref, M. Olhofer, G. Rudolph, W. Sachs, S. Schlieuwe, H. Seitz, and I. Tesari. VDI-Richtlinie 6224, Blatt 2: Bionische Optimierung – Anwendung biologischer Wachstumsgesetze zur strukturmechanischen Optimierung technischer Bauteile. In *VDI-Handbuch Bionik*. Verein Deutscher Ingenieure, Düsseldorf, 2011.
- [8] S. Meyer-Nieberg and H.-G. Beyer. The Dynamical Systems Approach – Progress Measures and Convergence Properties. In G. Rozenberg, T. Bäck, and J.H. Kok, editors, *Handbook of Natural Computing*, pages 741–814. Springer, Berlin, 2012.
- [9] H. Beismann, J. Bertling, H.-G. Beyer, I. Boblan, Erb. R., M. Fischer, M. Herdy, A. Jordan, A. Kesel, S. Menzel, M. Mörtl, G. Pohl, H. Seitz, O. Speck, Speck T., I. Tesari, J. Tschernjaew, and M. Wirth. VDI-Richtlinie 6220: Bionik – Konzeption und Strategie. In *VDI-Handbuch Bionik*. Verein Deutscher Ingenieure, Düsseldorf, 2012.
- [10] H.-G. Beyer, J. Edler, M. Herdy, I. Santibanez-Koref, M. Olhofer, G. Rudolph, W. Sachs, S. Schlieuwe, H. Seitz, and I. Tesari. VDI-Richtlinie 6224, Blatt 1: Bionische Optimierung – Evolutionäre Algorithmen in der Anwendung. In *VDI-Handbuch Bionik*. Verein Deutscher Ingenieure, Düsseldorf, 2012.

Editorial Work

- [1] H.-G. Beyer, K. De Jong, D.B. Fogel, and I. Wegener, editors. *Theory of Evolutionary Algorithms*, Dagstuhl-Seminar-Report 265, 13.02.-18.02. 2000. IBFI GmbH, Schloß Dagstuhl, Wadern.
- [2] D. Whitley, D. Goldberg, E. Cantu-Paz, I. Parmee, L. Spector, and H.-G. Beyer, editors. *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO'2000)*, San Francisco, CA, 2000. Morgan Kaufmann.
- [3] H.-G. Beyer, K. De Jong, C. Reeves, and I. Wegener, editors. *Theory of Evolutionary Algorithms*, Dagstuhl-Seminar-Report 330, 13.01.-18.01. 2002. IBFI GmbH, Schloß Dagstuhl, Wadern.
- [4] J.J. Merelo Guervós, P. Adamidis, H.-G. Beyer, J.L. Fernández-Villacañas, and H.-P. Schwefel, editors. *Proceedings of the 7th International Conference on Parallel Problem Solving from Nature (PPSN VII)*, Heidelberg, 2002. Springer.
- [5] H.-G. Beyer, T. Jansen, C. Reeves, and M.D. Vose, editors. *Abstracts Collection – Theory of Evolutionary Algorithms*, Dagstuhl Seminar Proceedings 04081, 15.02.–20.02.2004 2004. IBFI GmbH, Schloß Dagstuhl, Wadern.

- [6] Hans-Georg Beyer and Una-May O'Reilly, editors. *Genetic and Evolutionary Computation Conference, GECCO 2005, Proceedings, Washington DC, USA, June 25-29, 2005*. ACM, 2005.
- [7] Dirk Thierens, Hans-Georg Beyer, Josh Bongard, Jurgen Branke, John Andrew Clark, Dave Cliff, Clare Bates Congdon, Kalyanmoy Deb, Benjamin Doerr, Tim Kovacs, Sanjeev Kumar, Julian F. Miller, Jason Moore, Frank Neumann, Martin Pelikan, Riccardo Poli, Kumara Sastry, Kenneth Owen Stanley, Thomas Stutzle, Richard A Watson, and Ingo Wegener, editors. *GECCO 2007: Proceedings of the 9th annual conference on Genetic and evolutionary computation*, London, UK, 7-11 July 2007. ACM Press.
- [8] H.-G. Beyer and W.B. Langdon, editors. *FOGA '11: Proceedings of the 11th workshop on Foundations of Genetic Algorithms, 11*, New York, NY, USA, 2011. ACM.

Journal Articles

- [1] H.-G. Beyer. Evolutionsverfahren - Nutzung des Darwinschen Paradigmas zur Feldberechnung. *Wissenschaftliche Zeitschrift der Hochschule für Verkehrswesen Dresden*, 51(Sonderheft):17–40, 1989. Dresden, Germany.
- [2] H.-G. Beyer. Simulation of Steady States in Dissipative Systems by Darwin's Paradigm of Evolution. *J. Non-Equilib. Thermodyn.*, 15:45–58, 1990. <https://doi.org/10.1515/jnet.1990.15.1.45>.
- [3] H.-G. Beyer. Toward a Theory of Evolution Strategies: Some Asymptotical Results from the $(1,^+ \lambda)$ -Theory. *Evolutionary Computation*, 1(2):165–188, 1993. <https://doi.org/10.1162/evco.1993.1.2.165>.
- [4] H.-G. Beyer. Toward a Theory of Evolution Strategies: The (μ, λ) -Theory. *Evolutionary Computation*, 2(4):381–407, 1995. <https://doi.org/10.1162/evco.1994.2.4.381>.
- [5] H.-G. Beyer. Toward a Theory of Evolution Strategies: On the Benefit of Sex – the $(\mu/\mu, \lambda)$ -Theory. *Evolutionary Computation*, 3(1):81–111, 1995. <https://doi.org/10.1162/evco.1995.3.1.81>.
- [6] H.-G. Beyer. Toward a Theory of Evolution Strategies: Self-Adaptation. *Evolutionary Computation*, 3(3):311–347, 1995. <https://doi.org/10.1162/evco.1995.3.3.311>.
- [7] H.-G. Beyer. An Alternative Explanation for the Manner in which Genetic Algorithms Operate. *BioSystems*, 41:1–15, 1997. [https://doi.org/10.1016/S0303-2647\(96\)01657-7](https://doi.org/10.1016/S0303-2647(96)01657-7).
- [8] D. B. Fogel and H.-G. Beyer. A Note on the Empirical Evaluation of Intermediate Recombination. *Evolutionary Computation*, 3(4):491–495, 1995. <https://doi.org/10.1162/evco.1995.3.4.491>.
- [9] A. I. Oyman, H.-G. Beyer, and H.-P. Schwefel. Analysis of the $(1, \lambda)$ -ES on the “Parabolic Ridge”. *Evolutionary Computation*, 8(3):249–265, 2000. <https://doi.org/10.1162/106365600750078772>.

