

**Research Interests:**

I am devoted to the investigation, creation, manipulation, and control of novel solid state materials with superior properties. The thrust of my research is to develop a comprehensive understanding of the interaction mechanisms between quantum structures, with the objective to apply the coupling mechanisms as tools in future quantum technologies.



**Summary:**

University Degrees: Dr. rer. nat. (*summa cum laude*)  
 Diplom Physiker  
 Master of Science

Publications: Total: **35** (First Author: **12**; Co-author: **23**; h-index: **13**)  
 In journals with Impact factor >7: **8**  
 In Journals with impact factor >3: **14**

Presentations: Total: **30**

Conferences: Invited: **5**  
 Plenary sessions: **1**  
 Contributed: **13**

Research Institutions: Invited: **12**

**Experience**

University of California, Merced CA, USA 2009-present  
 Assistant Professor at the School of Natural Sciences

Naval Research Laboratory, Washington DC, USA 2005-2009  
 Postdoctoral research on the optical properties of quantum dots and quantum dot molecules in the group of Dr. Daniel Gammon

University of Würzburg, Würzburg, Germany 2006  
 Academic Title: **Dr. rer. nat. (*summa cum laude*)**  
 Doctoral Work: 2001-2006  
 Thesis Title: *Dynamics of locally interacting spin carriers*  
 Advisors: Dr. Gerd Bacher and Dr. Lukas Worschech

Naval Research Laboratory, Washington DC, USA 2003  
 Research visit as part of a collaboration between the Technische Physik group of the University of Würzburg and the Electronic Materials branch of the Naval Research Laboratory

University of Würzburg, Würzburg, Germany 2001  
 Academic Title: **Diplom Physiker**  
 Diploma Program: 1995-2001 (Average grade **1.25**)  
 Major: Physics  
 Minors: Mathematics, Chemistry, Astronomy  
 Thesis Title: *Spin dynamics in low dimensional semiconductor structures*  
 Advisor: Dr. Gerd Bacher

University of New Mexico, New Mexico, USA 1998-1999  
 Academic Degree: **Master of Science**  
 Mexico in Albuquerque.  
 Participation in an exchange program between the Physics & Astronomy departments of the University of Würzburg and the University of New

	<u>Civilian Service, Hospital Ebern, Germany</u>	1994-1995
	Mandatory Civilian Service in the emergency room and surgery unit of the county hospital in Ebern, Bavaria, Germany	
	<u>Friedrich-Rückert Gymnasium, Ebern, Germany</u>	1985-1994
	Graduation: <b>Abitur</b> (Average Grade: <b>2.50</b> )	
	Major Subjects: Mathematics & Chemistry	
	<u>Teaching Record</u>	
	Analytic Mechanics PHYS105 University of California Merced	
	Graduate Quantum Mechanics PHYS237 University of California Merced	
	Journal Club, University of California Merced	
	Advising graduate and undergraduate students in research	
	Undergraduate physics lab courses at the University of New Mexico	
	Undergraduate physics lab courses at the University of Würzburg	
	Directing students in experiments in graduate research lab courses	
	Directing students in experiments for their diploma theses	
<b>Awards</b>	Commemoration Year Foundation for Science of Lower Franconia, Government of Lower Franconia	2007
	Alan Berman – Best Paper Post-doc Award: Naval Research Laboratory, Washington DC, USA	
	Award winning papers:	2007
	"Optical Signatures of Coupled Quantum Dots", <i>Science</i> <b>311</b> , 636 (2006)	
	"Electrically tunable g-factors in quantum dot molecular spin states", <i>Phys. Rev. Lett.</i> <b>97</b> , 197202 (2006)	
	Wilhelm Conrad Röntgen Science Award Institute of Physics, University of Würzburg	2006
<b>Successful Proposals</b>	Return Program for Young Scientists, (start-up grant) State of North Rhine Westphalia (I declined for UC Merced)	2008/09
	UC Merced (start-up grant)	2009
	NSF-COINS (grant)	2011
<b>Memberships</b>	German Physical Society (DPG) since 2001 American Physical Society (APS) since 2005 European Physical Society (EPS) since 2010	
<b>Services</b>	Refereeing: PRB, Physica E, Nano Lett., PRL, ACS Nano, Micro Nano Lett. Abstract Sorter: APS March Meeting	2005-2009
	Co-Organizer Physics and Applied Math seminar series UCM	2011-present
<b>Languages</b>	fluent in: German, English; learned: French, some Italian & some Spanish	

