

Pelster Axel

Position: Senior Scientific Assistant and Guest Professor
Faculty of Physics at the Free University

Period covered: 2004 - present



I Scientific Work

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| Aug. 1992 - Dec. 1995 | scientific employee (BAT IIA/2) in the SFB 230 (Natural Constructions – Lightweight Construction in Architecture and Nature) at the University of Stuttgart |
| Jan. - April 1996 | scientific collaborator (BAT IIA/2) at the Institute for Theoretical Physics and Synergetics of Prof. Dr. Dr. h.c. mult. Hermann Haken |
| April 1996 - April 1997 | scientific collaborator (BAT IIA) in the DFG Project <i>Solution of Classical and Quantum Mechanical Problems with Anholonomic Space and Time Transformations</i> (KL 256/26-1) with Prof. Dr. Dr. h.c. Hagen Kleinert at the Institute for Theoretical Physics of the Free University of Berlin |
| May 1997 - Oct. 1999 | scientific collaborator (BAT IIA) of Prof. Dr. Dr. h.c. Hagen Kleinert at the Institute for Theoretical Physics of the Free University of Berlin |
| Nov. 1999 - Jan. 2004 | scientific assistant (C1) of Prof. Dr. Dr. h.c. Hagen Kleinert at the Institute for Theoretical Physics of the Free University of Berlin |
| Feb. 2004 - Sept. 2008 | senior scientific assistant (C2) of Prof. Dr. Dr. h.c. Robert Graham at the Faculty of Physics of the University Duisburg-Essen |
| Okt. 2008 - March 2009 | guest professor at the Faculty of Physics at the Free University of Berlin |

Other Teaching Duties

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| Aug. - Sept. 1995 | lecture tour in the USA (DFG grant): State University at Albany, Clarkson University at Potsdam, McGill University at Montreal, Florida Atlantic University, Center for Nonlinear Studies in Los Alamos |
| Aug. - Sept. 2000 | lecture tour in the USA: University of Southern California in Los Angeles, University of California in Berkeley, University of California in Davis |
| Sept. - Oct. 2001 | research stay at the Washington University in St. Louis with Prof. Dr. Carl M. Bender (DFG grant) |
| Sept. - Oct. 2002 | research stay at the Massachusetts Institute of Technology in Cambridge with Prof. Dr. Roman W. Jackiw and Prof. Dr. Kerson Huang |

- [1] DFG Project KL 256/26-1 (1 BAT IIA position and funds of 3000 DM for 2 years):
Solution of Classical and Quantum Mechanical Problems with Anholonomic Space and Time Transformations
- [2] DFG Project KL 256/30-1 (1/2 BAT IIA position and funds of 3000 DM for 2 years):
Convergent Variational Perturbation Theory for Path Integrals
- [3] Application of Prof. Dr. Dr. h.c. Hagen Kleinert at the Permanent Commission for Research and Scientific Offspring (FNK) at the Free University of Berlin (funds of 92.000 DM for 2 years):
Field Theory at Strong Couplings and Critical Phenomena
- [4] DFG Project KL 256/38-1 (2/3 BAT IIA position and funds of 3000 EUR for 3 years):
Solution of Closed Systems of Schwinger-Dyson Equations in different Quantum Field Theories
- [5] DFG Project KL 256/41-1 within the Priority Program SPP 1116 *Interactions in Ultra-Cold Atomic and Molecular Gases* (co-applicant, 3/4 BAT IIA position and funds of 2000 EUR for 2 years):
Critical Properties of Homogeneous Bose-Einstein Condensates
- [6] DFG Project KL 256/41-2 within the Priority Program SPP 1116 *Interactions in Ultra-Cold Atomic and Molecular Gases* (co-applicant, 3/4 BAT IIA position and funds of 4000 EUR for 2 years):
Critical Properties of Bose-Einstein Condensates
- [7] DFG Project A3 within the SFB/TR 12 *Symmetries and Universality in Mesoscopic Systems* (co-applicant, 1 BAT IIA-Stelle for 2.5 years):
Nonlinear Quantum Dynamics of Interacting Quantum Fields in Bose-Einstein Condensates
- [8] Coinvestigator of a 2-year Indo-German (DST-DFG) Programme of Co-Operation in Science & Technology with a budget of 30 000 EUR together with Prof. Dr. J. Bosse (Freie Universität Berlin) and Prof. Dr. G.S. Singh (Indian Institute of Technology Roorkee):
Dynamics of Trapped Quantum Gases
- [9] Coinvestigator of a 2-year German-Uzbekistan Volkswagen Project with a budget of 50 000 EUR together with Prof. Dr. Dr. h.c. H. Kleinert (Freie Universität Berlin), Prof. Dr. A. Rakhimov, and Dr. A. Bakhodir (National University of Uzbekistan):
Quantum Field Theory and Quantum Monte-Carlo Approach to Bose-Einstein Condensation
- [10] Principal Investigator of a 2-year German-Serbien DAAD Project with a budget of 14 000 EUR together with Prof. Dr. A. Bogojević (Scientific Computing Laboratory, Institute of Physics, Belgrade):
Fast Converging Path Integral Approach to Bose-Einstein Condensation