- [10] A. I. Oyman, H.-G. Beyer, and H.-P. Schwefel. Convergence Behavior of the $(1 + \lambda)$ Evolution Strategy on the Ridge Functions. *Mathware & Soft Computing*, 7(1):35–75, 2000.
- [11] H.-G. Beyer. Evolutionary Algorithms in Noisy Environments: Theoretical Issues and Guidelines for Practice. *Computer Methods in Applied Mechanics and Engineering*, 186(2–4):239–267, 2000. [https://doi.org/10.1016/S0045-7825\(99\)00386-2](https://doi.org/10.1016/S0045-7825(99)00386-2).
- [12] K. Deb and H.-G. Beyer. Self-Adaptive Genetic Algorithms with Simulated Binary Crossover. *Evolutionary Computation*, 9(2):197–221, 2001. <https://doi.org/10.1162/106365601750190406>.
- [13] H.-G. Beyer and K. Deb. On Self-Adaptive Features in Real-Parameter Evolutionary Algorithms. *IEEE Transactions on Evolutionary Computation*, 5(3):250–270, 2001. <https://doi.org/10.1109/4235.930314>.
- [14] A. I. Oyman and H.-G. Beyer. Analysis of the $(\mu/\mu, \lambda)$ -ES on the Parabolic Ridge. *Evolutionary Computation*, 8(3):267–289, 2000. <https://doi.org/10.1162/106365600750078781>.
- [15] H.-G. Beyer. On the Performance of $(1, \lambda)$ -Evolution Strategies for the Ridge Function Class. *IEEE Transactions on Evolutionary Computation*, 5(3):218–235, 2001. <https://doi.org/10.1109/4235.930312>.
- [16] D. B. Fogel and H.-G. Beyer. Do Evolutionary Processes Minimize Expected Losses? *Journal of Theoretical Biology*, 207:117–123, 2000. <https://doi.org/10.1006/jtbi.2000.2166>.
- [17] D.V. Arnold and H.-G. Beyer. Local Performance of the $(1 + 1)$ -ES in a Noisy Environment. *IEEE Transactions on Evolutionary Computation*, 6(1):30–41, 2002. <https://doi.org/10.1109/4235.985690>.
- [18] D.V. Arnold and H.-G. Beyer. Performance Analysis of Evolution Strategies with Multi-Recombination in High-Dimensional \mathbb{R}^N -Search Spaces Disturbed by Noise. *Theoretical Computer Science*, 289:629–647, 2002. [https://doi.org/10.1016/S0304-3975\(01\)00384-X](https://doi.org/10.1016/S0304-3975(01)00384-X).
- [19] H.-G. Beyer and D.V. Arnold. Qualms Regarding the Optimality of Cumulative Path Length Control in CSA/CMA-Evolution Strategies. *Evolutionary Computation*, 11(1):19–28, 2003. https://doi.org/10.1162/EVC0_a_00261.
- [20] H.-G. Beyer and H.-P. Schwefel. Evolution Strategies: A Comprehensive Introduction. *Natural Computing*, 1(1):3–52, 2002. <https://doi.org/10.1023/A:1015059928466>.
- [21] D.V. Arnold and H.-G. Beyer. A Comparison of Evolution Strategies with Other Direct Search Methods in the Presence of Noise. *Computational Optimization and Applications*, 24:135–159, 2003. <https://doi.org/10.1023/A:1021810301763>.
- [22] H.-G. Beyer, H.-P. Schwefel, and I. Wegener. How to Analyse Evolutionary Algorithms. *Theoretical Computer Science*, 287:101–130, 2002. [https://doi.org/10.1016/S0304-3975\(02\)00137-8](https://doi.org/10.1016/S0304-3975(02)00137-8).

- [23] D.V. Arnold and H.-G. Beyer. Expected Sample Moments of Concomitants of Selected Order Statistics. *Statistics and Computing*, 15:241–250, 2005. <https://doi.org/10.1007/s11222-005-1312-y>.
- [24] D.V. Arnold and H.-G. Beyer. On the Benefits of Populations for Noisy Optimization. *Evolutionary Computation*, 11(2):111–127, 2003. <https://doi.org/10.1162/106365603766646799>.
- [25] D.V. Arnold and H.-G. Beyer. Performance Analysis of Evolutionary Optimization With Cumulative Step Length Adaptation. *IEEE Transactions on Automatic Control*, 49(4):617–622, 2004. <https://doi.org/10.1109/TAC.2004.825637>.
- [26] D.V. Arnold and H.-G. Beyer. Optimum Tracking with Evolution Strategies. *Evolutionary Computation*, 14(3):291–308, 2006. <https://doi.org/10.1162/evco.2006.14.3.291>.
- [27] H.-G. Beyer, M. Olhofer, and B. Sendhoff. On the Impact of Systematic Noise on the Evolutionary Optimization Performance – A Sphere Model Analysis. *Genetic Programming and Evolvable Machines*, 5(4):327–360, 2004. <https://doi.org/10.1023/B:GENP.0000036020.79188.a0>.
- [28] H.-G. Beyer, D.V. Arnold, and S. Meyer-Nieberg. A New Approach for Predicting the Final Outcome of Evolution Strategy Optimization under Noise. *Genetic Programming and Evolvable Machines*, 6(1):7–24, 2005. <https://doi.org/10.1007/s10710-005-7617-y>.
- [29] D.V. Arnold and H.-G. Beyer. A General Noise Model and Its Effects on Evolution Strategy Performance. *IEEE Transactions on Evolutionary Computation*, 10(4):380–391, 2006. <https://doi.org/10.1109/TEVC.2005.859467>.
- [30] H.-G. Beyer and B. Sendhoff. Functions with Noise-Induced Multi-Modality: A Test for Evolutionary Robust Optimization – Properties and Performance Analysis. *IEEE Transactions on Evolutionary Computation*, 10(5):507–526, 2006. <https://doi.org/10.1109/TEVC.2005.861416>.
- [31] H.-G. Beyer and S. Meyer-Nieberg. Self-Adaptation of Evolution Strategies under Noisy Fitness Evaluations. *Genetic Programming and Evolvable Machines*, 7(4):295–328, 2006. <https://doi.org/10.1007/s10710-006-9017-3>.
- [32] D.V. Arnold and H.-G. Beyer. Evolution Strategies with Cumulative Step Length Adaptation on the Noisy Parabolic Ridge. *Natural Computing*, 7(4):555–587, 2008. <https://doi.org/10.1007/s11047-006-9025-5>.
- [33] H.-G. Beyer and B. Sendhoff. Robust Optimization - A Comprehensive Survey. *Computer Methods in Applied Mechanics and Engineering*, 196(33–34):3190–3218, 2007. <https://doi.org/10.1016/j.cma.2007.03.003>.
- [34] H.-G. Beyer and S. Finck. Performance of the $(\mu/\mu_I, \lambda)$ - σ SA-ES on PDQFs. *IEEE Transactions on Evolutionary Computation*, 14(3):400–418, 2010. <https://doi.org/10.1109/TEVC.2009.2033581>.

