Symposium on Photonics Science and Technology

2023 Fitzpatrick Institute for Photonics (FIP) Annual Meeting
March 13-14, 2023, Duke University

ADVANCE PROGRAM AGENDA

DUKE FITZPATRICK INSTITUTE *for* PHOTONICS

Monday, March 13, 2023 (Fitzpatrick Building) – Morning Session

9:00-9:30 am **Registration with coffee & pastries**

9:30-9:35 **Introduction**
Tuan Vo-Dinh, Director of the Fitzpatrick Institute for Photonics, R. Eugene and Susie E. Goodson Professor of Biomedical Engineering and Professor of Chemistry, Duke University

9:35-9:45 **Opening Welcome Address**
Jennifer Francis, Interim Provost, Robert L. Dickens Professor of Business Administration, Duke University

Jerome Lynch, Vinik Dean, Pratt School of Engineering
Professor in the Department of Civil and Environmental Engineering
Professor in the Department of Electrical & Computer Engineering
Duke University

9:45-10:20 **Plenary Lecture**
Mike Wasielewski
Clare Hamilton Hall Professor of Chemistry
Executive Director, Institute of Sustainability & Energy;
Director, Center for Molecular Quantum Transduction
Northwestern University
"Using Light to Generate Molecular Spin Qubits for Quantum Information Science"

10:20-11:30 **Session 1: Special Topic – *Photonics in the Nano and Quantum Era***
Session Chair: Christopher R. Monroe, Gilhuly Family Presidential Distinguished Professor of Electrical & Computer Engineering, Professor of Physics, Director of the Quantum Information Center in the Pratt School of Engineering, Duke University

10:20-10:50 **Invited Lecture**
Theodore (Ted) Goodson III
Richard Barry Bernstein Collegiate Professor of Chemistry,
College of LSA, Professor of Macromolecular Science & Engineering
University of Michigan
"Entangled Photon Spectroscopy in Organic and Biological Materials"

10:50- 11:10 **Jungsang Kim**
Schiciano Family Distinguished Professor of Electrical and Computer Engineering, Professor of Physics
Duke University
"Practical Quantum Computing with Trapped Ions"

11:10- 11:30 **Maiken Mikkelsen**
James N. and Elizabeth H. Barton Associate Professor in the Department of Electrical and Computer Engineering, Associate Professor in the Department of Mechanical Engineering and Materials Science
Duke University
"Extreme Photonics with Nanogap Cavities"

Monday, March 13, 2023 (Fitzpatrick Building) Special Luncheon and Afternoon Session

KEYNOTE LECTURE & SPECIAL LUNCHEON
To Honor 2023 FIP Pioneer Awardee

11:30-12:15 **Lunch served outside of Atrium to take into auditorium for presentation**

12:15-1:10 **Symposium Keynote**
Stefan W. Hell
Nobel Laureate in Chemistry 2014
Max Planck Institute for Multidisciplinary Sciences, Department of NanoBiophotonics
Gottingen, Germany
"MINFLUX nanoscopy and related matters"

1:10-1:30 **FIP Award Presentation – *2023 Pioneer in Photonics Award***

1:30-2:45 **Session 2: Special Topic – *Photonics and Global Health***
Session Chair: Chris Beyrer, Director, Duke Global Health Institute, Professor of Medicine, Duke University

SESSION CO-SPONSORED BY
DUKE GLOBAL HEALTH INSTITUTE & FITZPATRICK INSTITUTE FOR PHOTONICS

1:30–1:40 **Introduction Presentation**
Chris Beyrer
Director, Duke Global Health Institute
Professor of Medicine, Duke University
"DGHI in the Global Health Innovation Space"

1:40-1:55 **Krishna Udayakumar**
Director of the Duke Global Health Innovation Center
Associate Professor of the Practice of Global Health
Duke University
"***Global Health Innovation: Designing for Scale & Sustainability"***

1:55-2:15 **Megan Huchko**
Associate Professor of Obstetrics & Gynecology and Global Health
Director, Medical Scholars Program, Duke Global Health Institute
Director, Center for Global Reproductive Health at Duke University
And Co-Presenting with
Nimmi Ramanujam
Robert W. Carr, Jr. Distinguished Professor of Biomedical Engineering
Professor of Cancer Pharmacology and Global Health, Founder of the Center for Global Women's Health Technologies (GWHT)
Duke University
"Applying Digital Health Technology to Meet Global Cervical Cancer Elimination Targets"

2:15-2:45 **Panel Discussion on Global Health**
Moderator: Krishna Udayakumar*

Panel Members:
Megan Huchko
Associate Professor of Obstetrics & Gynecology and Global Health
Director, Medical Scholars Program, Duke Global Health Institute
Director, Center for Global Reproductive Health at Duke University

