

33rd Annual Symposium
Program



June 30 - July 3, 2019

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#PS33 Program

Day 1 - Sunday, June 30, 2019

Opening Plenary Session

8:30 - 9:10 a.m. | Grand Ballroom A & B

8:30 - 8:35 a.m. *Intro & Welcome From The Protein Society President*
Charles L. Brooks III, University of Michigan

8:35 - 8:40 a.m. *Introduction of Nobel Laureate Lecturer*
Richard Henderson*

8:40 - 9:10 a.m. **Nobel Laureate Lecture**
*Impact of Electron Cryomicroscopy in
Macromolecular Structural Biology*
Richard Henderson, 2017 Nobel Prize in Chemistry
MRC Lab, Cambridge, England; United Kingdom

Coffee Break | 9:10 - 9:40 a.m. | Grand Ballroom D
**Cryo-EM Workshop, Presenter Salvatore Sechi; NIH/NIDDK |
9:10 - 9:40 a.m. | Cedar A & B**

CONCURRENT MORNING SESSION 1

Mechanobiology - Force-Dependent Protein Interactions with Cytoskeleton
9:40 - 11:30 a.m. | Grand Ballroom A

9:40 - 9:45 a.m. *Introduction From Chair*
Eva-Maria Strauch, University of Georgia;
Athens, Georgia; United States

9:45 - 10:15 a.m. *Dissecting Structural Mechanisms of Force-sensitive
Actin Binding*
Greg Alushin, The Rockefeller University
New York, New York; United States

10:15 - 10:45 a.m. *The Stability of Mechanosensing Force-transmission
Supramolecular Linkages*
Jie Yan, National University of Singapore; Malaysia

10:45 - 11:00 a.m. *The Role of Conformational Dynamics in Shear-
Enhanced FimH-mediated Bacterial Adhesion*
Pearl Magala, University of Washington;
Seattle, Washington; United States

11:00 - 11:30 a.m. *Orthogonal Biophysical Techniques on Proteins and
Intact Cells Reveal the Secrets of Integrin Activation*
Timothy Springer, Harvard University; Cambridge,
Massachusetts; United States

1 * travel support provided by Fred Hutchinson Cancer Research Center

Day 1 - Sunday, June 30, 2019 - (cont.)

CONCURRENT MORNING SESSION 2

**Timing is of the Essence: Dynamics and Kinetics of Biological Function via
Experiment and Simulation**
9:40 - 11:30 a.m. | Grand Ballroom B

9:40 - 9:45 a.m. *Introduction From Chair*
Ying Li, University of Louisville;
Louisville, Kentucky; United States

9:45 - 10:15 a.m. *Optical Tweezers: Watching a Riboswitch Switch*
Steven Block, Stanford University; Palo Alto,
California; United States

10:15 - 10:45 a.m. *Phase Transitions and Timing Mechanisms Governing
Signaling at the Membrane*
Jay Groves, University of California, Berkeley;
Berkeley, California; United States

10:45 - 11:00 a.m. *Real-time Monitoring of Clock Controlled Signal
Transduction Pathway*
Archana Chavan, University of California Merced;
Merced, California; United States

11:00 - 11:30 a.m. *Molecular Mechanisms of RNA Polymerase II
Transcription Elongation Elucidated by Kinetic
Network Models*
Xuhui Huang, Hong Kong University of Science and
Technology; Hong Kong; China

Box Lunch Pickup | 11:30 a.m. - 1:10 p.m. | Grand Ballroom D

ForteBio Exhibitor's Workshop | 11:30 a.m. - 1 p.m. | Cedar A & B

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Day 1 - Sunday, June 30, 2019

CONCURRENT AFTERNOON SESSION 1 Mechanisms of Protein Aggregation 1:10 - 4:30 p.m. | Grand Ballroom A