- [35] D.V. Arnold and H.-G. Beyer. On the Behaviour of Evolution Strategies Optimising Cigar Functions. *Evolutionary Computation*, 18(4):661–682, 2010. https://doi.org/10.1162/EVC0_a_00023.
- [36] S. Finck and H.-G. Beyer. Performance Analysis of Simultaneous Perturbation Stochastic Approximation on the Noisy Sphere Model. *Theoretical Computer Science*, 419:50–72, 2012. <https://doi.org/10.1016/j.tcs.2011.11.015>.
- [37] H.-G. Beyer and S. Finck. On the Design of Constraint Covariance Matrix Self-Adaptation Evolution Strategies Including a Cardinality Constraint. *IEEE Transactions on Evolutionary Computation*, 16(4):578–596, 2012. <https://doi.org/10.1109/TEVC.2011.2169967>.
- [38] H.-G. Beyer, S. Finck, and T. Breuer. Evolution on Trees: On the Design of an Evolution Strategy for Scenario-Based Multi-Period Portfolio Optimization under Transaction Costs. *Swarm and Evolutionary Computation*, 17:74–87, 2014. <https://doi.org/10.1016/j.swevo.2014.03.002>.
- [39] H.-G. Beyer and A. Melkozerov. The Dynamics of Self-Adaptive Multi-Recombinant Evolution Strategies on the General Ellipsoid Model. *IEEE Transactions on Evolutionary Computation*, 18(5):764–778, 2014. <https://doi.org/10.1109/TEVC.2013.2283968>.
- [40] H.-G. Beyer. Convergence Analysis of Evolutionary Algorithms That are Based on the Paradigm of Information Geometry. *Evolutionary Computation*, 22(4):679–709, 2014. https://doi.org/10.1162/EVC0_a_00132.
- [41] H.-G. Beyer and M. Hellwig. The Dynamics of Cumulative Step-Size Adaptation on the Ellipsoid Model. *Evolutionary Computation*, 24(1):25–57, 2016. https://doi.org/10.1162/EVC0_a_00142.
- [42] M. Hellwig and H.-G. Beyer. Mutation Strength Control via Meta-Evolution Strategies on the Ellipsoid Model. *Theoretical Computer Science*, 623:160–179, 2016. <https://doi.org/10.1016/j.tcs.2015.12.011>.
- [43] H.-G. Beyer and B. Sendhoff. Toward a Steady-State Analysis of an Evolution Strategy on a Robust Optimization Problem with Noise-Induced Multi-Modality. *IEEE Transactions on Evolutionary Computation*, 21(4):629–643, 2017. <https://doi.org/10.1109/TEVC.2017.2668068>.
- [44] H.-G. Beyer and B. Sendhoff. Simplify Your Covariance Matrix Adaptation Evolution Strategy. *IEEE Transactions on Evolutionary Computation*, 21(5):746–759, 2017. <https://doi.org/10.1109/TEVC.2017.2680320>.
- [45] M. Hellwig and H.-G. Beyer. On the steady state analysis of covariance matrix self-adaptation evolution strategies on the noisy ellipsoid model. *Theoretical Computer Science*, 832:98–122, 2018. <https://doi.org/10.1016/j.tcs.2018.05.016>.
- [46] P. Spettel and H.-G. Beyer. Analysis of the $(1, \lambda)$ - σ -Self-Adaptation Evolution Strategy with Repair by Projection Applied to a Conically Constrained Problem. *Theoretical Computer Science*, 785:30–45, 2019. <https://doi.org/10.1016/j.tcs.2018.10.036>.

- [47] M. Hellwig and H.-G. Beyer. Benchmarking evolutionary algorithms for single objective real-valued constrained optimization – A critical review. *Swarm and Evolutionary Computation*, 44:927–944, 2019. <https://doi.org/10.1016/j.swevo.2018.10.002>.
- [48] P. Spettel, H.-G. Beyer, and M. Hellwig. A Covariance Matrix Self-Adaptation Evolution Strategy for Optimization under Linear Constraints. *IEEE Transactions on Evolutionary Computation*, 23(3):514–524, 2019. <https://doi.org/10.1109/TEVC.2018.2871944>.
- [49] I. Loshchilov, T. Glasmachers, and H.-G. Beyer. Large Scale Black-box Optimization by Limited-Memory Matrix Adaptation. *IEEE Transactions on Evolutionary Computation*, 23(2):353–358, 2019. <https://doi.org/10.1109/TEVC.2018.2855049>.
- [50] P. Spettel and H.-G. Beyer. A multi-recombinative active matrix adaptation evolution strategy for constrained optimization. *Soft Computing*, 23(16):6847–6869, 2019. <https://doi.org/10.1007/s00500-018-03736-z>.
- [51] P. Spettel and H.-G. Beyer. Analysis of the $(\mu/\mu_I, \lambda)$ - σ -Self-Adaptation Evolution Strategy with Repair by Projection Applied to a Conically Constrained Problem. *IEEE Transactions on Evolutionary Computation*, 24(3):593–602, 2020. <https://doi.org/10.1109/TEVC.2019.2930316>.
- [52] P. Spettel and H.-G. Beyer. Analysis of the $(\mu/\mu_I, \lambda)$ -CSA-ES with Repair by Projection Applied to a Conically Constrained Problem. *Evolutionary Computation*, 28(3):463–488, 2020. https://doi.org/10.1162/EVCQ_a_00261.
- [53] P. Spettel and H.-G. Beyer. Matrix Adaptation Evolution Strategies for Optimization Under Nonlinear Equality Constraints. *Swarm and Evolutionary Computation*, 54:100653, 2020. <https://doi.org/10.1016/j.swevo.2020.100653>.
- [54] P. Spettel and H.-G. Beyer. On the Design of a Matrix Adaptation Evolution Strategy for Optimization on General Quadratic Manifolds. *ACM Transactions on Evolutionary Learning and Optimization (TELO)*, 2022. <https://doi.org/10.1145/3551394>.
- [55] A. Omeradzic and H.-G. Beyer. Progress Analysis of a Multi-Recombinative Evolution Strategy on the Highly Multimodal Rastrigin Function. *Theoretical Computer Science*, 2023. <https://doi.org/10.1016/j.tcs.2023.114179>.
- [56] A. Omeradzic and H.-G. Beyer. Self-Adaptation of Multi-Recombinant Evolution Strategies on the Highly Multimodal Rastrigin Function. *IEEE Transactions on Evolutionary Computation*, 2024. <https://doi.org/10.1109/TEVC.2024.3400857>.
- [57] L. Schönerberger and H.-G. Beyer. On a Population Sizing Model for Evolution Strategies in Multimodal Landscapes. *IEEE Transactions on Evolutionary Computation*, 2024. <https://doi.org/10.1109/TEVC.2024.3419931>.

Online Articles

- [1] H.-G. Beyer. Evolution Strategies. *Scholarpedia*, 2(8):1965, 2007.

