

## Scientific Program

### Sunday, 2. October, 2016

Registration and poster set-up (15:00-17:30)

Welcome drinks (17:30-18:30)

Welcome address (18:30-18:45): **Peter Hegemann**

Welcome from the local organizer (18:45-19:00): **Wiebke Apel**

Session introduction (19:00-19:05): **Klaus Gerwert**

**Keynote lecture** (19:05 - 20:00): **Karl Deisseroth**; Integrated brainwide structural and functional analysis

Discussion (20:00)

Drinks and cheese (20:00-21:00)

### Monday, 3. October, 2016

#### Session I: Prokaryotic rhodopsins, evolution

Session intro (09:00-09:10): **Kwang-Hwan Jung**

Talk (09:10-09:35): **Osamu JP Nureki**; Light driven sodium ion pump KR2: emerging new player in the field of rhodopsin research

Short talk (9:35- 9:50): **Alina Pushkarev**; Using functional metagenomics to find new and diverse microbial rhodopsins

Short talk (09:50-10:05): **Leonid Brown**; Third Time's the Charm – Spectroscopic Insights into Mechanism of Chloride Transport by Cyanobacterial Rhodopsins

Short talk (10:05-10:20): **Lada Petrovskaya**; Study of exiguobacterium sibiricum rhodopsin (esr) with a chromophoric group modification

Short talk (10:20-10:35): **Jarone Pinhassi**; Ecology and physiology of proteorhodopsin phototrophy in marine bacteria

Session discussion (10:35-10:45): **Kwang-Hwan Jung**

Coffee break (10:45-11:15)

#### Session II: Light driven Na<sup>+</sup> / K<sup>+</sup>-pumps

Session intro (11:15-11:25): **Sergei Balashov**

Talk (11:25-11:50): **Hideki Kandori**; Mechanism of light-driven Na<sup>+</sup> pump rhodopsin

Short talk (11:50-12:05): **Christian Bamann**; Probing the ion transport in channelrhodopsin and the sodium pump KR2

Short talk (12:05-12:20): **Yusaku Hontani**; Retinal dynamics of Na<sup>+</sup> pump rhodopsin KR2 probed by femto- to microsecond stimulated Raman spectroscopy

Short talk (12:20-12:35): **Arisu Shigeta**; Structural analysis of retinal binding pocket of sodium pumping rhodopsin, KR2, studied by solid-state NMR

Session discussion (12:35-12:45): **Sergei Balashov**

Lunch (13:00- 14:30)

### Session III: Microbial rhodopsins, molecular details

Session intro: (14:30-14:40) **Mordechai Sheves**

Short talk (14:40-14:55): **Izuru Kawamura**; Solid-state NMR structural study of Tyr residue in the retinal binding-pocket of microbial rhodopsins.

Short talk (14:55-15:10): **Akira Naito**; Photoreaction pathways of bacteriorhodopsin and its mutants as revealed by in-situ photo-irradiation solid state NMR

Short talk (15:10-15:25): **Elias Eckert**; The blue-light quenching effect of proteorhodopsin

Short talk (15:25-15:40): **Sanford Ruhman**; Temperature independence of ultrafast photo-isomerization in thermophilic rhodopsin; Assessment vs other microbial proton pumps

Short talk (15:40-15:55): **Clemens Glaubitz**; New functional insight into microbial rhodopsins ChR2, KR2 and PR by solid-state NMR spectroscopy

Session discussion (15:55-16:05): **Mordechai Sheves**

Coffee break (16:05-16:35)

Speed presentation of posters (16:35-17:45): **Klaus Gerwert**

Poster session I (17:45-20:00)

Drinks and snacks (18:30-20:00)

## Tuesday, 4. October 2016

### Session IV: Channelrhodopsins (ChRs), details and application

Session intro (9:00-09:10): **Franz Bartl**

Talk (09:10-09:35): **John Kennis**; Femto- to millisecond reaction dynamics of microbial rhodopsins: the chimeric C1C2 channelrhodopsin and the HKR1 UV rhodopsin.