- 1:10 - 1:15 p.m. *Introduction From Chair*
Jonathan Pruneda, Oregon Health & Science University; Portland, Oregon; United States
- 1:15 - 1:45 p.m. *Amyloid Fibrils: Structure, Energetics, and Function*
David Eisenberg, University of California, Los Angeles; Los Angeles, California; United States
- 1:45 - 2:15 p.m. *The Division of Amyloid Fibrils – Stability, Toxicity and Infectious Potential*
Wei-Feng Xue, University of Kent; Kent, England; United Kingdom
- 2:15 - 2:30 p.m. *Oxidized Dopamine Causes Neuronal Cell Death by Impairing Protein Function and Folding*
Dennis Ozelik, University of Copenhagen; Copenhagen; Denmark
- Coffee Break | 2:30 - 3:15 p.m. | Grand Ballroom C & D**
- 3:15 - 3:45 p.m. *Proteins at the Centre of Neurodegeneration in Alzheimer's Disease*
Louise Serpell, University of Sussex; Sussex, England; United Kingdom
- 3:45 - 4:00 p.m. *Dynamics of Amyloid Fibrils Play a Role in Seeding and Propagating the Aggregation of α -Synuclein*
Jonathan Williams, Rutgers University; New Brunswick, New Jersey; United States
- 4:00 - 4:30 p.m. *Modulation of Interactome by Protein Self-assembly: the Case of Alpha-synuclein*
Emma Sierecki, The University of New South Wales, Kensington Campus; Sydney; Australia



Day 1 - Sunday, June 30, 2019 (cont.)

CONCURRENT AFTERNOON SESSION 2 Protein Folding and Dynamics: Experiments and Simulations 1:10 - 4:30 p.m. | Grand Ballroom B

- 1:10 - 1:15 p.m. *Introduction From Chair*
Karin Crowhurst, California State University, Northridge; Los Angeles, California; United States
- 1:15 - 1:45 p.m. *Rational Enhancement of Protein Conformational Switching Kinetics: Weighted Ensembles of Folding Trajectories*
Lillian Chong, University of Pittsburgh; Pittsburgh, Pennsylvania; United States
- 1:45 - 2:15 p.m. *Deciphering Protein Dynamics and Function by Combining HDX-Mass Spectrometry with MD Simulations*
Lars Konermann, Western University; London, Ontario; Canada
- 2:15 - 2:30 p.m. *Local and Non-local Topological Information in the Denatured State Ensemble of a Beta-barrel Protein*
2018 Protein Science Best Paper Award Winner
Abhay Thakur, Pall Corporation; Port Washington, New York; United States

Coffee Break | 2:30 - 3:15 p.m. | Grand Ballroom C & D

- 3:15 - 3:45 p.m. *Folding, Frustration and Function*
Shachi Gosavi, National Center for Biological Sciences; Bangalore, Karnataka; India
- 3:45 - 4:00 p.m. *Exploring Sequence-Space in TIM Barrel Proteins*
Gloria Saab Rincón; UNAM; Mexico City, Mexico
- 4:00 - 4:30 p.m. *Measuring Weak Protein-protein and Protein-RNA Interactions Inside the Cell*
Martin Gruebele, University of Illinois; Urbana-Champaign, Illinois; United States

Poster Presentation and Mix & Mingle Reception, 4:30 - 6:30 p.m. | Grand Ballroom C & D

Networking Event | 6:45 - 7:45 p.m. | Grand Ballroom B

#PS33

Program

Day 2 - Monday, July 1, 2019

New Member Welcome Breakfast/Member Business Meeting
7:30 - 8:15 a.m. | Cedar A & B

CONCURRENT MORNING SESSION 1

Chaperoning Aggregation and Proteostasis: Life and Death in a Cell
8:30 - 11:45 a.m. | Grand Ballroom A