Conference Articles

- [1] H.-G. Beyer. Ein Evolutionsverfahren zur mathematischen Modellierung stationärer dynamischer Systeme. In 10. ibausil-Tagungsbericht, *Sektion 4, Glas*, pages 175–180, Weimar, Germany, 1988. Hochschule für Architektur und Bauwesen.
- [2] H.-G. Beyer. On a General Evolution Strategy for Dissipative Systems. In H.-M. Voigt, H. Mühlenbein, and H.-P. Schwefel, editors, *Evolution and Optimization '89*, pages 69–78, Berlin, 1990. Akademie-Verlag.
- [3] H.-G. Beyer. Reduction of the Multibunch-BBU by Evolutionary Strategies. In V. Balakin, S. Lepshokow, and N. Solyak, editors, *Third International Workshop on Linear Colliders LC91*, pages 237–238 (Vol. 1) and 160–164 (Vol. 2), Protvino, USSR, 1991. BINP.
- [4] H.-G. Beyer. Some Aspects of the ‘Evolution Strategy’ for Solving TSP-like Optimization Problems. In R. Männer and B. Manderick, editors, *Parallel Problem Solving from Nature, 2*, pages 361–370, Amsterdam, 1992. Elsevier.
- [5] H.-G. Beyer, M. Drevlak, N. Holtkamp, U. van Rienen, V. Tsakanov, R. Wanzenberg, T. Weiland, and M. Zhang. Minimization of Multibunch-BBU in a LINAC by Evolutionary Strategies. In J. Rossbach, editor, *15th Int. Conf. on High Energy Accelerators HEACC'92*, pages 848–850, Hamburg, 1993. Int. J. Mod. Phys. A (Proc. Suppl.) 2B.
- [6] H.-G. Beyer, N. Holtkamp, U. van Rienen, V. Tsakanov, R. Wanzenberg, T. Weiland, and M. Zhang. Automatic Computer-Aided Optimization of Cavities for the Desing of Accelerating Structures. In J. Rossbach, editor, *15th Int. Conf. on High Energy Accelerators HEACC'92*, pages 939–941, Hamburg, 1993. Int. J. Mod. Phys. A (Proc. Suppl.) 2B.
- [7] H.-G. Beyer, N. Holtkamp, U. van Rienen, K. Steinigke, V. Tsakanov, R. Wanzenberg, T. Weiland, M. Witting, and M. Zhang. Modal Field Matching in Tapered Multicell Structures. In J. Rossbach, editor, *15th Int. Conf. on High Energy Accelerators HEACC'92*, pages 845–847, Hamburg, 1993. Int. J. Mod. Phys. A (Proc. Suppl.) 2B.
- [8] H.-G. Beyer, N. Holtkamp, U. van Rienen, V. Tsakanov, R. Wanzenberg, and T. Weiland. Wake Field Effects In Final Focus Quadrupoles For Next Linear Collider. In J. Rossbach, editor, *15th Int. Conf. on High Energy Accelerators HEACC'92*, pages 851–854, Hamburg, 1993. Int. J. Mod. Phys. A (Proc. Suppl.) 2B.
- [9] H.-G. Beyer, M. Drevlak, N. Holtkamp, U. van Rienen, V. Tsakanov, R. Wanzenberg, T. Weiland, and M. Zhang. Single and Multi Bunch Instabilities in a $2 \times 250\text{GeV}$ Linear Collider. In J. Rossbach, editor, *15th Int. Conf. on High Energy Accelerators HEACC'92*, pages 855–857, Hamburg, 1993. Int. J. Mod. Phys. A (Proc. Suppl.) 2B.
- [10] H.-G. Beyer, M. Drevlak, N. Holtkamp, U. van Rienen, V. Tsakanov, R. Wanzenberg, T. Weiland, and M. Zhang. Attenuation of Transverse Modes by Variable Cell Geometries in Travelling Wave Tubes. In J. Rossbach, editor, *15th Int. Conf. on High Energy Accelerators HEACC'92*, pages 876–878, Hamburg, 1993. Int. J. Mod. Phys. A (Proc. Suppl.) 2B.

- [11] H.-G. Beyer. Towards a Theory of ‘Evolution Strategies’: Results for $(1,^+ \lambda)$ -Strategies on (Nearly) Arbitrary Fitness Functions. In Y. Davidor, R. Männer, and H.-P. Schwefel, editors, *Parallel Problem Solving from Nature*, 3, pages 58–67, Heidelberg, 1994. Springer. https://doi.org/10.1007/3-540-58484-6_250.
- [12] H.-G. Beyer. On the Asymptotic Behavior of Multirecombinant Evolution Strategies. In H.-M. Voigt, W. Ebeling, I. Rechenberg, and H.-P. Schwefel, editors, *Parallel Problem Solving from Nature*, 4, pages 122–133, Heidelberg, 1996. Springer. https://doi.org/10.1007/3-540-61723-X_976.
- [13] H.-T. Nürnberg and H.-G. Beyer. The Dynamics of Evolution Strategies in the Optimization of Traveling Salesman Problems. In P.J. Angeline, R.G. Reynolds, J.R. McDonnell, and R. Eberhart, editors, *Evolutionary Programming VI: Proceedings of the Sixth Annual Conference on Evolutionary Programming*, pages 349–359, Heidelberg, 1997. Springer-Verlag. <https://doi.org/10.1007/BFb0014824>.
- [14] H.-G. Beyer and D. B. Fogel. A Note on the Escape Probabilities for Two Alternative Methods of Selection under Gaussian Mutation. In P.J. Angeline, R.G. Reynolds, J.R. McDonnell, and R. Eberhart, editors, *Evolutionary Programming VI: Proceedings of the Sixth Annual Conference on Evolutionary Programming*, pages 265–274, Heidelberg, 1997. Springer-Verlag. <https://doi.org/10.1007/BFb0014817>.
- [15] K. Weinert, J. Mehnen, J. Jasper, H.-P. Schwefel, and H.-G. Beyer. Entwicklung von Prozeßmodellen der spanenden Bearbeitung mit Methoden der nichtlinearen Dynamik. In H.-P. Wiendahl, editor, *1. Symposium des Förderschwerpunktes “Untersuchung nichtlinear-dynamischer Effekte in produktionstechnischen Systemen” der VW Stiftung*, pages 1–24, Universität Hannover, September 1997. Institut für Fabrikanlagen.
- [16] H.-G. Beyer. On the “Explorative Power” of ES/EP-like Algorithms. In V.W. Porto, N. Saravanan, D. Waagen, and A.E. Eiben, editors, *Evolutionary Programming VII: Proceedings of the Seventh Annual Conference on Evolutionary Programming*, pages 323–334, Heidelberg, 1998. Springer-Verlag. <https://doi.org/10.1007/BFb0040785>.
- [17] H.-G. Beyer. On the Dynamics of EAs without Selection. In W. Banzhaf and C. Reeves, editors, *Foundations of Genetic Algorithms*, 5, pages 5–26, San Mateo, CA, 1999. Morgan Kaufmann.
- [18] H.-G. Beyer. Mutate Large, But Inherit Small! On the Analysis of Rescaled Mutations in $(\tilde{1}, \tilde{\lambda})$ -ES with Noisy Fitness Data. In A. E. Eiben, T. Bäck, M. Schoenauer, and H.-P. Schwefel, editors, *Parallel Problem Solving from Nature*, 5, pages 109–118, Heidelberg, 1998. Springer. <https://doi.org/10.1007/BFb0056854>.
- [19] A. I. Oyman, H.-G. Beyer, and H.-P. Schwefel. Where Elitists Start Limping: Evolution Strategies at Ridge Functions. In A. E. Eiben, T. Bäck, M. Schoenauer, and H.-P. Schwefel, editors, *Parallel Problem Solving from Nature*, 5, pages 34–43, Heidelberg, 1998. Springer. <https://doi.org/10.1007/BFb0056847>.
- [20] L. Grünz and H.-G. Beyer. Some Observations on the Interaction of Recombination and Self-Adaptation in Evolution Strategies. In P.J. Angeline, editor, *Proceedings of the CEC’99 Conference*, pages 639–645, Piscataway, NJ, 1999. IEEE. <https://doi.org/10.1109/CEC.1999.781992>.