Short talk (09:35-09:50): **Daniel Stöppler**; Structural Investigations of Retinal Proteins Using Sensitivity Enhanced Solid-state MAS NMR

Short talk (09:50-10:05): **Victor Lórenz-Fonfria**; Insights on the activation and desensitization mechanism of the light-gated ion channel channelrhodopsin-2 from *Chlamydomonas reinhardtii*

Short talk (10:05-10:20): **Joachim Heberle**; Retinal isomerization, proton transfer and helix hydration in channelrhodopsin monitored by time-resolved IR spectroscopy

Short talk (10:20-10:35): **Jens Kuhne**; Time Resolved Infrared and Raman Spectroscopy on Channelrhodopsin-2 reveals an Early Splitting of the Photocycle

Session discussion (10:35-10:45): **Franz Bartl**

Coffee break (10:45-11:15)

## Session V: Novel microbial rhodopsins and tool development

Session intro (11:15-11:25): **Oleg Sineshchekov**

Short talk (11:25-11:40): **Johannes Vierock**; High proton selectivity of the red-shifted channelrhodopsin Chrimson

Talk (11:40-12:05): **Elena Govorunova**; Functional analysis of anion channelrhodopsin homologs from cryptophyte algae

Short talk (12:05-12:20): **Keiichi Inoue**; Inward light-driven proton pump rhodopsin found in marine bacterium

Talk (12:20-12:45): **Jana Liewald**; Using rhodopsin-based genetically encoded voltage indicators (GEVIs) to analyze neuronal networks in *C. elegans*

Session discussion (12:45-12:55): **Oleg Sineshchekov**

Lunch (13:00- 14:30)

## Session VI: Bacteriorhodopsin and enzyme rhodopsins

Session intro: (14:30-14:40): **Peter Hegemann**

Short talk (14:40-14:55): **Jörg Standfuss**; Direct observation of the bacteriorhodopsin photocycle using X-ray free electron lasers

Talk (14:55-15:20): **Suely L. Gomes**; A rhodopsin-guanylyl cyclase fusion protein underpins a novel mode of visual perception in the fungi

Talk (15:20-15:45): **Georg Nagel**; A new class of microbial opsins: Cyclaseopsins for tight light-regulation of cGMP production

Short talk (15:45-16:00): **Ulrike Scheib**; The rhodopsin-guanylyl cyclase of the aquatic fungus *Blastocladiella emersonii* enables fast optical control of cGMP signaling

Session discussion (16:00-16:15): **Peter Hegemann**

Coffee break (16:15-16:45)

Speed presentation of posters (16:45-17:45): **Klaus Gerwert**

Poster session II (17:45-20:00)

Drinks and snacks (18:30-20:00)

## Wednesday, 5. October 2016

### Session VII: Invertebrate rhodopsins

Session intro (9:00-09:10): **Yoshinori Shichida**

Talk (09:10-9:35): **Midori Murakami**; Crystal structure of the LM intermediate of squid rhodopsin

Short Talk (09:35-09:50): **Valerie Panneels**; Towards the molecular dynamics of rhodopsin and supramolecular 3D-organisation of neuronal networks in the retina.

Short talk (09:50-10:05): **Mitsumasa Koyanagi**; Optical control of cell signaling using bistable animal opsin-based pigments

Talk (10:05-10:30): **Yoshinori Shichida**; Molecular properties of opsins belonging to one of the subgroups of Opn5

Session discussion (10:30-10:40): **Yoshinori Shichida**

Coffee break (10:40-11:10)

### Session VIII: Non-visual rhodopsins and rhodopsin-GPCR hybrids

Session intro (11:10-11:20): **Thomas Sakmar**

Talk (11:20-11:45): **Harald Janovjak**; Optical functionalization of human Class A orphan G-protein coupled receptors

Short talk (11:45-12:00): **Robert Lucas**; Optimising human and other animal opsins for specific optogenetic applications

Short talk (12:00-12:15): **Kristin Tessmar-Raible**; More than meets the eye: Non-visual photoreceptors in teleost fish

Short talk (12:15-12:30): **Hisau Tsukamoto**; Spectral and biochemical characterization of mammalian melanopsins (Opn4s) and invertebrate Opn3 homologs

Short talk (12:30-12:45): **Takahiro Yamashita**; Characterization of visible light-sensitive subtype of non-visual opsin, Opn5

Session discussion (12:45-12:55): **Thomas Sakmar**

Group photo (13:00-13:20)

Lunch (13:20-open)

Free Afternoon

Program options:

Guided tour around Potsdam / Park

Bike tour Schwielowsee

Walk (Potsdam): Spy Bridge, Heiliger See, Pfingstberg and the Russian Quarter

Dinner with advisory board (19:00-open): Wiener Café, Luisenplatz, Potsdam

## Thursday, 6. October 2016

### Session IX: Vertebrate rhodopsins 1

Session intro (9:00-09:10): **Klaus-Peter Hofmann**

Talk (09:10-9:35): **Patrick Scheerer**; Specificity of the Rhodopsin - G-protein Interface

Short talk (09:35-09:50): **Philipp Kukura**; A new perspective on opsin's role in tuning retinal photochemistry and photophysics

Short talk (09:50-10:05): **Michele Cascella**; An isomerase function in cellular retinaldehyde binding protein

Short talk (10:05-10:20): **Aidin R. Balo**; Exploring the Retinal Protein World in Virtual Reality

Session discussion (10:20-10:30): **Klaus-Peter Hofmann**

Coffee break (10:30-11:00)

### Session X: Vertebrate rhodopsins 2

Session intro (11:10-11:20): **Ulrike Alexiev**

Talk (11:20-11:45): **Yoshitika Fukada**; Development/maintenance of middle wavelength-sensitive cones: Transcription regulation of MWS opsins in zebrafish

Short talk (11:45-12:00): **Thomas Huber**; The kinetics and thermodynamics of chromophore binding to opsin

Short talk (12:00-12:15): **Steve Smith**; Retinal orientation and interactions in rhodopsin reveal a two-stage trigger mechanism for activation

Short talk (12:15-12:30): **Philip Reeves**; Retinitis Pigmentosa Positions and Group Conserved Residues Mediate Folding and Helix Packing in Rhodopsin

Short talk (12:30-12:45): **Renu Batra-Safferling**; Crystal structures of constitutively active variants of visual arrestin

Session discussion (12:45-13:00): **Ulrike Alexiev**

Lunch (13:00- 14:30)

### Session XI: Rhodopsin-application, medical relevance, optogenetics

Session intro (14:30-14:40): **Russel Foster**

Talk (14:40-15:05): **Samouil L. Farhi**; All-optical perturbation and recording of neuronal function

Talk (15:05-15:30): **Ofer Yizhar**; The good, the bad, and the ugly in synaptic optogenetics

Short talk (15:30-15:45): **Franziska Schneider**; Using rhodopsin-based optogenetic tools to study heterocellular coupling in the heart

Short talk (15:45-16:00): **Alexander Gottschalk**; Optogenetic tool development and application in *Caenorhabditis elegans*

Short talk (16:00-16:15): **Shoko Hososhima**; Upconversion-rhodopsin hybrid system for near-infrared optogenetics

Session discussion (16:15-16:25): **Russel Foster**

Coffee (16:25-16:55)

Round table discussion (17:00-18:00):

**Peter Hegemann & Klaus Gerwert**; Future of the retinal protein research

Gala dinner (18:30-open end)

Including: Poster Award

**Friday, 7. October 2016**

**Session XII: Non-visual rhodopsins and synthetic photoreceptors**

Session Intro (09:00-09:10): **Gebhard Schertler**

Talk (09:10-09:35): **Russel Foster**; Melanopsin signaling to the molecular clockwork

Talk (09:35-10:00): **Samir Hattar**; How the retina detect light for conscious versus subconscious perception.

Short talk (10:00-10:15): **Slawomir Filipek**; Rhodopsin and other GPCRs

Short talk (10:15-10:30): **Pere Garriga**; Molecular characterization in mammalian visual rhodopsin evolution

Short talk (10:30-10:45): **Elena Lesca**; Lighting up signalling: chimeric gpcrs for optogenetics

Coffee break (10:45-11:15)

Talk award (11:15-11:25): **Peter Hegemann**

Talk (11:25-11:50): **Anna Moroni**; Improving the expression of a synthetic light-gated potassium channel in mammalian cells

Short talk (11:50-12:05): **Massimo Olivucci**; Towards Systematic (High Throughput) Quantum Chemical Studies of Microbial and Animal Rhodopsins

Talk (12:05- 12:30): **Akihisa Terakita**; Parapinopsin-involving light receptions in the pineal organs of lower vertebrates

Session discussion (12:30-12:40): **Gebhard Schertler**

Closing remarks (12:40-13:00): **Klaus Gerwert**

End of conference