- 8:30 - 8:35 a.m. *Introduction From Chair*
Mark Herzik, University of California, San Diego;
San Diego, California; United States
- 8:35 - 9:05 a.m. *Chaperone Functions in Protein Folding and Proteome Maintenance*
Ulrich Hartl, Max Planck Institute of Biochemistry;
Munich; Germany
- 9:05 - 9:35 a.m. *Factors Modulating Hsp70 Substrate Recognition and Mediation of the Stress Response*
Sarah Perrett, Institute of Biophysics Chinese Academy of Sciences; Beijing, China
- 9:35 - 9:50 a.m. *Distinct Pathways of Activation of Human Small Heat Shock Protein HSPB5 by Different Stress Factors*
Maria Janowska, University of Washington; Seattle, Washington; United States
- Coffee Break | 9:50 - 10:15 a.m. | Grand Ballroom C & D**
- 10:15 - 10:45 a.m. *High Throughput Methods for Discovering Protein Fold Correctors*
Jason Gestwicki, University of California, San Francisco; San Francisco, California; United States
- 10:45 - 11:15 a.m. *Molecular Details of Protein Misfolding in Myocilin-associated Glaucoma*
Raquel Lieberman, Georgia Institute of Technology; Atlanta, Georgia; United States
- 11:15 - 11:45 a.m. *The Impact of Diverse Triggers of Proteostasis Stress on Proteome Aggregation-State*
Danny Hatters, The University of Melbourne; Melbourne, Australia

Day 2 - Monday, July 1, 2019 (cont.)

CONCURRENT MORNING SESSION 2

Folding, Function & Quality Control of Membrane Proteins
8:30 - 11:45 a.m. | Grand Ballroom B

- 8:30 - 8:35 a.m. *Introduction From Chair*
Donald Spratt, Clarke University; Worcester, Massachusetts; United States
- 8:35 - 9:05 a.m. *Probing Sequence Constraints Associated with the Cotranslational Folding and Misfolding of Integral Membrane Proteins*
Jonathan Schleich, Indiana University; Bloomington, Indiana; United States
- 9:05 - 9:35 a.m. *Unfolding and Refolding of Individual Bacteriorhodopsin Molecules Probed with 1- μ s Resolution*
Thomas Perkins, University of Colorado Boulder; Boulder, Colorado; United States
- 9:35 - 9:50 a.m. *Computational Design of Multipass Transmembrane Proteins*
Peilong Lu, University of Washington; Seattle, Washington; United States
- Coffee Break | 9:50 - 10:15 a.m. | Grand Ballroom C & D**
- 10:15 - 10:45 a.m. *Weak Hydrogen Bonds and Packing Modulate the Stability of Transmembrane Dimers*
Alessandro Senes, University of Wisconsin; Madison, Wisconsin; United States
- 10:45 - 11:15 a.m. *Guiding Membrane Proteins to the ER in a Chaperone Cascade*
Shu-ou Shan, California Institute of Technology; Pasadena, California; United States
- 11:15 - 11:45 a.m. *Structural and Functional Characterization of p13II Protein from Human T-cell Leukemia Virus Type 1*
Elka Georgieva, Cornell University; Ithaca, New York; United States

Box Lunch Pickup | 11:45 a.m. - 1:10 p.m. | Grand Ballroom C & D
Wiley Publisher's Workshop | Noon - 1:10 p.m. | Cedar A & B
Educators' Workshop | Noon - 1:10 p.m. | Willow A & B



Program

Day 2 - Monday, July 1, 2019

CONCURRENT AFTERNOON SESSION 1

Proteins in the Membrane: Dynamics and Recognition
1:10 - 4:30 p.m. | Grand Ballroom A

- 1:10 - 1:15 p.m. *Introduction From Chair*
Amanda Duran, Cyrus Biotechnology; Seattle, Washington; United States
- 1:15 - 1:45 p.m. *Dynamics of GPCR Signal Transmission and Allosteric Regulation Detected by NMR*
Stephan Grzesiek, University of Basel; Basel, Switzerland
- 1:45 - 2:15 p.m. *How Do Membrane Protein Extracellular Domains Regulate Intracellular Catalytic Function?*
Adam Smith, University of Akron; Akron, Ohio; United States
- 2:15 - 2:30 p.m. *Directed Evolution of Sensor Proteins for GPCR Signaling Mechanisms*
Andre Berndt, University of Washington; Seattle, Washington; United States
- Coffee Break | 2:30 - 3:15 p.m. | Grand Ballroom C & D**
- 3:15 - 3:45 p.m. *Receptor Clustering and Activation Driven by its Transmembrane Anchor*
James Chou, Harvard Medical School; Cambridge, Massachusetts; United States
- 3:45 - 4:00 p.m. *Native-state Prolyl Isomerization is Involved in the Activation of a CNG Channel*
Phillip Schmidpeter, Weill Cornell Medical College; New York, New York; United States
- 4:00 - 4:30 p.m. *The Chaperonin TRiC/CCT Associates with Prefoldin Through a Conserved Electrostatic Interface Essential for Cellular Proteostasis*
Daniel Gestaut, Stanford University, Palo Alto, California; United States

