

Physical Virology

Gordon Research Conference

Structure-Function Relations in Viruses and Virus-Like Materials

Dates

January 29 - February 3, 2017

Location

Renaissance Tuscany Il Ciocco
Lucca (Barga), Italy

Organizers

Chairs:

Brian Bothner & Jeroen J.L.M. Cornelissen

Vice Chairs:

Wouter H. Roos & Tuli Mukhopadhyay

Application Deadline

The application deadline for this meeting was **January 1, 2017**. You may still submit an application, which may be considered by the conference chair if there is still room available.

Meeting Description

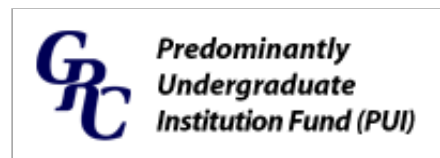
The inception of the GRC on Physical Virology in 2009 was born of the desire to bring together scientists with an interest in applying a multidisciplinary approach that includes biology, biophysics, chemistry, mathematics, material science, physics, and virology, to understanding the basic biology of viruses. While this diversity in disciplines is a plus, it posed challenges because of the poor communication between the disciplines. The goal of this conference was thus to bring together, for a first time, the physical, biological, and materials perspectives that was driving the research in the field of viruses as multifunctional systems with increasing utility in material science and biomedicine. Significantly, a Gordon Research Seminar (GRS), organized by graduate students and held in conjunction with the parent GRC meeting on the same topic, provided the opportunity for young scientists to present their work to their peers and senior scientists in the field. Interest and attendance of joint meetings has continued to grow, and in this the 5th biennial GRC Physical Virology meeting, the first to be held at a European site, the emphasis will continue to have the following objectives: 1. To provide a forum for virologists, bioengineers, chemists, materials scientists, physicists, biologists, and clinicians to present current research on the fundamental understanding of the relationship between virus structure and function. 2. To initiate interdisciplinary collaborative interactions between scientists interested in biological, biomedical, colloidal, and self-assembled materials to facilitate the design of advanced materials, with a particular focus on applications in health care. 3. To establish opportunities for fostering biomedical and industrial applications of virus-derived materials. 4. To provide an opportunity for young scientists (graduate students and postdoctoral fellows) to present their research results and interact with established members of the field.

Related Meeting



This GRC will be held in conjunction with the "**Physical Virology**" **Gordon Research Seminar (GRS)**. Those interested in attending both meetings must submit an application for the GRS in addition to an application for the GRC. Refer to the [associated GRS program page](#) for more information.

Contributors



Meeting Program

Sunday

- 4:00 pm - 8:00 pm Arrival and Check-in
- 6:00 pm Dinner
- 7:30 pm - 7:40 pm Welcome / Introductory Comments by GRC Site Staff
- 7:40 pm - 9:30 pm **Keynote Session: Virus Assembly: Theory and Practice**
- Discussion Leader: **Brian Bothner** (Montana State University, USA)
- 7:40 pm - 7:50 pm Opening Remarks
- 7:50 pm - 8:25 pm **Adam Zlotnick** (Indiana University, USA)
"Virion-Based Therapeutics: Small Molecules Affect Virus Structure and Dynamics"
- 8:25 pm - 8:40 pm Discussion
- 8:40 pm - 9:15 pm **Bogdan Dragnea** (Indiana University, USA)
"The Interface of Biology and Nanomaterials"
- 9:15 pm - 9:30 pm Discussion

Monday

- 7:30 am - 8:30 am Breakfast
- 9:00 am - 12:30 pm **Materials and Devices**
- Discussion Leader: **Mauri Kostianen** (Aalto University, Finland)
- 9:00 am - 9:10 am Introduction by Discussion Leader
- 9:10 am - 9:35 am **Nicole Steinmetz** (Case Western Reserve University, USA)
"Plant Virus-Based Therapeutics and Contrast Agents"
- 9:35 am - 9:45 am Discussion
- 9:45 am - 10:10 am **Trevor Douglas** (Indiana University, USA)
"Biomimetic Reaction Chambers"
- 10:10 am - 10:20 am Discussion
- 10:20 am - 10:30 am Short Talk Selected from Poster Abstracts
- 10:30 am - 10:35 am Discussion
- 10:35 am - 11:05 am Coffee Break
- 11:05 am - 11:30 am **Matthew Francis** (University of California, Berkeley, USA)
"Viral Capsids for Drug Delivery and 3-D Nanomaterial Construction"
- 11:30 am - 11:40 am Discussion