III Service activities

Within ICRANet

- 1) Gravitational Theories with Torsion
- 2) Bose Stars

IV Other

- [1] Physics Colloquium at the University Duisburg-Essen in the winter term 2005/2006 and in the summer term 2006
- [2] Member of the Local Organizing Committee of the *Eleventh Marcel Grossmann Meeting: On Recent Developments in Theoretical and Experimental General Relativity, Gravitation, and Relativistic Field Theories*; Berlin, Germany, July 23 – 29, 2006 (800 participants):
<http://www.icra.it/MG/mg11>
- [3] Scientific Coordination together with Professor Dr. M. Holthaus (University of Oldenburg) of the Workshop *Quo Vadis BEC?*; Free University of Berlin, Berlin, Germany, October 27 – 29, 2006 (approx. 40 participants):
http://www.theo-phys.uni-essen.de/tp/ags/pelster_dir/BEC/bec.html
- [4] Scientific Coordination together with Professor Dr. W. Janke (University of Leipzig) of *The 9th International Conference Path Integrals – New Trends and Perspectives*; Max-Planck Institute for the Physics of Complex Systems, Dresden, Germany, September 23–28, 2007 (approx. 120 participants):
<http://www.physik.uni-leipzig.de/~janke/PI07>
- [5] Scientific Coordination of the Symposium *Controlling Dirty Bosons: Disorder Effects on BECs*, DPG Spring Conference; Berlin, February 25 – 29, 2008:
http://www.theo-phys.uni-essen.de/tp/ags/pelster_dir/DPG-berlin/index.html
- [6] Scientific Coordination together with Professor Dr. M. Holthaus (University of Oldenburg) of the 422nd Wilhelm and Else Heraeus Seminar *Quo Vadis BEC?*; Bad Honnef, October 29 – 31, 2008 (60 participants):
http://www.theo-phys.uni-essen.de/tp/ags/pelster_dir/Heraeus/index.html
- [7] Workshop *Delayed Complex Systems*; Max-Planck Institute for the Physics of Complex Systems, Dresden, Germany, October 5 – 9, 2009 (80 participants) together with Priv.-Doz. Dr. W. Just (University of London), Priv.-Doz. Dr. M. Schanz (Universität Stuttgart), and Prof. Dr. Eckehard Schöll, PhD (Technische Universität Berlin):
<http://ipvs.informatik.uni-stuttgart.de/BV/dcs09>

V 2007-2008 List of Publications

W. Janke and A. Pelster (Editors): *Proceedings of the 9th International Conference Path Integrals – New Trends and Perspectives*, Max-Planck Institute for the Physics of Complex Systems, Dresden, Germany, September 23–28, 2007; World Scientific, 1-610 (2008)

P. Navez, A. Pelster, and R. Graham: *Bose Condensed Gas in Strong Disorder Potential With Arbitrary Correlation Length*; *Applied Physics B* 86, 395-398 (2007)

K. Glaum, A. Pelster, H. Kleinert, and T. Pfau: *Critical Temperature of Weakly Interacting Dipolar Condensates*; *Physical Review Letters* 98, 080407/1-4 (2007)

G.M. Falco, A. Pelster, and R. Graham: *Thermodynamics of a Bose-Einstein Condensate with Weak Disorder*; *Physical Review A* 75, 063619/1-11 (2007)

S. Kling and A. Pelster: Thermodynamical Properties of a Rotating Ideal Bose Gas; *Physical Review A* 76, 023609/1-6 (2007)

