

**AG Kuch**  
**Scientific Activity Report 2013**

**Scientists:**

Bernien, Matthias

Chang, Yin-Ming

Erkovan, Mustafa (07.06.–20.06.)

Hermanns, Ch. Felix (until 30.06.)

Khalifa, Zaki (until 15.03.)

Kopprasch, Jens (18.03.–31.07.)

Krüger, Alex

Kuch, Wolfgang

Nickel, Fabian (since 19.04.)

Sandig, Oliver

Shokr, Yasser

Song, Jiaming

Wu, Chii-Bin (until 31.01.)

Xu, Jianli (since 23.10.)

Xu, Qingyu (12.06.–08.09.)

Zhang, Bin

**Bachelor, Master, and Diploma students:**

Chittas, Pantelis (since 04.11.)

Drescher, Lorenz (until 28.01.)

Hagelschuer, Till (since 12.09.)

Hahn, Marc (until 28.02.)

Hartmann, Claudia (until 07.08.)

Khan, Risalat (until 22.10.)

Kraffert, Kai (since 30.09.)

Krüger, Dennis (until 11.02.)

Nickel, Fabian (until 04.04.)

Zitzke, Patrick (25.03.–27.05.)

## **Publications:**

S. Bhandary, B. Brena, P. M. Panchmatia, I. Brumboiu, M. Bernien, C. Weis, B. Krumme, C. Etz, W. Kuch, H. Wende, O. Eriksson, and B. Sanyal  
Manipulation of spin state of iron porphyrin by chemisorption on magnetic substrates  
Phys. Rev. B **88**, 024401-1–9 (2013).

T. G. Gopakumar, M. Bernien, H. Naggert, F. Matino, C. F. Hermanns, A. Bannwarth, S. Mühlenberend, A. Krüger, D. Krüger, F. Nickel, W. Walter, R. Berndt, W. Kuch, and F. Tuczek  
Spin Crossover Complex on Au(111): Structural and Electronic Differences Between Mono- and Multilayers  
Chem. Eur. J. **19**, 15702–15709 (2013).

C. F. Hermanns, M. Bernien, A. Krüger, C. Schmidt, S. T. Waßerroth, G. Ahmadi, B. W. Heinrich, M. Schneider, P. W. Brouwer, K. J. Franke, E. Weschke, and W. Kuch  
Magnetic Coupling of Gd<sub>3</sub>N@C<sub>80</sub> Endohedral Fullerenes to a Substrate  
Phys. Rev. Lett. **111**, 167203-1–5 (2013).

C. F. Hermanns, K. Tarafder, M. Bernien, A. Krüger, Y.-M. Chang, P. M. Oppeneer, and W. Kuch  
Magnetic Coupling of Porphyrin Molecules Through Graphene  
Adv. Mater. **25**, 3473–3477 (2013).

C. F. Hermanns, M. Bernien, A. Krüger, W. Walter, Y.-M. Chang, E. Weschke, and W. Kuch  
Huge magnetically coupled orbital moments of Co porphyrin molecules and their control by CO adsorption  
Phys. Rev. B **88**, 104420-1–6 (2013).

H. C. Herper, M. Bernien, S. Bhandary, C. F. Hermanns, A. Krüger, J. Miguel, C. Weis, C. Schmitz-Antoniak, B. Krumme, D. Bovenschen, C. Tieg, B. Sanyal, E. Weschke, C. Czekelius, W. Kuch, H. Wende, and O. Eriksson  
Iron Porphyrin molecules on Cu(001): Influence of adlayers and ligands on the magnetic properties  
Phys. Rev. B **87**, 174425-1–15 (2013).

M. Y. Khan, Chii-Bin Wu, M. Erkovan, and W. Kuch  
Probing antiferromagnetism in NiMn/Ni/(Co)/Cu<sub>3</sub>Au(001) single-crystalline epitaxial thin films  
J. Appl. Phys. **113**, 023913-1–7 (2013).

M. Y Khan, Chii-Bin Wu, S. K. Kreft, and W. Kuch  
Concentration- and thickness-dependent magnetic properties of Ni<sub>x</sub>Mn<sub>100-x</sub> in epitaxially grown Ni<sub>x</sub>Mn<sub>100-x</sub>/Ni/(Co)/Cu<sub>3</sub>Au(001)  
J. Phys.: Cond. Matt. **25**, 386005-1–11 (2013).

V. Mazalova, A. Soldatov, A. Krüger, and W. Kuch  
Theoretical study of the local atomic and electronic structure of dimetacyano azobenzene molecules on Bi (111) substrate  
J. Phys.: Conf. Ser. **430**, 012036-1–6 (2013).

## **Presentations:**

### **a) invited talks**

W. Kuch

X-ray spectroscopic investigations of adsorbed switchable molecules  
Institut für Physik, Johannes Gutenberg Universität Mainz, 10.01.2013.

