

# Holography Workshop 2018

Technische Universität Berlin, Germany

June 26<sup>th</sup> – June 28<sup>th</sup> 2018

Location: Seehotel Zeuthen in Berlin-Zeuthen

## Programme

### Tuesday June 26<sup>th</sup>

|              |   |              |                              |
|--------------|---|--------------|------------------------------|
| <b>9:00</b>  | - | <b>9:20</b>  | <b>Workshop Opening</b>      |
| <b>9:20</b>  | - | <b>11:00</b> | <b>I. Phase: Part 1</b>      |
| 11:00        | - | 11:30        | Coffee Break                 |
| <b>11:30</b> | - | <b>13:00</b> | <b>I. Phase: Part 2</b>      |
| 13:00        | - | 14:30        | Lunch Break                  |
| <b>14:30</b> | - | <b>16:00</b> | <b>II. Dynamics &amp; 3D</b> |
| 16:00        | - | 16:30        | Coffee Break                 |
| <b>16:30</b> | - | <b>18:00</b> | <b>III. Theory</b>           |
| 19:00        | - | 20:00        | Dinner                       |

### Wednesday June 27<sup>th</sup>

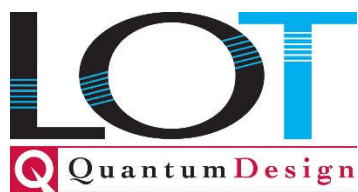
|              |   |              |   |
|--------------|---|--------------|---|
| <b>9:00</b>  | - | <b>11:00</b> | <b>IV. In situ &amp; Applications: Part 1</b> |
| 11:00        | - | 11:30        | Coffee Break                                  |
| <b>11:30</b> | - | <b>13:00</b> | <b>IV. In situ &amp; Applications: Part 2</b> |
| 13:00        | - | 14:30        | Lunch Break                                   |
| <b>14:30</b> | - | <b>16:00</b> | <b>IV. In situ &amp; Applications: Part 3</b> |
| 16:00        | - | 16:30        | Coffee Break                                  |
| <b>16:30</b> | - | <b>18:00</b> | <b>IV. In situ &amp; Applications: Part 4</b> |
| 19:00        | - | 22:00        | BBQ and campfire                              |

## Thursday June 28<sup>th</sup>

|               |                                   |
|---------------|-----------------------------------|
| 9:00 - 11:00  | <b>V. Instrumentation: Part 1</b> |
| 11:00 - 11:30 | Coffee Break                      |
| 11:30 - 13:00 | <b>V. Instrumentation: Part 2</b> |
| 13:00 - 14:30 | Lunch Break                       |
| 14:30 - 16:00 | <b>V. Instrumentation: Part 3</b> |
| 16:00 - 16:30 | Coffee Break                      |
| 16:30 - 18:00 | <b>V. Instrumentation: Part 4</b> |
| 19:00 - 20:00 | Dinner                            |

### Sponsors:

We would like to thank the following companies for their financial support:



**Tuesday June 26<sup>th</sup>**

**I. Phase: Part 1 & 2** (Axel Lubk & Tore Niermann)

**1. General**

**Axel Lubk** *"Phase Space Tomography - Unified Perspective on Focal Series, TIE and Off-axis Holography"*

**David Cooper** *"Electrostatic polarization fields semiconductor materials DPC vs EH vs 4DSTEM"*

**Rodney Herring** *"Object phase measurements in diffraction"*

**2. DPC**

**Helmut Kohl** *"Comparison of the Contrast Transfer Functions for Differential Phase Contrast with Split, a Quadrant and a Center of Mass Detector"*

**3. Inline Holography**

**Christoph Koch** *"Recent developments in and applications of inline electron holography"*

**4. Ptychography**

**Jonas Krehl** *"Inelastic DPC/Ptychography to Measure Fields in Surface Plasmons"*

**Arthur Blackburn** *"Recent experiences and practical implementation of high-speed defocused-probe ptychography using a Merlin/Medipix3RX detector and the ePIE algorithm"*

**II. Dynamics & 3D** (Tolga Wagner & Daniel Wolf)

**1. Time-resolved electron holography**

**Tolga Wagner** *"Challenges and Limitations in Time-Resolved EH"*

**Florent Houdellier** *"Electron holography using femtosecond electron pulses"*

**Yoshie Murooka** *"Towards direct imaging of fast magnetic dynamics with nm resolution in a transmission electron microscope"*