- 11:40 am - 12:05 pm **Xian-En Zhang** (Institute of Biophysics, Chinese Academy of Sciences, China)
"Viral and Microbial Elements as Building Blocks for Nanobiosensor Platform"
- 12:05 pm - 12:15 pm Discussion
- 12:15 pm - 12:25 pm Short Talk Selected from Poster Abstracts
- 12:25 pm - 12:30 pm Discussion
- 12:30 pm Lunch
- 1:30 pm - 4:30 pm Free Time
- 4:30 pm - 6:00 pm Poster Session
- 6:00 pm - 8:00 pm **Biomedical Applications**

Discussion Leader: **M.G. Finn** (Georgia Institute of Technology, USA)

- 6:00 pm - 6:10 pm Introduction by Discussion Leader
- 6:10 pm - 6:35 pm **Maya Shmulevitz** (University of Alberta, Canada)
"Reshaping Oncolytic Reovirus for the Tumor Niche"
- 6:35 pm - 6:45 pm Discussion
- 6:45 pm - 7:10 pm **Aravind Asokan** (University of North Carolina at Chapel Hill, USA)
"Evolving New Features on Adeno-Associated Viruses"
- 7:10 pm - 7:20 pm Discussion
- 7:20 pm - 7:45 pm **Kah Peng** (Mayo Clinic College of Medicine, USA)
"Viruses as Oncolytic Agents: Preclinical and Clinical Insights"
- 7:45 pm - 7:55 pm Discussion
- 7:55 pm - 8:00 pm General Discussion
- 8:00 pm Dinner

Tuesday

- 7:30 am - 8:30 am Breakfast
- 8:30 am Group Photo
- 9:00 am - 12:30 pm **Structural Studies of Viruses**
- Discussion Leader: **Mavis Agbandje-McKenna** (University of Florida, USA)
- 9:00 am - 9:10 am Introduction by Discussion Leader
- 9:10 am - 9:35 pm **Pepe Caston** (Spanish National Research Council (CSIC), Spain)
"Structural Virotechnology or How 3D Cryo-EM Facilitates Viral Biotechnology"
- 9:35 am - 9:45 am Discussion
- 9:45 am - 10:10 am **Kay Grunewald** (University of Oxford, United Kingdom)
"Structural Analysis of Herpes Virus Infection"
- 10:10 am - 10:20 am Discussion
- 10:20 am - 10:30 am Short Talk Selected from Poster Abstracts
- 10:30 am - 10:35 am Discussion
- 10:35 am - 11:05 am Coffee Break
- 11:05 am - 11:30 am **Hong Zhou** (California NanoSystems Institute, UCLA, USA)
"Viral RNA Genomes by CryoEM: Atomic Structures and Mechanisms of Action"
- 11:30 am - 11:40 am Discussion

11:40 am - 12:05 pm **Charlotte Uetrecht** (Heinrich Pette Institute / European XFEL, Germany)
"Flying Viruses - From Biophysical to Structural Characterization"

12:05 pm - 12:15 pm Discussion

12:15 pm - 12:25 pm Short Talk Selected from Poster Abstracts

12:25 pm - 12:30 pm Discussion

12:30 pm Lunch

1:30 pm - 4:30 pm Free Time

4:30 pm - 6:00 pm Poster Session

6:00 pm - 8:00 pm

Virus Structure-Function

Discussion Leader: **Rebecca Dutch** (University of Kentucky, USA)

6:00 pm - 6:05 pm Introduction by Discussion Leader

6:05 pm - 6:30 pm **Kristin Parent** (Michigan State University, USA)
"Decoration Mechanism of PhageL Capsids"