- [21] H.-G. Beyer and D.V. Arnold. Fitness Noise and Localization Errors of the Optimum in General Quadratic Fitness Models. In W. Banzhaf, J. Daida, A.E. Eiben, M.H. Garzon, V. Honavar, M. Jakiela, and R.E. Smith, editors, *GECCO'99: Proceedings of the Genetic and Evolutionary Computation Conference*, pages 817–824, San Francisco, CA, 1999. Morgan Kaufmann.
- [22] K. Deb and H.-G. Beyer. Self-Adaptation in Real-Parameter Genetic Algorithms with Simulated Binary Crossover. In W. Banzhaf, J. Daida, A.E. Eiben, M.H. Garzon, V. Honavar, M. Jakiela, and R.E. Smith, editors, *GECCO'99: Proceedings of the Genetic and Evolutionary Computation Conference*, pages 172–179, San Francisco, CA, 1999. Morgan Kaufmann.
- [23] A. I. Oyman, K. Deb, and H.-G. Beyer. An Alternative Constraint Handling Method for Evolution Strategies. In P.J. Angeline, editor, *Proceedings of the CEC'99 Conference*, pages 612–619, Piscataway, NJ, 1999. IEEE. <https://doi.org/10.1109/CEC.1999.781989>.
- [24] D.V. Arnold and H.-G. Beyer. Local Performance of the $(\mu/\mu_I, \lambda)$ -ES in a Noisy Environment. In W. Martin and W. Spears, editors, *Foundations of Genetic Algorithms, 6*, pages 127–141, San Francisco, CA, 2001. Morgan Kaufmann.
- [25] D.V. Arnold and H.-G. Beyer. Efficiency and Mutation Strength Adaptation of the $(\mu/\mu_I, \lambda)$ -ES in a Noisy Environment. In M. Schoenauer, editor, *Parallel Problem Solving from Nature, 6*, pages 39–48, Heidelberg, 2000. Springer. https://doi.org/10.1007/3-540-45356-3_4.
- [26] H.-G. Beyer and K. Deb. On the Desired Behaviors of Self-Adaptive Evolutionary Algorithms. In M. Schoenauer, editor, *Parallel Problem Solving from Nature, 6*, pages 59–68, Heidelberg, 2000. Springer. https://doi.org/10.1007/3-540-45356-3_6.
- [27] D.V. Arnold and H.-G. Beyer. Investigation of the (μ, λ) -ES in the Presence of Noise. In *Proceedings of the CEC'01 Conference*, pages 332–339, Piscataway, NJ, 2001. IEEE. <https://doi.org/10.1109/CEC.2001.934409>.
- [28] S. Markon, D.V. Arnold, T. Bäck, T. Beielstein, and H.-G. Beyer. Thresholding – a Selection Operator for Noisy ES. In *Proceedings of the CEC'01 Conference*, pages 465–472, Piscataway, NJ, 2001. IEEE. <https://doi.org/10.1109/CEC.2001.934428>.
- [29] D.V. Arnold and H.-G. Beyer. Random Dynamics Optimum Tracking with Evolution Strategies. In J.J. Merelo Guervós et al., editor, *Parallel Problem Solving from Nature 7*, pages 3–12, Heidelberg, 2002. Springer. https://doi.org/10.1007/3-540-45712-7_1.
- [30] H.-G. Beyer, M. Olhofer, and B. Sendhoff. On the Behavior of $(\mu/\mu_I, \lambda)$ -ES Optimizing Functions Disturbed by Generalized Noise. In K. De Jong, R. Poli, and J. Rowe, editors, *Foundations of Genetic Algorithms, 7*, pages 307–328, San Francisco, CA, 2003. Morgan Kaufmann.
- [31] B. Sendhoff, H.-G. Beyer, and M. Olhofer. On Noise Induced Multi-Modality in Evolutionary Algorithms. In L. Wang, K.C. Tan, T. Furuhashi, J.-H. Kim, and F. Sattar, editors, *Proceedings of the 4th Asia-Pacific Conference on Simulated Evolution and Learning – SEAL*, volume 1, pages 219–224, 2002.

- [32] H.-G. Beyer and D.V. Arnold. The Steady State Behavior of $(\mu/\mu_I, \lambda)$ -ES on Ellipsoidal Fitness Models Disturbed by Noise. In E. et al. Cantú-Paz, editor, *GECCO'03: Proceedings of the Genetic and Evolutionary Computation Conference*, pages 525–536, Berlin, Germany, 2003. Springer. https://doi.org/10.1007/3-540-45105-6_65.
- [33] D.V. Arnold and H.-G. Beyer. On the Effects of Outliers on Evolutionary Optimization. In J. Liu, Y.-M. Cheung, and H. Yin, editors, *Fourth International Conference on Intelligent Data Engineering and Automated Learning (IDEAL 2003)*, pages 151–160, Heidelberg, Germany, 2003. Springer. https://doi.org/10.1007/978-3-540-45080-1_22.
- [34] H.-G. Beyer and S. Meyer-Nieberg. Evolutionary Optimization under Noise – Predicting the Solution Quality. In I. Boblan and R. Bannasch, editors, *First International Industrial Conference Bionik 2004*, pages 49–55, Düsseldorf, 2004. VDI Verlag GmbH.
- [35] H.-G. Beyer. Actuator Noise in Recombinant Evolution Strategies on General Quadratic Fitness Models. In K. Deb et al., editor, *GECCO'04: Proceedings of the Genetic and Evolutionary Computation Conference*, volume LNCS Volume 3102, pages 654–665, Heidelberg, 2004. Springer-Verlag. https://doi.org/10.1007/978-3-540-24854-5_68.
- [36] H.-G. Beyer and S. Meyer-Nieberg. On the Quality Gain of $(1, \lambda)$ -ES under Fitness Noise. In X. Yao et al., editor, *Parallel Problem Solving from Nature 8*, pages 1–10, Berlin, 2004. Springer. https://doi.org/10.1007/978-3-540-30217-9_1.
- [37] H.-G. Beyer and S. Meyer-Nieberg. On the Prediction of the Solution Quality in Noisy Optimization. In A.H. Wright et al., editor, *Foundations of Genetic Algorithms, 8*, pages 238–259, Berlin, 2005. Springer-Verlag. https://doi.org/10.1007/11513575_13.
- [38] S. Meyer-Nieberg and H.-G. Beyer. On the Analysis of Self-Adaptive Recombination Strategies: First Results. In *Proceedings of the CEC'05 Conference*, pages 2341–2348, Piscataway, NJ, 2005. IEEE. <https://doi.org/10.1109/CEC.2005.1554986>.
- [39] H.-G. Beyer and B. Sendhoff. Evolution Strategies for Robust Optimization. In *Proceedings of the WCCI'06 Conference*, pages 4489–4496, Piscataway, NJ, 2006. IEEE Press. <https://doi.org/10.1109/CEC.2006.1688465>.
- [40] H.-G. Beyer and S. Meyer-Nieberg. Self-Adaptation on the Ridge Function Class: First Results for the Sharp Ridge. In T.P. Runarsson et al., editor, *Parallel Problem Solving from Nature 9*, pages 71–80, Berlin, 2006. Springer. https://doi.org/10.1007/11844297_8.
- [41] S. Meyer-Nieberg and H.-G. Beyer. Mutative Self-Adaptation on the Sharp and Parabolic Ridge. In C. Stephens et al., editor, *Foundations of Genetic Algorithms, 9*, pages 70–96, Berlin, 2007. Springer-Verlag. https://doi.org/10.1007/978-3-540-73482-6_5.
- [42] H.-G. Beyer and B. Sendhoff. Evolutionary Algorithms in the Presence of Noise: To Sample or Not to Sample. In J. Mendel, T. Omori, and X. Yao, editors, *First IEEE Symposium on Foundations of Computational Intelligence (FOCI'07)*, pages 17–24. IEEE Computational Intelligence Society, 2007. <https://doi.org/10.1109/FOCI.2007.372142>.
- [43] H.-G. Beyer and S. Finck. On the Performance of Evolution Strategies on Noisy PDQFs: Progress Rate Analysis. In *Proceedings of the WCCI'08 Conference*, pages 495–502, Piscataway, NJ, 2008. IEEE Press. <https://doi.org/10.1109/CEC.2008.4630843>.