Day 2 - Monday, July 1, 2019 (cont.)

CONCURRENT AFTERNOON SESSION 2

Unrestricted Bullies in the Cell - Large Protein Systems in Solution
1:10 - 4:30 p.m. | Grand Ballroom B

- 1:10 - 1:15 p.m. *Introduction From Chair*
Mikaela Stewart, Texas Christian University; Fort Worth, Texas; United States
- 1:15 - 1:45 p.m. *Structural Basis for the Binding of Non-native Proteins by Molecular Chaperones*
Charalampos Kalodimos, St. Jude Children's Research Hospital; Memphis, Tennessee; United States
- 1:45 - 2:15 p.m. *Targeting KRAS Oncoprotein at Biological Membranes*
Mitsu Ikura, University of Toronto; Toronto, Canada
- 2:15 - 2:30 p.m. *Turning Up the Heat on Dynamic Proteins: Observing Molecular Motion in Real Time with Temperature-jump X-ray Crystallography and Solution Scattering*
Michael Thompson, University of California, San Francisco; San Francisco, California; United States
- Coffee Break | 2:30 - 3:15 p.m. | Grand Ballroom C & D**
- 3:15 - 3:45 p.m. *Structural Biology of PmhC Receptors Functioning as Mechanosensors in the Ab T-Cell Lineage*
Ellis Reinherz, Dana-Farber Cancer Institute; Boston, Massachusetts; United States
- 3:45 - 4:00 p.m. *The Structure of Discoidal High-density Lipoprotein Particles*
Stefan Bibow, University of Basel; Basel, Switzerland
- 4:00 - 4:30 p.m. *Activation of the Exocyst Tethering Complex for Snare Complex Regulation and Membrane Fusion*
Mary Munson, University of Massachusetts Medical School; Worcester, Massachusetts; United States

Poster Presentation and Mix & Mingle Reception
4:30 - 6:30 p.m. | Grand Ballroom C & D

Mentoring Panel | 6:45 - 7:45 p.m. | Willow A & B

#PS33 Program

Day 3 - Tuesday, July 2, 2019

CONCURRENT MORNING SESSION 1

Selectivity in Protein-Protein Interactions: From Design to Control 8:30 - 11:45 a.m. | Grand Ballroom A

- 8:30 - 8:35 a.m. *Introduction From Chair*
Jeanine Amacher, Western Washington University;
Bellingham, Washington; United States
- 8:35 - 9:05 a.m. *Engineered Circular Tandem Repeat Proteins: Structure, Behavior and Function*
Barry Stoddard, Fred Hutchinson Cancer Research Center; Seattle, Washington; United States
- 9:05 - 9:35 a.m. *Engineering Linkage-Specific Polyubiquitin Antibodies: Tools for Elucidation of Novel Signaling Pathways*
Marissa Matsumoto, Genentech;
San Francisco, California; United States
- 9:35 - 9:50 a.m. *Microfluidic Methods Reveal the Thermodynamics of Chaperone Binding*
Therese Herling; University of Cambridge;
Cambridge, England; United Kingdom

Coffee Break | 9:50 - 10:15 a.m. | Grand Ballroom C & D

- 10:15 - 10:45 a.m. *From Systems Biology to Systems Biologics*
Dev Sidhu, University of Toronto; Toronto, Canada
- 10:45 - 11:15 a.m. *Cellular Consequences of Systematic Perturbations of a Highly Conserved Biological Switch*
Tanja Kortemme, University of California, San Francisco;
San Francisco, California; United States
- 11:15 - 11:45 a.m. *A Molecular View of the Liquid to Gel Phase Transition of Heterochromatin Protein HP1 α*
Galia Debelouchina; University of California, San Diego;
San Diego, California; United States

Day 3 - Tuesday, July 2, 2019 (cont.)