**2. Tomography**

**Daniel Wolf** *"STEM vs holographic Tomography"*

**Sebastian Sturm** *"Development of a Multiple-Axes Holder"*

### **III. Theory** (Kurt Scheerschmidt & Tore Niermann)

**Kurt Scheerschmidt** *"Image matching and beyond: tools and techniques"*

**Zhongbo Li** *"Phase contrast imaging at low voltages"*

**Marco Beleggia** *"Parameter estimation of a Gaussian phase object imaged in Fresnel mode"*

**Giulio Guzzinati** *"The role of phase in the inelastic interaction with plasmonic structures"*

**Florian Winkler** *"Absolute scale Quantitative off-axis Electron Holography at atomic resolution"*

**Rodney Herring** *"Dynamical diffraction of specimen phase instabilities"*

**Wednesday June 27<sup>th</sup>**

**IV. In situ & Applications: Part 1 & 2** (Udo Hömpler & Tolga Wagner)

**1. Overview**

**Florent Houdellier** *"Direct determination of coherent electron source performances based on double biprism interferometry performed in splitting CBED configuration"*

**2. Strain**

**Laura Meißner** *"The influence of dynamical scattering on the geometric phase"*

**Thibaud Denneulin** *"Strain measurement in ferroelectric thin films using off-axis dark-field electron holography"*

**3. Biasing**

**Rémy Berthier** *"Protochips solutions for reliable in-situ TEM biasing for FIB prepared samples."*

**Tolga Wagner** *"Special Preparation for a Constant Reference Wave"*

**Udo Hömpler** *"Contacting of TEM-lamellas on MEMS chips for in-situ biasing experiments"*

**Martin Hýtch** *"The Joys and Sorrows of Electrical Measurements"*

**Tsukasa Hirayama** *"Precise Measurement of Electric Potential, Field, and Charge Density Profiles across a biased GaAs p-n Junction by in situ Electron Holography"*

**Martien den Hertog** *"In situ biasing and off-axis electron holography of a ZnO nanowire"*

**IV. In situ & Applications: Part 3** (David Cooper & Michael Narodovitch)

**4. Application: Electrostatic Fields**

**Michael Narodovitch** *"The Mystery about the Polarization Fields in AlGa<sub>N</sub>/Ga<sub>N</sub> Multi Quantum Well Structures."*

**Fengshan Zheng** *"Model-based iterative reconstruction of electric field and charge distribution in nanoscale materials using off-axis electron holography"*

**David Cooper** *"Holography on III-V materials - Combining High Signal to Noise and high Spatial Resolution"*

**Mahdi Halabi** *"Mapping the Space Charge Region in Nanoscale Magnesium Aluminate Spinel, "Off-axis EH"*

**Elisabetta Maria Fiordaliso** *"Doping in NW solar cells"*

#### **IV. In situ & Applications: Part 4** (Marco Beleggia & Michael Lehmann)

##### **5. Application: Magnetic Fields**

**András Kovács** *"Experimental challenges of studies the magnetic states of skyrmions"*

**Franziska Seifert** *"Cryo Electron Holography of Skyrmions"*

**Jan Caron** *"Model-based reconstruction of magnetisation distributions in nanostructures from electron optical phase images"*

**Aurélien Masseboeuf** *"Integration and field of view problematics for Magnetic characterization in EH"*

**Thursday June 28<sup>th</sup>**

**V. Instrumentation: Part 1 & 2** (Jo Verbeeck & Christoph Koch)

**1. Phase plates**

**Jo Verbeeck** *"Designing a programmable phase plate for electrons"*

**Peng-Han Lu** *"Dynamic wavefront engineering using structured electromagnetic fields: Prospects for a spatial electron phase modulator"*

**Martial Duchamp** *"Manipulation of the phase of the electron wave using MEMS devices: electrostatic simulations, fabrications and implementation in the microscope column"*

**Chris Boothroyd** *"Understanding images from phase plates"*

**Amir Tavabi** *"Electrostatic Aharonov-Bohm effect: A tunable electron vortex beam generator"*

**Rebecca Pretzsch** *"Physical properties of hole-free phase plates for TEM"*

**Martin Obermair** *"Phase plates for phase contrast enhancement in TEM"*

**Armand Béch ** *"Dynamic generation of electron vortex beams in a (S)TEM"*

**V. Instrumentation: Part 3 & 4** (Martin Linck & Tore Niermann)

**2. Holographic setups / optics**

**Martin Linck** *"Utilizing aberration correctors for electron holography"*

**Christophe Gatel** *"Real-time optimized acquisition of off-axis holograms by computer control of the electron microscope"*

**Chris Boothroyd** *"Phase-shifting holography"*

**3. High / Low – Voltage Electron Holography**

**Toshiaki Tanigaki** *"High-Voltage Electron Holography"*

**Robert Leiter** *"Low Voltage EM / Instrumentation and Applications"*

**Baokun Liang** *"Low Voltage Electron Microscope"*

**Hannah Ochner** *"Low Energy Electron Holography as a tool for imaging single proteins at high resolution"*