## Full List Of Publications

- First Author**
- [1] **M. Scheibner**, S.E. Economou, I.V. Ponomarev, A.S. Bracker, D. Gammon, "Essential Concepts in the Optical Properties of Quantum Dot Molecules," *JOSA B*, **29**, A82 (2012)
- [2] **M. Scheibner**, A.S. Bracker, D. Kim, D. Gammon, "Essential Concepts in the Optical Properties of Quantum Dot Molecules," *Solid State Communications*, **149**, 1427 (2009) *(invited)*
- [3] **M. Scheibner**, M. Yakes, A.S. Bracker, I.V. Ponomarev, M.F. Doty, C.S. Hellberg, L.J. Whitman, T.L. Reinecke & D. Gammon, "Optically Mapping the Electronic Structure of Coupled Quantum Dots," *Nature Physics* **4**, 291 (2008).
- [4] **M. Scheibner**, I.V. Ponomarev, E.A. Stinaff, M.F. Doty, A.S. Bracker, C.S. Hellberg, T.L. Reinecke & D. Gammon, "Photoluminescence Spectroscopy of the Molecular Biexciton in Vertically Stacked InAs-GaAs Quantum Dot Pairs," *Phys. Rev. Lett.* **99**, 197402 (2007).
- [5] **M. Scheibner**, "Coupling of optically active quantum dots," Proc. to the 20<sup>th</sup> Annual Meeting of the IEEE Laser & Electro-Optics Society of America, Lake Buena Vista FL, ISBN 978-1-4244-0925-9, *LEOS* 662-663 (2007).
- [6] **M. Scheibner**, M.F. Doty, I.V. Ponomarev, A.S. Bracker, E.A. Stinaff, V.L. Korenev, T.L. Reinecke, and D. Gammon, "Spin Fine Structure in Optically Excited Quantum Dot Molecules," *Phys. Rev. B* **75**, 245318 (2007).
- [7] **M. Scheibner**, A.S. Bracker, E.A. Stinaff, M.F. Doty, D. Gammon, I.V. Ponomarev, T.L. Reinecke, and V.L. Korenev, "Optical Spectroscopy of Charged Quantum Dot Molecules," Proceedings of the 28<sup>th</sup> ICPS in Vienna, Austria 2006, *AIP Conf. Ser.* **893**, 871 (2007).
- [8] **M. Scheibner**, T. Schmidt, L. Worschech, A. Forchel, G. Bacher, T. Passow, and D. Hommel, "Superradiance of Quantum Dots," *Nature Physics* **3**, 106 (2007).
- [9] **M. Scheibner**, T.A. Kennedy, L. Worschech, A. Forchel, G. Bacher, T. Slobodskyy, G. Schmidt, and L.W. Molenkoamp, "Coherent dynamics of locally interacting spins in self-assembled Cd<sub>1-x</sub>Mn<sub>x</sub>Se/ZnSe quantum dots," *Phys. Rev. B* **73**, 081308(R) (2006).
- [10] **M. Scheibner**, J. Seufert, H. Schömgig, G. Bacher, and A. Forchel, "Spin and polarization dynamics in magnetic and non-magnetic semiconductor quantum dots," *Proceedings of the SPIE* **4992**, 1 (2003). *(invited)*
- [11] **M. Scheibner**, G. Bacher, S. Weber, A. Forchel, T. Passow, and D. Hommel, "Polarization dynamics in self-assembled CdSe/ZnSe quantum dots – the role of excess energy," *Phys. Rev. B* **67**, 153302 (2003).
- [12] **M. Scheibner**, G. Bacher, A. Forchel, T. Passow, and D. Hommel, "Spin dynamics in CdSe/ZnSe quantum dots: resonant versus non-resonant excitation," *J. of Superconductivity: Incorporating Novel Magnetism* **16**, 395 (2003).

