4-Day Hands-On Workshop: Super Resolution Microscopy: Principles & Methods

Course Schedule 2016 (Tentative)

Day 1 (March 15th)

9:00-9:15 Introduction (**Jithesh Veetil**)

9:15-9:30 Program Review (**Xufeng Wu**)

9:30-10:10 Perils and Pitfalls in Super-Resolution Microscopy (**Hari Shroff**)

10:10-10:50 Study of focal adhesions using super resolution imaging (**Clare Waterman**)

11:00 -11:45 Cell biological studies using super resolution microscopy (**Jennifer Lippincott-Schwartz**)

1:00 – 3:00 Hands-on session I

3:15 – 5:15 Hands-on session II

Day 2 (March 16th)

9:00 -9:40 SIM microscopy: theoretical basis and practical guide I (**Lin Shao**)

- Structured illumination: theory and implementation
- Image reconstruction algorithms
- Keys to a high-quality structured-illumination microscope

9:40 -10:20 STED microscopy: theoretical basis and practical guide (**Chris Combs**)

- Stimulated emission depletion (STED) microscopy: basics and theory
- Dyes suitable for STED imaging
- Problems associated with STED imaging
- How STED fits into the toolbox of super-resolution techniques

10:30 -11:10 PALM/dSTORM: theoretical basis and practical guide I (**Kem Sochacki**)

Optimizing precision and accuracy in your experiment by understanding sample preparation options.

- Brief overview of how PALM/dSTORM works
- Differences between PALM and dSTORM and choosing which to use
- Typical laser intensities during imaging
- What probes are available
- How to pick a good probe

- Optimizing dSTORM reducing buffer
- How to interpret your final image

11:10 -11:40 PALM/dSTORM: theoretical basis and practical guide II (**Jason Yi**)

- Is your data worth fitting and reconstructing?
- Precision and resolution

1:00 - 3:00 Hands-on session III

3:15 - 5:15 Hands-on session IV

Day 3 (March 17th)

9:00 -9:40 Advances in fluorescent protein development and application in super resolution microscopy (**George Patterson**)

9:40 -10:10 Lattice Light Sheet Microscopy for 3D live cell imaging (**Wesley Legant**)

10:10 -10:50 TIRF SIM (**Jordan Beach and Srich Murugesan**)

11:00 -11:30 Imaging Multicellular Specimens with Real-time Optimized Tiling Light Sheet Selective Plane Illumination Microscopy (**Liang Gao**)

11:30-12:00 Airyscan : Bring Super Resolution to Confocal Microscopy (**Xufeng Wu**)

1:00 - 3:00 Hands-on session V&VI

3:15 - 5:15 Hands-on session VII

Day 4 (March 18th)

8:30 Shuttle Bus to Advanced Imaging Center (AIC) at Janelia Farm HHMI Research Center

10:30 - 11:30 Introduction to State-of-the-Art Super Resolution Microscopes in the AIC (**Leong Chew**)

1:00 - 4:00 Demo of the SR Microscopes (iPALM, TIRF-SIM, Lattice Light Sheet Microscopes)

4:30 Shuttle Bus to NIH campus

TRAINING STATIONS

<table>
<tr><td>Station I
Leica – gSTED microscope, Model # TCS SP8
Geoff Daniels</td><td>Station II
GE – SIM microscope, Model # OMX V4
Katie O’Neil</td><td>Station III
Nikon – STORM microscope, Model # N-STORM
Eric Balzer</td><td>Station IV
Zeiss – PALM microscope, Model # ELYRA
Elise Shumsky
Arnold, Alma</td></tr>
<tr><td>Station V
Hari Shroff LAB – Instant SIM Microscope; Hari Shroff LAB – Dual-View Plane Illumination Microscope
Hari Shroff</td><td>Station VI
Zeiss LSM880-Airyscan
Elise Shumsky
Arnold, Alma</td><td colspan="2">Station VII-VIIII
AIC at Janelia HHMI Research Campus – iPALM, TIRM-SIM, Lattice Light Sheet
Leong Chew</td></tr>
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