- [44] S. Meyer-Nieberg and H.-G. Beyer. Why Noise may be Good: Additive Noise on the Sharp Ridge. In M. Keijzer et al., editor, *GECCO'08: Proceedings of the Genetic and Evolutionary Computation Conference*, pages 511–518, New York, 2008. ACM. <https://doi.org/10.1145/1389095.1389192>.
- [45] H.-G. Beyer and A. Melkozerov. Mutative σ -Self-Adaptation Can Beat Cumulative Step Size Adaptation when Using Weighted Recombination. In M. Keijzer et al., editor, *GECCO'08: Proceedings of the Genetic and Evolutionary Computation Conference*, pages 487–494, New York, 2008. ACM. <https://doi.org/10.1145/1389095.1389190>.
- [46] H.-G. Beyer and A. Melkozerov. σ -Self-Adaptive Weighted Multirecombination Evolution Strategy with Scaled Weights on the Noisy Sphere. In G. Rudolph et al., editor, *Parallel Problem Solving from Nature 10*, pages 11–20, Berlin, 2008. Springer. https://doi.org/10.1007/978-3-540-87700-4_2.
- [47] H.-G. Beyer and B. Sendhoff. Covariance Matrix Adaptation Revisited – the CMSA Evolution Strategy. In G. Rudolph et al., editor, *Parallel Problem Solving from Nature 10*, pages 123–132, Berlin, 2008. Springer. https://doi.org/10.1007/978-3-540-87700-4_13.
- [48] S. Finck and H.-G. Beyer. Weighted Recombination Evolution Strategy on PDQF's. In T. Jansen et al., editor, *Foundations of Genetic Algorithms, 10*, pages 1–12. ACM, 2009. <https://doi.org/10.1145/1527125.1527127>.
- [49] D.V. Arnold, H.-G. Beyer, and A. Melkozerov. On the Behaviour of Weighted Multi-Recombination Evolution Strategies Optimising Noisy Cigar Functions. In G. Raidl et al., editor, *GECCO'09: Proceedings of the Genetic and Evolutionary Computation Conference*, pages 483–490, New York, 2009. ACM. <https://doi.org/10.1145/1569901.1569969>.
- [50] H.-G. Beyer, M. Dobler, C. Hämmerle, and P. Masser. On Strategy Parameter Control by Meta-ES. In G. Raidl et al., editor, *GECCO'09: Proceedings of the Genetic and Evolutionary Computation Conference*, pages 499–506, New York, 2009. ACM. <https://doi.org/10.1145/1569901.1569971>.
- [51] A. Melkozerov and H.-G. Beyer. On the Analysis of Self-Adaptativ Evolution Strategies on Elliptic Model: First Results. In J. Branke et al., editor, *GECCO'10: Proceedings of the Genetic and Evolutionary Computation Conference*, pages 369–376, New York, 2010. ACM. <https://doi.org/10.1145/1830483.1830554>.
- [52] S. Finck and H.-G. Beyer. Benchmarking CMA-EGS on the BBOB 2010 Noiseless Function Testbed. In J. Branke et al., editor, *GECCO'10: Proceedings of the Genetic and Evolutionary Computation Conference*, pages 1633–1639, New York, 2010. ACM. <https://doi.org/10.1145/1830761.1830783>.
- [53] S. Finck and H.-G. Beyer. Benchmarking CMA-EGS on the BBOB 2010 Noisy Function Testbed. In J. Branke et al., editor, *GECCO'10: Proceedings of the Genetic and Evolutionary Computation Conference*, pages 1641–1647, New York, 2010. ACM. <https://doi.org/10.1145/1830761.1830784>.
- [54] S. Finck and H.-G. Beyer. Benchmarking SPSA on the BBOB 2010 Noiseless Function Testbed. In J. Branke et al., editor, *GECCO'10: Proceedings of the Genetic*

and Evolutionary Computation Conference, pages 1657–1663, New York, 2010. ACM. <https://doi.org/10.1145/1830761.1830786>.

- [55] S. Finck and H.-G. Beyer. Benchmarking SPSA on the BBOB 2010 Noisy Function Testbed. In J. Branke et al., editor, *GECCO'10: Proceedings of the Genetic and Evolutionary Computation Conference*, pages 1665–1671, New York, 2010. ACM. <https://doi.org/10.1145/1830761.1830787>.
- [56] S. Finck and H.-G. Beyer. On the Evaluation of Direct Search Methods. In F. Hoffmann and E. Hüllermeier, editors, *Proceedings 20. Workshop Computational Intelligence, Haus Bommerholz*, pages 13–32, Karlsruhe, Germany, 2010. KIT Scientific Publishing.
- [57] S. Finck, H.-G. Beyer, and A. Melkozerov. Noisy Optimization: A Theoretical Strategy Comparison of ES, EGS, SPSA & IF on the Noisy Sphere. In J. Krasnogor et al., editor, *GECCO'11: Proceedings of the Genetic and Evolutionary Computation Conference*, pages 813–820, New York, 2011. ACM. <https://doi.org/10.1145/2001576.2001688>.
- [58] H.-G. Beyer and M. Hellwig. Mutation Strength Control by Meta-ES on the Sharp Ridge. In T. Soule et al., editor, *GECCO'12: Proceedings of the Genetic and Evolutionary Computation Conference*, pages 305–312, New York, 2012. ACM. <https://doi.org/10.1145/2330163.2330208>.
- [59] H.-G. Beyer and S. Finck. HappyCat – A Simple Function Class Where Well-Known Direct Search Algorithms Do Fail. In V. Coello Coello C.A. et al., editor, *Parallel Problem Solving from Nature 12*, pages 367–376, Berlin, 2012. Springer. https://doi.org/10.1007/978-3-642-32937-1_37.
- [60] H.-G. Beyer and M. Hellwig. Controlling Population Size and Mutation Strength by Meta-ES under Fitness Noise. In F. Neumann and K. De Jong, editors, *Foundations of Genetic Algorithms, 12*, pages 11–24. ACM, 2013. <https://doi.org/10.1145/2460239.2460242>.
- [61] A. Melkozerov and H.-G. Beyer. Optimization of Multiconductor Transmission Line Parameters using Constrained Evolution Strategies. In *2014 International Conference on Numerical Electromagnetic Modeling and Optimization for RF, Microwave, and Terahertz Applications (NEMO)*, pages 1–4. IEEE, 2014. <https://doi.org/10.1109/NEMO.2014.6995673>.
- [62] A. Melkozerov and H.-G. Beyer. Towards an Analysis of Self-Adaptive Evolution Strategies on the Noisy Ellipsoid Model: Progress Rate and Self-Adaptation Response. In *GECCO'15: Proceedings of the Genetic and Evolutionary Computation Conference*, pages 297–304, New York, 2015. ACM. <https://doi.org/10.1145/2739480.2754800>.
- [63] M. Hellwig and H.-G. Beyer. Evolution under Strong Noise: A Self-Adaptive Evolution Strategy Can Reach the Lower Performance Bound - the pcCMSA-ES. In E. Hart et al., editor, *Parallel Problem Solving from Nature XXIV*, pages 26–36, Berlin, 2016. Springer. https://doi.org/10.1007/978-3-319-45823-6_3.
- [64] H.-G. Beyer and M. Hellwig. Analysis of the pcCMSA-ES on the noisy ellipsoid model. In *GECCO'17: Proceedings of the Genetic and Evolutionary Computation Conference*, pages 689–696, New York, 2017. ACM. <https://doi.org/10.1145/3071178.3079195>.