CONCURRENT MORNING SESSION 2

What do Proteins do When They Are Crowded? Does it Matter? 8:30 - 11:45 a.m. | Grand Ballroom B

- 8:30 - 8:35 a.m. *Introduction From Chair*
David Ban, Merck; Kenilworth, New Jersey; United States
- 8:35 - 9:05 a.m. *Exploring the Determinants of Protein Crowding Effects by Molecular Simulation*
Rebecca Wade, Heidelberg Institute for Theoretical Studies gGmbH; Heidelberg; Germany
- 9:05 - 9:35 a.m. *Solution NMR Approaches to 3D Structure Determination of Proteins In Living Eukaryotic Cells*
Yutaka Ito, Tokyo Metropolitan University; Tokyo; Japan
- 9:35 - 9:50 a.m. *Brownian Dynamic Study of an Enzyme Metabolon in the TCA Cycle: Substrate Kinetics And Channeling*
2018 Protein Science Best Paper Award Winner
Yu-ming "Mindy" Huang; University of California San Diego;
San Diego, California; United States

Coffee Break | 9:50 - 10:15 a.m. | Grand Ballroom C & D

- 10:15 - 10:45 a.m. *Protein Folding, Aggregation and Phase Separation in the Cell*
Simon Ebbinghaus, Ruhr-Universität Bochum;
Bochum; Germany
- 10:45 - 11:15 a.m. *Protein Crowding at Membrane Surfaces*
Jeanne C. Stachowiak, University of Texas at Austin;
Austin, Texas; United States
- 11:15 - 11:45 a.m. *Critical Phenomena in the Temperature-pressure-crowding Phase Diagram of a Protein*
Margaret Cheung; University of Houston;
Houston, Texas; United States

Box Lunch Pickup | 11:45 a.m. - 1:30 p.m. | Grand Ballroom C & D

Undergrad Research Session | 12:15 - 1:30 p.m. | Willow A & B

#PS33 Program

Day 3 - Tuesday, July 2, 2019

PLENARY AWARDS SESSION

1:30 - 5:30 p.m. | **Grand Ballroom A**

- 1:30 - 1:35 p.m. *Introduction from The Protein Society President*
Charles L. Brooks III, University of Michigan
- 1:35 - 1:40 p.m. *Presentation - Hans Neurath Award*
1:40 - 2:10 p.m. *GroEL and RNA Chaperones as Stochastic Machines*
2019 Hans Neurath Award Winner **Dave Thirumalai**,
University of Texas at Austin; Austin, Texas, United States
- 2:10 - 2:15 p.m. *Presentation - Dorothy Crowfoot Hodgkin Award*
2:15 - 2:45 p.m. *Higher-order Supramolecular Assemblies for Immune Signaling and Beyond*
2019 Dorothy Crowfoot Hodgkin Award Winner
Hao Wu, Harvard University;
Cambridge, Massachusetts; United States
- 2:45 - 2:50 p.m. *Presentation - Christian B. Anfinsen Award*
2:50 - 3:20 p.m. *Chaperone-Assisted Structure Determination: Bringing High Hanging Fruit to Ground Level*
2019 Christian B. Anfinsen Award Winner
Anthony Kossiakoff, University of Chicago;
Chicago, Illinois; United States

Coffee Break | 3:20 - 3:45 p.m. | **Grand Ballroom**

Day 3 - Tuesday, July 2, 2019 (cont.)