W. Kuch

X-ray spectroscopic studies of paramagnetic porphyrin molecules on graphene  
International Conference on Functional Metal Organics and Hybrids, Kolkata (India), 08.–10-02.2013.

W. Kuch

X-ray spectroscopic investigations of adsorbed switchable molecules  
Institut Néel, CNRS Grenoble, Grenoble (France), 14.05.2013.

W. Kuch

Controlling the Magnetic Properties of Metalloporphyrin Molecules on Ferromagnetic Films  
International Conference on Nanoscale Magnetism (ICNM 2013), Istanbul (Turkey), 02.–06.09.2013.

W. Kuch

Ferromagnetic coupling in self-assembled metal-organic networks at surfaces  
II. German-Russian Interdisciplinary Workshop “Nanodesign: Physics, Chemistry, Computer Modeling”, Rostov-on-Don (Russia), 10.–11.10.2013.

W. Kuch

Magnetic coupling in metal-organic surface layers  
Kick-off Workshop of TUM-IAS Fellow Prof. Harald Brune, TU München, Garching, 07.11.2013.

### **b) contributed talks**

M. Bernien, D. Wiedemann, C. F. Hermanns, A. Krüger, D. Rolf, W. Kroener, P. Müller, A. Grohmann, and W. Kuch

Spin Crossover in a Vacuum-Deposited Submonolayer of a Molecular Iron(II) Complex  
DPG-Frühjahrstagung 2013 of the Condensed Matter Section, Regensburg, 10.–15.03.2013.

M. Bernien, C. F. Hermanns, K. Tarafder, A. Krüger, W. Walter, Y.-M. Chang, E. Weschke, P. M. Oppeneer, and W. Kuch

Magnetic coupling of porphyrin molecules through graphene  
Joint European Magnetic Symposia (JEMS 2013), Rhodes (Greece), 25.–30.08.2013.

C. F. Hermanns, K. Tarafder, M. Bernien, A. Krüger, W. Walter, Y.-M. Chang, E. Weschke, P. M. Oppeneer, and W. Kuch

Huge magnetically coupled orbital moments of Co porphyrin molecules and their control by CO adsorption  
DPG-Frühjahrstagung 2013 of the Condensed Matter Section, Regensburg, 10.–15.03.2013.

H. C. Herper, S. Bhandary, M. Bernien, C. F. Hermanns, A. Krüger, E. Weschke, C. Czekelius, C. Weis, C. Antoniak, B. Krumme, J. Miguel, D. Bovenschen, B. Sanyal, W. Kuch, H. Wende, and O. Eriksson  
Magnetism and molecule-surface interaction in transition metal porphyrin molecules on Cu(001)  
DPG-Frühjahrstagung 2013 of the Condensed Matter Section, Regensburg, 10.–15.03.2013.

S. Polesya, S. Mankovsky, H. Ebert, W. Kuch, and J. Minar  
Magnetic properties of  $\text{Fe}_x\text{Mn}_{1-x}/\text{Ni}$  bilayers: an ab initio study  
DPG-Frühjahrstagung 2013 of the Condensed Matter Section, Regensburg, 10.–15.03.2013.

T. R. Umbach, M. Bernien, C. Hartmann, A. Krüger, J. N. Ladenthin, C. Czekelius, J. I. Pascual, K. J. Franke, and W. Kuch  
Structural and magnetic properties of pyridyl and benzonitrile based metal-organic networks  
DPG-Frühjahrstagung 2013 of the Condensed Matter Section, Regensburg, 10.–15.03.2013.

W. Stefanowicz L. E. Nistor, S. Pizzini, W. Kuch, V. Nguyen, G. Gaudin, S. Auffret, B. Rodmacq, and J. Vogel  
Size dependence of magnetic switching in perpendicular pillars close to the spin reorientation transition  
58th Annual Conference on Magnetism and Magnetic Materials, Denver (U.S.A.), 04.–08.11.2013.

### **c) posters**

G. Ahmadi, C. F. Hermanns, M. Bernien, A. Krüger, Ch. Schmidt, S. T. Wasserroth, B. W. Heinrich, M. Schneider, P. W. Brouwer, K. J. Franke, E. Weschke, and W. Kuch  
Electronic and magnetic properties of  $\text{Gd}_3\text{N}@C_{80}$  on Cu(100)  
544. Wilhelm und Else Heraeus-Seminar „Interactions with the Nanoworld: Local Probes with High Time, Energy and Force Resolution“, Bad Honnef, 11.–13.11.2013.

M. Bernien, C. F. Hermanns, A. Krüger, W. Kuch, C. Schmidt, S. T. Wasserroth, G. Ahmadi, B. W. Heinrich, K. J. Franke, M. Schneider, P. W. Brouwer, and E. Weschke  
Magnetic Coupling of  $\text{Gd}_3\text{N}@C_{80}$  Endohedral Fullerenes to a Substrate  
Fifth Joint BER II and BESSY II Users Meeting, Berlin, 04.–06.12.2013.