- [65] M. Hellwig and H.-G. Beyer. A Matrix Adaptation Evolution Strategy for Constrained Real-Parameter Optimization. In *Proceedings of the WCCI'18 Conference*, pages 749–756, Piscataway, NJ, 2018. IEEE Press. <https://doi.org/10.1109/CEC.2018.8477950>.
- [66] P. Spettel and H.-G. Beyer. A Simple Approach for Constrained Optimization – An Evolution Strategy that Evolves Rays. In *Proceedings of the WCCI'18 Conference*, pages 298–305, Piscataway, NJ, 2018. IEEE Press. <https://doi.org/10.1109/CEC.2018.8477753>.
- [67] M. Hellwig and H.-G. Beyer. A Linear Constrained Optimization Benchmark for Probabilistic Search Algorithms: The Rotated Klee-Minty Problem. In *7th International Conference on the Theory and Practice of Natural Computing TPNC2018*, pages 139–151, Berlin, 2018. Springer. https://doi.org/10.1007/978-3-030-04070-3_11.
- [68] M. Hellwig and H.-G. Beyer. Analysis of a Meta-ES on a Conically Constrained Problem. In *GECCO'19: Proceedings of the Genetic and Evolutionary Computation Conference*, pages 673–681, New York, 2019. ACM. <https://doi.org/10.1145/3321707.3321824>.
- [69] M. Hellwig, H.-G. Beyer, and P. Spettel. Evolutionsstrategien zur Optimierung unter Nebenbedingungen. 100 - Forschung im Rahmen von Exzellenzprogrammen. In *13. Forschungsforum der Österreichischen Fachhochschulen. Forschung bewegt. 24. & 25. April am Campus 1 Wiener Neustadt. FH Forschungsforum 2019*, 2019.
- [70] M. Hellwig, P. Spettel, and H.-G. Beyer. Comparison of Contemporary Evolutionary Algorithms on the Rotated Klee-Minty Problem. In *GECCO'19: Proceedings of the Genetic and Evolutionary Computation Conference Companion*, pages 1879–1887, New York, 2019. ACM. <https://doi.org/10.1145/3319619.3326805>.
- [71] P. Spettel, H.-G. Beyer, and M. Hellwig. Steady State Analysis of a Multi-Recombinative Meta-ES on a Conically Constrained Problem with Comparison to σ SA and CSA. In D.V. Arnold and C. Doerr, editors, *Foundations of Genetic Algorithms, XV*, pages 43–57. ACM, 2019. <https://doi.org/10.1145/3299904.3340306>.
- [72] M. Hellwig and H.-G. Beyer. A Modified Matrix Adaptation Evolution Strategy with Restarts for Constrained Real-World Problems. In *Proceedings of the WCCI'20 Conference*, pages 1–8, Piscataway, NJ, 2020. IEEE Press. <https://doi.org/10.1109/CEC48606.2020.9185566>.
- [73] P. Spettel and H.-G. Beyer. A Matrix Adaptation Evolution Strategy for Optimization on General Quadratic Manifolds. In *GECCO'21: Proceedings of the Genetic and Evolutionary Computation Conference Companion*, pages 537–545, New York, 2021. ACM. <https://doi.org/10.1145/3449639.3459282>.
- [74] M. Hellwig and H.-G. Beyer. Benchmarking ϵ MAg-ES and BP- ϵ MAg-ES on the bbob-constrained Testbed. In *GECCO'22: Proceedings of the Genetic and Evolutionary Computation Conference Companion*, pages 1717–1724, New York, 2022. ACM. <https://doi.org/10.1145/3520304.3534010>.
- [75] A. Omeradzic and H.-G. Beyer. Progress Rate Analysis of Evolution Strategies on the Rastrigin Function: First Results. In H. Aguirre et al., editor, *Parallel Problem Solving*

from *Nature XVII*, pages 499–511, Berlin, 2022. Springer. https://doi.org/10.1007/978-3-031-14721-0_35.

- [76] L. Schönerberger and H.-G. Beyer. On a Population Sizing Model for Evolution Strategies Optimizing the Highly Multimodal Rastrigin Function. In 848–855, editor, *GECCO'23: Proceedings of the Genetic and Evolutionary Computation Conference*, New York, 2023. ACM. <https://doi.org/10.1145/3583131.3590451>.
- [77] H.-G. Beyer. Tutorial: What You Always Wanted to Know About Evolution Strategies, But Never Dared to Ask. In *GECCO '23 Companion: Genetic and Evolutionary Computation Conference Companion*, page tut101, New York, 2023. ACM. <https://doi.org/10.1145/3583133.3595041>.
- [78] A. Omeradzic and H.-G. Beyer. Convergence Properties of the $(\mu/\mu_I, \lambda)$ -ES on the Rastrigin Function. In *Foundations of Genetic Algorithms, XVII*, pages 117–128. ACM, 2023. <https://doi.org/10.1145/3594805.3607126>.
- [79] A. Omeradzic and H.-G. Beyer. Bias in Standard Self-Adaptive Evolution Strategies. In *Proceedings of the WCCI'24 Conference*, pages 1–8, Piscataway, NJ, 2024. IEEE Press. <https://doi.org/10.1109/CEC60901.2024.10612110>.
- [80] L. Schönerberger and H.-G. Beyer. Success Rate of Evolution Strategies on the Multimodal Griewank Function. In *Proceedings of the WCCI'24 Conference*, pages 1–8, Piscataway, NJ, 2024. IEEE Press. <https://doi.org/10.1109/CEC60901.2024.10612209>.
- [81] L. Schönerberger and H.-G. Beyer. Optimal Scaling of an Algorithmic Parameter in Restart Strategies. In H. Schulte, F. Hoffmann, and R. Mikut, editors, *Proceedings 34. Workshop Computational Intelligence*, pages 193–208, Karlsruhe, Germany, 2024. KIT Scientific Publishing. <https://doi.org/10.58895/ksp/1000174544-12>.
- [82] L. Schönerberger and H.-G. Beyer. Optimal Restart Strategies for Parameter-dependent Optimization Algorithms. In *Foundations of Genetic Algorithms, XVII*, pages 273–284. ACM, 2025. <https://doi.org/10.1145/3729878.3746697>.