- Co-Author**
- [12] K. C. Wijesundara, M. Garrido, S. Ramanathan, E. A. Stinaff, **M. Scheibner**, A.S. Bracker, and D. Gammon, "Electric field tunable exchange interaction in InAs/GaAs coupled quantum dots," *MRS Proceedings* **1117E**, 1117-J04-08 (2009)
- [13] M. Garrido, K. C. Wijesundara, S. Ramanathan, E. A. Stinaff, **M. Scheibner**, A.S. Bracker, and D. Gammon, "Characterization of the shell structure in coupled quantum dots through resonant optical probing," *MRS Proceedings* **1117E**, 1117-J05-03 (2009)
- [14] M. F. Doty, J.I. Climente, M. Korkusinski, **M. Scheibner**, A.S. Bracker, P. Hawrylak, and D. Gammon, "Antibonding ground states in semiconductor artificial molecules," *Phys. Rev. Lett.* **102**, 047401 (2009)
- [15] M. F. Doty, **M. Scheibner**, A.S. Bracker, and D. Gammon, "Optical Spectroscopy of Spins in Quantum Dots," to appear in 'Single Semiconductor Quantum Dots' *Springer Series on NanoScience and Technology*. ISBN: 978-3-540-87445-4 (2009)
- [16] D. Kim, S. Economou, S. Badescu, **M. Scheibner**, A.S. Bracker, M. Bashkansky T.L. Reinecke, and D. Gammon, "Optical Spin Initialization and Nondestructive Measurement in a Quantum Dot Molecule," *Phys. Rev. Lett.* **101**, 236804 (2008)
- [17] E.A. Stinaff, S. Ramanathan, K.C. Wijesundara, M. Garrido, **M. Scheibner**, A.S. Bracker, and D. Gammon, "Polarization dependent photoluminescence of charged quantum dot molecules," *phys. stat. sol (c)*. **5**, 2464 (2008)
- [18] M.F. Doty, **M. Scheibner**, A.S. Bracker, I.V. Ponomarev, T.L. Reinecke, and D. Gammon, "Spins in optically excited doubly charged quantum dot molecules," *Phys. Rev. B*. **78**, 115316 (2008)
- [19] T. Schmidt, L. Worschech, **M. Scheibner**, T. Slobodskyy, L.W. Molenkamp, and A. Forchel, "Spin Polarization in Semimagnetic CdMnSe/ZnSe Quantum Dots with Zero Exciton g Factor," *Int. J. Mod. Phys. B* **21**, 1626 (2007).
- [20] T. Schmidt, L. Worschech, **M. Scheibner**, T. Slobodskyy, G. Schmidt, L.W. Molenkamp, T. Passow, D. Hommel, and A. Forchel, "Light controlled spin properties and radiative coupling of CdSe based quantum dots," *phys. stat. sol. (c)* **4**, 3334 (2007).
- [21] I. V. Ponomarev, T.L. Reinecke, **M. Scheibner**, E.A. Stinaff, A.S. Bracker, M.F. Doty, D. Gammon, and V.L. Korenev, "Theory of spin states quantum dot molecules," Proceedings of the 28<sup>th</sup> ICPS in Vienna, Austria 2006, *AIP Conf. Ser.* Vol. **893**, 873 (2007).
- [22] T. Schmidt, **M. Scheibner**, L. Worschech, A. Forchel, T. Slobodskyy, and L.W. Molenkamp, "Sign reversal and light controlled tuning of circular polarization in semimagnetic CdMnSe quantum dots," *J. Appl. Phys.* **100**, 123109 (2006).
- [23] A. S. Bracker, **M. Scheibner**, M.F. Doty, E.A. Stinaff, I.V. Ponomarev, J.C. Kim, L.J. Whitman, T.L. Reinecke, and D. Gammon, "Engineering electron and hole tunneling with asymmetric InAs quantum dot molecules," *Appl. Phys. Lett.* **89**, 233110 (2006).