M. Bernien, C. F. Hermanns, A. Krüger, D. Krüger, F. Nickel, W. Walter, W. Kuch, H. Naggert, A. Bannwarth, F. Tucek, T. G. Gopakumar, F. Matino, S. Mühlenberend, and R. Berndt  
A Spin-Crossover Complex on Surfaces: Structural and Electronic Differences Between Mono- and Multilayers  
Fifth Joint BER II and BESSY II Users Meeting, Berlin, 04.–06.12.2013.

M. Erkovan, Y. Shokr, D. Schiestl, M. Yaqoob Khan, C.-B. Wu, and W. Kuch  
Spin-Reorientation Transition of Ni on  $\text{Cu}_3\text{Au}(001)$  and Dependence of Curie Temperature on Ni and NiMn Thickness  
International Conference on Nanoscale Magnetism (ICNM 2013), Istanbul (Turkey), 02.–06.09.2013.

F. Nickel, M. Bernien, Q. Xu, and W. Kuch

Light-induced ring opening of a submonolayer nitrospiropyran electronically decoupled from a Cu(100) surface

International Symposium on Photochromism 2013 (ISOP 2013), Berlin, 23.–26.09.2013.

H. Ryll, F. Radu, C. Back, W. Kuch, A. Tennant, and H. Zabel

VEKMAG - a vector magnet for BESSY II

Fifth Joint BER II and BESSY II Users Meeting, Berlin, 04.–06.12.2013.

Y. Shokr, M. Erkovan, D. Schiestl, C.-B. Wu, M. Y. Khan, and W. Kuch

Influence of top Ni layer on exchange bias and blocking temperature in Ni/NiMn/Ni trilayers

The European School on Magnetism – 2013 School "Magnetism for Energy – From fundamentals to materials", Cargèse (France), 25.02.–08.03.2013.

Y. Shokr, M. Erkovan, D. Schiestl, C.-B. Wu, M. Y. Khan, and W. Kuch

Influence of top Ni layer on exchange bias and blocking temperature in Ni/NiMn/Ni trilayers

DPG-Frühjahrstagung 2013 of the Condensed Matter Section, Regensburg, 10.–15.03.2013.

Y. Shokr, M. Erkovan, C.-B. Wu, and W. Kuch

Probing the magnetic interlayer coupling between perpendicularly magnetized Ni films across thick Ni<sub>25</sub>Mn<sub>75</sub> antiferromagnetic layers by minor-loop measurements

International Conference on Nanoscale Magnetism (ICNM 2013), Istanbul (Turkey), 02.–06.09.2013.

J. Song, C.-B. Wu, and W. Kuch

Optimization of the differential conductance contrast in spin-polarized room temperature scanning tunneling microscopy of e-fct Mn on Co/Cu(001)

DPG-Frühjahrstagung 2013 of the Condensed Matter Section, Regensburg, 10.–15.03.2013.

## Degrees:

Drescher, Lorenz

Die Entkopplung von Spiropyran vom Substrat auf Xenon- und Adamantan-modifizierten Cu(100)-Oberflächen

Bachelor degree, Freie Universität Berlin, February 2013.

Hahn, Marc

Magnetisierungsdynamik gekoppelter magnetischer Dünnschichtsysteme in Experiment und Simulation

Diploma degree, Freie Universität Berlin, February 2013.

Hartmann, Claudia

Untersuchung magnetischer Eigenschaften von Eisen und Kobalt in selbstorganisierenden metall-organischen Netzwerken auf Gold(111) mittels Röntgenabsorptionsspektroskopie

Diploma degree, Freie Universität Berlin, August 2013.

Hermanns, Ch. Felix

X-ray absorption studies of metalloporphyrin molecules on surfaces: Electronic interactions, magnetic coupling, and chemical switches

PhD degree, Freie Universität Berlin, 25.09.2013.

Khan, Risalat

Surface characterization of ultrathin Mn films grown on Co/Cu(001) using spin-polarized scanning tunneling microscopy

Master degree, Freie Universität Berlin, October 2013.

Krüger, Dennis

Adsorptionsverhalten und chemische Modifikation eines Spin-Crossover-Komplexes auf Au(111)

Bachelor degree, Freie Universität Berlin, February 2013.

Nickel, Fabian

Untersuchung von photochromen Molekülen auf Oberflächen mit Differentieller Reflexions-Spektroskopie

Master degree, Freie Universität Berlin, March 2013.

Zitzke, Patrick

Untersuchungen des Exchange Bias an Ni/NiMn/Ni-Dreischichtsystemen

Bachelor degree, Freie Universität Berlin, May 2013.