Book Reviews and Editorials

- [1] H.-G. Beyer. Book Review of M. Vose's: “The Simple Genetic Algorithm – Foundations and Theory” . IEEE Transactions on Evolutionary Computation 4(2):191–192, 2000.
- [2] H.-G. Beyer. Special Issue: Best of GECCO 2005. *Genetic Programming and Evolvable Machines*, 7(2):129–130, 2006.
- [3] H.-G. Beyer. Best of GECCO 2005. *Natural Computing*, 5(3):225–227, 2006.

Technical Reports and Miscellaneous

- [1] H.-G. Beyer. Der Zufall aus naturwissenschaftlicher Sicht, sein Wesen, seine Nutzung. A philosophical essay on chance and necessity, Dec. 1988.
- [2] K. Balewski et al. Status Report of a 500 GeV S-Band Linear Collider Study. Technical Report 91-153, DESY, Dec. 1991.

- [3] H.-G. Beyer. Benutzeranleitung für ein EVO-LAN-Programm zur Minimierung der BBU durch evolutionsstrategische Optimierung der Anordnungsreihenfolge der Beschleunigungsstrukturen. Technical report, Institut für HF-Technik, Fachgebiet TEMF, Technische Hochschule Darmstadt, 1992.
- [4] H.-G. Beyer. Anwendung des PARSYTEC-Transputersystems zur Designoptimierung bei einem 0.5 TeV Linear Collider: Evolutionsstrategie zur Lösung eines TSP-ähnlichen Reihenfolgeproblems. Technical report, Institut für HF-Technik, Fachgebiet TEMF, Technische Hochschule Darmstadt, 1992.
- [5] H.-G. Beyer. Optimization of large-scale order problems by the Evolution Strategy. In R. Schumacher, editor, *One Year KSR1 at the University of Mannheim*, pages 11–16. Computing Center, University of Mannheim, Germany, 1993. Report-No. RUM 35/93.
- [6] H.-G. Beyer. Towards a Theory of ‘Evolution Strategies’: Results from the N -dependent (μ, λ) and the Multi-Recombinant $(\mu/\mu, \lambda)$ Theory. Technical Report SYS-5/94, Department of Computer Science, University of Dortmund, 1994.
- [7] H.-G. Beyer. How GAs do *NOT* Work – Understanding GAs without Schemata and Building Blocks. Technical Report SYS-2/95, Department of Computer Science, University of Dortmund, 1995.
- [8] A. I. Oyman, H.-G. Beyer, and H.-P. Schwefel. Analysis of a Simple ES on the “Parabolic Ridge”. Technical Report SyS-2/97, University of Dortmund, Department of Computer Science, Systems Analysis Research Group, August 1997.
- [9] A. I. Oyman, H.-G. Beyer, and H.-P. Schwefel. Convergence Behavior of the $(1 + \lambda)$ Evolution Strategy on the Ridge Functions. Technical Report SyS-1/98, University of Dortmund, Department of Computer Science, Systems Analysis Research Group, February 1998.
- [10] K. Deb and H.-G. Beyer. Self-Adaptive Genetic Algorithms with Simulated Binary Crossover. Series CI 61/99, SFB 531, University of Dortmund, March 1999.
- [11] H.-G. Beyer and K. Deb. On the Analysis of Self-Adaptive Evolutionary Algorithms. Series CI 69/99, SFB 531, University of Dortmund, May 1999.
- [12] H.-G. Beyer, S. Röhl, and J. Schumacher. An optimization model for storing and delivering a spare part. Technical Report, Vorarlberg University of Applied Sciences, Research Center PPE, A-6850 Dornbirn, Austria, July 2006.
- [13] H.-G. Beyer and S. Röhl. An optimization model for storing and delivering spare parts. Technical Report, Vorarlberg University of Applied Sciences, Research Center PPE, A-6850 Dornbirn, Austria, August 2007.
- [14] C. Li, S. Yang, T.T. Nguyen, E.L. Yu, Y. Yao, Y. Jin, H.-G. Beyer, and P.N. Suganthan. Benchmark Generator for CEC’2009 Competition on Dynamic Optimization. Technical Report, Dept. of CS, University of Leicester, Leicester, UK, 2008.
- [15] A. Melkozerov and H.-G. Beyer. On the Derivation of the Progress Rate and Self-Adaptation Response for the $(\mu/\mu_I, \lambda)$ - σ SA-ES on the Noisy Ellipsoid Model. Technical Report 2015/01, Vorarlberg University of Applied Sciences, A-6850 Dornbirn, Austria, March 2015.

- [16] M. Hellwig and H.-G. Beyer. Population Size Control of CMSA-ES for Noisy Optimization Using Time Series Analysis. Technical Report 2015/02, Vorarlberg University of Applied Sciences, A-6850 Dornbirn, Austria, April 2015.
- [17] M. Hellwig and H.-G. Beyer. Population Size Control of CMSA-ES for Noisy Optimization Using Time Series Analysis. Technical Report 2015/02, Vorarlberg University of Applied Sciences, A-6850 Dornbirn, Austria, April 2015.
- [18] Ilya Loshchilov, Tobias Glasmachers, and Hans-Georg Beyer. Limited-memory matrix adaptation for large scale black-box optimization, 2017. <https://doi.org/10.48550/arXiv.1705.06693>.
- [19] Michael Hellwig and Hans-Georg Beyer. Analyzing design principles for competitive evolution strategies in constrained search spaces, 2024. <https://doi.org/10.48550/arXiv.2405.05005>.

Patents

- [1] H.-G. Beyer, B. Brückner, C. Gartenschläger, and S. Wildgrube. WP DD 220 168 A1 (Aktenzeichen: WP H 01 H 258 369 8). Digitale Anordnung zur Reduzierung des Prellverhaltens mechanischer Relais, 1983.
- [2] H.-G. Beyer. WP DD 220 423 A1 (Aktenzeichen: WP H 01 R 258 282 4). Schaltung zur Niederspannungsmessung an durch Hochspannung belasteten Objekten, 1983.
- [3] H.-G. Beyer. WP DD 222 458 A1 (Aktenzeichen: WP H 03 K 261 254 2). Anordnung zum Schalten hoher Spannungen bei kleinen Strömen, 1983.
- [4] H.-G. Beyer and B. Sendhoff. USA Patent 7783583. Evolutionary search for robust solutions, 2005.