- [24] M. F. Doty, M.E. Ware, E.A. Stinaff, **M. Scheibner**, A.S. Bracker, I.V. Ponomarev, S.C. Badescu, V.L. Korenev, T.L. Reinecke, and D. Gammon, "Spin Interactions in InAs Quantum Dots and Molecules," *phys. stat. sol. (b)* **243**, 3859 (2006).
- [25] M. F. Doty, **M. Scheibner**, I.V. Ponomarev, E.A. Stinaff, A.S. Bracker, V.L. Korenev, T.L. Reinecke, and D. Gammon, "Electrically tunable g-factors in quantum dot molecular spin states," *Phys. Rev. Lett.* **97**, 197202 (2006).
- [26] I. V. Ponomarev, **M. Scheibner**, E.A. Stinaff, A.S. Bracker, M.F. Doty, S.C. Badescu, M.E. Ware, V.L. Korenev, T.L. Reinecke, and D. Gammon, "Theory of spin states in coupled quantum dots," *phys. stat. sol. (b)* **243**, 3869 (2006).
- [27] E. A. Stinaff, **M. Scheibner**, A.S. Bracker, I.V. Ponomarev, V.L. Korenev, M.E. Ware, M.F. Doty, T.L. Reinecke, and D. Gammon, "Optical Signatures of Coupled Quantum Dots," *Science* **311**, 636 (2006).
- [28] T. A. Kennedy, A. Shabaev, **M. Scheibner**, Al. L. Efros, A.S. Bracker, and D. Gammon, "Optical initialization and dynamics in a remotely doped quantum well," *Phys. Rev. B* **73**, 045307 (2006).
- [29] G. Bacher, H. Schömig, **M. Scheibner**, A. Forchel, A.A. Maksimov, A.V. Chernenko, P.S. Dorozhkin, V.D. Kulakovskii, T. Kennedy, and T.L. Reinecke, "Spin-Spin interaction in magnetic semiconductor quantum dots," *Physica E* **26**, 37 (2005).
- [30] J. Seufert, G. Bacher, **M. Scheibner**, A. Forchel, S. Lee, M. Dobrowolska, and J.K. Furdyna, "Dynamical spin response in semimagnetic quantum dots," *Phys. Rev. Lett.* **88**, 027402 (2002).
- [31] G. Bacher, H. Schömig, M.K. Welsch, **M. Scheibner**, J. Seufert, M. Obert, A. Forchel, A.A. Maksimov, S. Zaitsev, and V.D. Kulakovskii, "Nano-optics on individual quantum objects – from single to coupled semiconductor quantum dots," *Acta Physica Polonica A* **102**, 475 (2002).
- [32] J. Seufert, **M. Scheibner**, G. Bacher, A. Forchel, S. Lee, M. Dobrowolska, and J.K. Furdyna, "Dynamics of zero-dimensional excitons in a semimagnetic environment," *phys. stat. sol. (b)* **229**, 727 (2002).
- [33] J. Seufert, M. Obert, **M. Scheibner**, N.A. Gippius, G. Bacher, A. Forchel, T. Passow, K. Leonardi, and D. Hommel, "Stark effect and polarizability in a single CdSe/ZnSe quantum dot," *Appl. Phys. Lett.* **79**, 1033 (2001).
- [34] B. Oetiker, N. Duric, J. McGraw, T. Williams, D. Jackson, H.J. Deeg, **M. Scheibner**, D. Garcia, E. Wilcox, "Searching for companions to late-type M stars," Proc. of 'From Giant Planets to Cool Stars', *ASP Conf. Ser.* **212**, 88 (2000).

## Conference Contributions

- M. Kerfoot, *et al.*, "Resonant Fluorescence from Quantum Dot Excitonic Transitions," *APS March Meeting 2011*, Dallas TX, USA, Mar. 21<sup>st</sup> – 25<sup>th</sup> 2011.