M. G \ddot{u} ßmann, A. Pelster, and G. Wunner: Synergetic Analysis of the H \ddot{a} ussler-von der Malsburg Equations for Manifolds of Arbitrary Geometry; *Annalen der Physik (Leipzig)* 16, 379-394 (2007)

M. G \ddot{u} ßmann, A. Pelster, and G. Wunner: Solutions of the H \ddot{a} ussler-von der Malsburg Equations in Manifolds with Constant Curvatures; *Annalen der Physik (Leipzig)* 16, 395-425 (2007)

K. Glaum and A. Pelster, Bose-Einstein Condensation Temperature of Dipolar Gas in Anisotropic Harmonic Trap; *Physical Review A* 76, 023604/1-11 (2007)

G.M. Falco, A. Pelster, and R. Graham: Collective Excitations in Trapped Bose-Einstein Condensed Gases in the Presence of Weak Disorder; *Physical Review A* 76, 013624/1-5 (2007)

S.F. Brandt, A. Pelster, and R. Wessel, Controlling the Phase in a Neuronal Feedback Loop through Asymmetric Temporal Delays; *Europhysics Letters* 79, 38001/1-5 (2007)

S. R \ddot{o} thel and A. Pelster: Density and Stability in Ultracold Dilute Boson-Fermion Mixtures; *European Physical Journal B* 59, 343-356 (2007)

K. Glaum, A. Pelster, and H. Kleinert: Condensation of Ideal Bose Gas Confined in a Box within a Canonical Ensemble; *Physical Review A* 76, 063604/1-12 (2007)

R. Graham and A. Pelster: Order Via Nonlinearity in Randomly Confined Bose Gases; *International Journal of Bifurcation and Chaos* (in press), eprint: cond-math/0508306

F.E.A. dos Santos and A. Pelster: On the Quantum Phase Diagram of Bosons in Optical Lattices; *Physical Review A* (in press), eprint: arXiv:0806.2812

B. Bradlyn, F. E. A. dos Santos, and Axel Pelster: Effective Action Approach for Quantum Phase Transitions in Bosonic Lattices *Physical Review A* (in press), eprint: arXiv:0809.0706

R. Graham and A. Pelster: Functional Integral Approach to Disordered Bosons; in W. Janke and A. Pelster (Editors): *Proceedings of the 9th International Conference Path Integrals – New Trends and Perspectives*; Max-Planck Institute for the Physics of Complex Systems, Dresden, Germany, September 23–28, 2007; World Scientific, 376-383 (2008)

K. Glaum, A. Pelster, and H. Kleinert: Thermodynamical Properties for Weakly Interacting Dipolar Gases Within Canonical Ensembles; in W. Janke and A. Pelster (Editors): *Proceedings of the 9th International Conference Path Integrals – New Trends and Perspectives*; Max-Planck Institute for the Physics of Complex Systems, Dresden, Germany, September 23–28, 2007; World Scientific, 403-408 (2008)

M. Sch \ddot{u} tte and A. Pelster: Critical Temperature of a Bose-Einstein Condensate With $1/r$ Interactions; in W. Janke and A. Pelster (Editors): *Proceedings of the 9th International Conference Path Integrals – New Trends and Perspectives*; Max-Planck Institute for the Physics of Complex

Systems, Dresden, Germany, September 23–28, 2007; World Scientific, 417-420 (2008)

B. Klünder, A. Pelster, and R. Graham: Critical Temperature of Dirty Bosons; in W. Janke and A. Pelster (Editors): Proceedings of the 9th International Conference Path Integrals – New Trends and Perspectives; Max-Planck Institute for the Physics of Complex Systems, Dresden, Germany, September 23–28, 2007; World Scientific, 421-424 (2008)

S. Rothel and A. Pelster: Density and Stability in Ultracold Dilute Boson-Fermion Mixtures; in W. Janke and A. Pelster (Editors): Proceedings of the 9th International Conference Path Integrals – New Trends and Perspectives; Max-Planck Institute for the Physics of Complex Systems, Dresden, Germany, September 23–28, 2007; World Scientific, 425-428 (2008)

A. Lima and A. Pelster: Spinor Fermi Gases; in W. Janke and A. Pelster (Editors): Proceedings of the 9th International Conference Path Integrals – New Trends and Perspectives; Max-Planck Institute for the Physics of Complex Systems, Dresden, Germany, September 23–28, 2007; World Scientific, 429-432 (2008)