Nimmi Ramanujam
Robert W. Carr, Jr. Distinguished Professor of Biomedical Engineering
Professor of Cancer Pharmacology and Global Health, Founder of the Center for Global Women's Health Technologies (GWHT)
Duke University

Krishna Udayakumar*
Director of the Duke Global Health Innovation Center
Associate Professor of the Practice of Global Health
Duke University

2:45-3:00 **COFFEE BREAK**

3:00-4:40 **Session 3:** ***Frontiers in Photonics Imaging: From Super-resolution to Single Molecule***
Session Chair: Qui Wang, Robert R. & Katherine B. Penn Associate Professor, Department of Chemistry, Duke University

3:00-3:30 **Wesley R. Legant**
Assistant Professor of Biomedical Engineering and Pharmacology
The University of North Carolina at Chapel Hill
"Multimodal lightsheet microscopy for super-resolution imaging of chromatin and transcription"

3:30-4:00 **Hong Wang**
Professor of Physics
North Carolina State University
"What do you see if you light up proteins: sequence and structure-specific binding by proteins on DNA"

4:00-4:20 **Martin Fischer**
Research Professor, Department of Chemistry
Duke University
"Optical pump-probe microscopy in biological, material science, cultural heritage, and maybe your samples?"

4:20-4:40 **Kevin Welsher**
Assistant Professor, Department of Chemistry
Duke University
"'Locking on' to single molecules and the extracellular phase of viral infection"

4:40-6:00 **POSTER SESSION & RECEPTION**
Posters are exhibited in the Atrium area of the Fitzpatrick Center
FIP Symposium Cocktail Reception in the Atrium area of the Fitzpatrick Center

COCKTAIL RECEPTION
(Heavy hors d'oeuvres will be served)

Tuesday, March 14, 2023 (Fitzpatrick Bldg. to Chesterfield Bldg.) – Morning Session

10:00am -12:00pm**: Special Tour of the Duke Quantum Center at Chesterfield**

10:00am **Shuttle pickup from Science Drive loop by Fitzpatrick Building**
(parking on city street is limited- recommend the shuttle)

10:30-11:30am **Visit and tour the Duke Quantum Center**

11:30am **Shuttle back to the Fitzpatrick Building** for lunch before afternoon session.

12:00-1:30 pm **LUNCH BREAK Day 2** (Lunch provided at Fitzpatrick Building)

Poster Session
Posters are exhibited in the Atrium area of the Fitzpatrick Center

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Tuesday, March 14, 2023 (Fitzpatrick Building) Afternoon Session

1:30-2:40pm **Session 4: Special Topic – *Advanced Photonics I: From Quantum Cascade Lasers to AI***
Session Chair: Willie John Padilla, Professor in the Department of Electrical and Computer Engineering, Duke University

1:30-2:00 **Invited Lecture**
Claire F. Gmachl
Eugene Higgins Professor of Electrical & Computer Engineering
Head of Whitman College, Interim Director ACEE
Princeton University
"Quantum Cascade Ring Lasers and Related Systems"

2:00-2:20 **Timothy Dunn**
Assistant Professor of Biomedical Engineering
Assistant Professor of Neurosurgery
Duke University
"Deep learning and computer vision for quantitative profiling of animal behavior"

2:20-2:40 **David Carlson**
Assistant Professor of Civil and Environmental Engineering
Assistant Professor in Biostatistics & Bioinformatics,
Assistant Professor in ECE & Computer Science
Duke University
"Closed-loop Optogenetic Neural Stimulation to Control Aggressive Behavior"

2:40-3:00 **COFFEE BREAK and POSTER DISPLAY**

3:00-4:30 **Session 5: Advanced Photonic Technologies and Systems II**
Session Chair: Junjie Yao, Assistant Professor, Department of Biomedical Engineering, Duke University

3:00-3:05 **FIP Poster Award Winners Announced**

3:05-3:35 **Invited Lecture**
Susan Trammell
Professor, Department of Physics and Optical Science
The University of North Carolina at Charlotte
"Enhanced Mid-IR Imaging as a Tool to Determine Cancer Margins and Evaluate Blood Perfusion in Tissues"

3:35-4:05 **Invited Lecture**
Shanthi Iyer
Professor in Nanoengineering
Department at the Joint School of Nanoscience and Nanoengineering
North Carolina Agricultural and Technical State University
"Self Catalyzed Molecular Beam Epitaxially grown GaAsSb(N)/GaAs Nanowires based Infrared Photodetectors"

4:05- 4:25 **Weston Ross**
Assistant Professor in Neurosurgery
Duke University
"Optical Pathological Diagnostics: Classification of Tumors Using Fluorescence Spectra and Machine Learning Tools"

4:25 – 4:30 pm **CLOSING REMARKS**

4:30 pm **SYMPOSIUM ADJOURNS**