- Invited** M. Scheibner, "Essential concepts for spin initialization, entanglement, and wavelength shifting of entangled photons with coupled quantum dots," [ONR Workshop on Entanglement beyond the optical regime](#), Orange CA, USA, Feb. 8<sup>th</sup> – 12<sup>th</sup> 2010.
- M. Scheibner, *et al.*, "Two-Photon Transitions in Molecular Quantum Dot Systems," [APS March Meeting 2009](#), Pittsburgh PA, USA, Mar. 15<sup>th</sup> – 20<sup>th</sup> 2009.
- Invited** M. Scheibner, "Level Anti-Crossing Spectroscopy--Optically Mapping the Electronic Structure of Coupled Quantum Dots," [15<sup>th</sup> International Conference on Superlattices, Nanostructures, and Nanodevices](#), Natal, Brazil, Aug. 3<sup>rd</sup> - 8<sup>th</sup> 2008.
- Invited** M. Scheibner, *et al.*, "Two-Photon Excitation Spectroscopy of Molecular Biexcitons in InAs/GaAs Quantum Dot Molecules," [29<sup>th</sup> Annual International Conference on the Physics of Semiconductors](#), Rio de Janeiro, Brazil, Jul. 27<sup>st</sup> - Aug.1<sup>st</sup> 2008.
- M. Scheibner, *et al.*, "Level Anti-Crossing Spectroscopy--Optically Mapping the Electronic Structure of Coupled Quantum Dots," [APS March Meeting 2008](#), New Orleans LA, USA, Mar. 10<sup>th</sup> – 15<sup>th</sup> 2008.
- Invited** M. Scheibner, *et al.*, "Coupling of Optically Active Quantum Dots," [20<sup>th</sup> Annual Meeting of the Laser and Electro-Optical Society of America](#), Orlando FL, USA, Oct. 21<sup>st</sup> - 26<sup>th</sup> 2007.
- Invited** M. Scheibner, *et al.*, "Spin Fine Structure in the Optical Spectra of Quantum Dot Molecules," [APS March Meeting 2007](#), Denver CO, USA, Mar. 5<sup>th</sup> – 9<sup>th</sup> 2007.
- M. Scheibner, *et al.*, "Superradiance of Quantum Dots," [APS March Meeting 2007](#), Denver CO, USA, Mar. 5<sup>th</sup> – 9<sup>th</sup> 2007.
- M. Scheibner, *et al.*, "Optical Spectroscopy Of Charged Quantum Dot Molecules," [28<sup>th</sup> International Conference on the Physics of Semiconductors](#), Vienna, Austria, Jul. 24<sup>th</sup> – 28<sup>th</sup> 2006.
- Plenary Session** M. Scheibner, *et al.*, "Fine Structure in the Optical Spectra of Quantum Dot Molecules," [28<sup>th</sup> International Conference on the Physics of Semiconductors](#), Vienna, Austria, Jul. 24<sup>th</sup> - 28<sup>th</sup> 2006.
- M. Scheibner, *et al.*, "Multi-Excitonic Quantum Dot Molecules," [APS March Meeting 2006](#), Baltimore MD, USA, Mar. 13<sup>th</sup> – 17<sup>th</sup> 2006.
- M. Scheibner, *et al.*, "Long Range Quantum Dot Interaction," [12<sup>th</sup> International Conference on Modulated Semiconductor Structures](#), Albuquerque NM, USA, Jul. 10<sup>th</sup> - 15<sup>th</sup> 2005.
- M. Scheibner, *et al.*, "Coherent spin dynamics in manganese-doped self-assembled quantum dots," [3<sup>rd</sup> International Conference on Physics and Applications of Spin-related Phenomena in Semiconductors](#), Santa Barbara CA, USA, Jul. 21<sup>st</sup> - 23<sup>rd</sup> 2004.
- M. Scheibner, *et al.*, "Polarization Dynamics in Cd(Mn)Se/ZnSe Quantum Dots," [11<sup>th</sup> International Conference on II-VI Compounds](#), Niagara Falls NY, USA, Sep. 22<sup>nd</sup> - 26<sup>th</sup> 2003.
- M. Scheibner, *et al.*, "Spin Coherence and Radiative Lifetime in CdSe/ ZnSe Quantum Dots," [26<sup>th</sup> International Conference on the Physics of Semiconductors](#), Edinburgh, Scotland, Jul. 27<sup>th</sup> - Aug. 2<sup>nd</sup> 2002.

M. Scheibner, *et al.*, "Spin dynamics in CdSe/ ZnSe Quantum Dots: Resonant versus Non-Resonant Excitation," [2nd International Conference on Physics and Application of Spin Related Phenomena in Semiconductors](#), Würzburg, Jul. 23<sup>rd</sup> - 26<sup>th</sup> 2002.

M. Scheibner, *et al.*, "Spinkohärenz in selbstorganisierten CdSe/ZnSe-Quantenpunkten," [DPG-Frühjahrstagung](#), Regensburg, Mar.11<sup>th</sup> – 15<sup>th</sup> 2002.

### Presentations at Universities & Research Institutions

"Optically Driven Quantum Dot Molecules," Walter-Schottky Institute/TU Munich, 20 Sep. 2006.

"Optically Driven Quantum Dot Molecules," Werkstoffe der Elektrotechnik (WET) University of Duisburg-Essen, 26 Sept. 2006.

"Coupling Between Optically Active Quantum Dots," Closing Colloquium of the SFB410, University of Würzburg, July 2007.

"Optically Driven Quantum Dot Molecules," Workshop of the SFB-445, University of Duisburg-Essen, 11 Sept. 2008.

"Optically Driven Quantum Dot Molecules," Condensed Matter Seminar, University of Dortmund, 16 Sept. 2008.

"Excitonic Quantum Dot Molecules," Technical Physics Group Seminar, University of Würzburg, 17 Sept. 2008.

"Optically Active Artificial Molecules," Condensed Matter and Surface Sciences Colloquium, Ohio University, 9 Oct. 2008.

"Optically Active Artificial Molecules," Condensed Matter Seminar, Forschungszentrum Jülich, 20 Oct. 2008.

"Optical Signatures of Coupled Quantum Dots," Graduate Lecture Series Physics Department, University of Paderborn, 22 Oct. 2008.

"Optical Spin Control in Artificial Molecules," Applied Math and Physics Seminar, School of Natural Sciences, University of California Merced, 6 Mar. 2009.

"Optical Spin Control in Artificial Molecules," Special Physics Colloquium, Department of Physics, University of California San Diego, 24 Apr. 2009.

"Artificial Molecules and Controlling Single Electrons with Light," Special Physics Seminar, Department of Physics, RWTH Aachen University, Aachen 12 Mar. 2010.