- 3:45 - 3:50 p.m. *Presentation - Emil Thomas Kaiser Award*
3:50 - 4:20 p.m. *Cell-wall Recycling in Pseudomonas aeruginosa and the Nexus to Antibiotic Resistance*
2019 Emil Thomas Kaiser Award Winner
Shahriar Mobashery, University of Notre Dame;
Notre Dame, Indiana; United States
- 4:20 - 4:25 p.m. *Presentation -Protein Science Young Investigator Award*
4:25 - 4:55 p.m. *Using Cryo-EM to Understand the Mechanisms of Mitochondrial Machines of Mass Destruction*
Protein Science Young Investigator Award Winner
Gabriel Lander, Scripps Research Institute;
La Jolla, California; United States
- 4:55 - 5:00 p.m. *HNOPTA and Society Service Awards*
Charles L. Brooks III, University of Michigan

Poster Presentations/Mix & Mingle Reception | 5:30 - 7:30 p.m. |
Grand Ballroom C & D
Members' Reception (All Welcome) | 8:30 - 10 p.m. |
Grand Ballroom B

#PS33 Program

Day 4 - Wednesday, July 3, 2019

CONCURRENT MORNING SESSION 1

Structural Elucidation of Protein Complexes by Mass Spectrometry 8:30 - 10:20 a.m. | Grand Ballroom A

- 8:30 - 8:35 a.m. *Introduction From Chair*
Benjamin Garcia, University of Pennsylvania;
Philadelphia, Pennsylvania; United States
- 8:35 - 9:05 a.m. *Elucidation of Protein Complexes in Heart*
James Bruce, University of Washington;
Seattle, Washington; United States
- 9:05 - 9:35 a.m. *Ultraviolet Photodissociation Mass Spectrometry for
Characterization of Proteins and Protein Complexes*
Jennifer Brodbelt, University of Texas at Austin;
Austin, Texas; United States
- 9:35 - 9:50 a.m. *Measuring the Functional Effect of Amino Acid
Substitutions Proteome-wide using Mistranslation*
Stephanie Zimmerman, University of Washington;
Seattle, Washington; United States
- 9:50 - 10:20 a.m. *Native Mass Spectrometry for a Top-Down View of
Protein Structures*
Joseph Loo, University of California, Los Angeles;
Los Angeles, California; United States

CONCURRENT MORNING SESSION 2

Signaling Across the Membrane, G-protein Coupled Receptors 8:30 - 10:20 a.m. | Grand Ballroom

- 8:30 - 8:35 a.m. *Introduction From Chair*
Anna Groat-Carmona, University of Washington,
Tacoma; Tacoma, Washington; United States
- 8:35 - 9:05 a.m. *Single-molecule Analysis of Ligand Efficacy in β 2AR-G
Protein Activation*
Scott Blanchard, Weill Cornell Medical College;
New York, New York; United States

Day 4 - Wednesday, July 3, 2019 (cont.)

- 9:05 - 9:35 a.m. *Snapshots of G Protein-Coupled Receptors at Work*
Georgios Skiniotis, Stanford University;
Palo Alto, California; United States
- 9:35 - 9:50 a.m. *Elucidating Relayed Proton Transfer Through a His-Trp-
His Triad of a Transmembrane Proton Channel by
Solid-State NMR*
Byongsu Kwon, Massachusetts Institute of Technology;
Cambridge, Massachusetts; United States
- 9:50 - 10:20 a.m. *Structural Insights into G Protein-coupled Receptor
Signaling*
Andy Kruse, Harvard University;
Cambridge, Massachusetts; United States

PLENARY AWARDS SESSION

10:20 - 11:45 a.m. | Grand Ballroom A & B

- 10:20 - 10:25 a.m. *Introduction from The Protein Society President*
Charles L. Brooks III, University of Michigan
- 10:25 - 10:55 a.m. *Mass Spectrometry: From Plasma Proteins to
Mitochondrial Membranes*
2019 Stein & Moore Award Winner
Dame Carol Robinson, University of Oxford;
Oxford, England; United Kingdom
- 11:00 - 11:30 a.m. *The Coming of Age of de novo Protein Design*
2018 Hans Neurath Award Winner
David Baker, University of Washington;
Seattle, Washington; United States
- 11:30 - 11:45 a.m. *Closing*
Charles L. Brooks III, University of Michigan