6:30 pm - 6:40 pm Discussion

6:40 pm - 7:05 pm **Jonathan Pokorski** (Case Western Reserve University, USA)
"Polymer Based Protein Engineering Using Viral Nanoparticles"

7:05 pm - 7:15 pm Discussion

7:15 pm - 7:25 pm Short Talk Selected from Poster Abstracts

7:25 pm - 7:30 pm Discussion

7:30 pm - 7:50 pm Late-Breaking Topic

7:50 pm - 8:00 pm Discussion

8:00 pm Dinner

Wednesday

7:30 am - 8:30 am Breakfast

9:00 am - 12:30 pm

Assembly and Biomechanics of Viruses

Session in memory of Dr. William Klug.

Discussion Leader: **Charles Knobler** (University of California, Los Angeles, USA)

9:00 am - 9:20 am Introduction by Discussion Leader

9:20 am - 9:45 am **William Gelbart** (University of California, Los Angeles, USA)
"Some New Twists on CCMV Self-Assembly, 50 Years After Bancroft"

9:45 am - 9:55 am Discussion

9:55 am - 10:20 am **Alex Evilevitch** (Carnegie Mellon University, USA)
"Genome Encapsidation and Release"

10:20 am - 10:30 am Discussion

10:30 am - 11:00 am Coffee Break

11:00 am - 11:25 am **Roya Zandi** (University of California, Riverside, USA)
"*In Vitro* Protease Cleavage and Computer Simulations Reveal the HIV-1 Capsid Maturation Pathway"

11:25 am - 11:35 am Discussion

11:35 am - 12:00 pm **Martin Lawrence** (Montana State University, USA)
"*Acidianus* Tailed Spindle Virus: A New Structural Paradigm for Viral Assembly"

- 12:00 pm - 12:10 pm Discussion
- 12:10 pm - 12:20 pm Short Talk Selected from Poster Abstracts
- 12:20 pm - 12:25 pm Discussion
- 12:25 pm - 12:30 pm Closing Remarks
- 12:30 pm Lunch
- 1:30 pm - 4:30 pm Free Time
- 4:30 pm - 6:00 pm Poster Session

6:00 pm - 8:00 pm

Viruses with Membranes

Discussion Leader: **Felix Rey** (Institut Pasteur, France)

- 6:00 pm - 6:25 pm **Susan Daniel** (Cornell University, USA)
"An Engineering Approach to Probing Host-Pathogen Interactions Using Single Virion Tracking Microscopy"
- 6:25 pm - 6:35 pm Discussion
- 6:35 pm - 7:00 pm **Kelly Lee** (University of Washington, USA)
"Interplay of Protein and Membrane Intermediates During Influenza Virus Fusion"
- 7:00 pm - 7:10 pm Discussion
- 7:10 pm - 7:35 pm **Mark Sansom** (University of Oxford, United Kingdom)
"Molecular Simulations to Characterise Viral Membranes and Their Interactions"
- 7:35 pm - 7:45 pm Discussion
- 7:45 pm - 7:55 pm Short Talk Selected from Poster Abstracts
- 7:55 pm - 8:00 pm Discussion
- 8:00 pm Dinner

Thursday

- 7:30 am - 8:30 am Breakfast
- 8:30 am - 9:00 am Business Meeting

Nominations for the Next Vice Chair; Fill in Conference Evaluation Forms; Discuss Future Site and Scheduling Preferences; Election of the Next Vice Chair

9:00 am - 12:30 pm

Protein Cages by Design

Discussion Leader: **Adam Zlotnick** (Indiana University, USA)

- 9:00 am - 9:10 am Introduction by Discussion Leader
- 9:10 am - 9:35 pm **Donald Hilvert** (ETH Zurich, Switzerland)
"Design, Structure and Applications of Scalable Protein Cages"
- 9:35 am - 9:45 am Discussion
- 9:45 am - 10:10 am **Roman Jerala** (National Institute of Chemistry, Slovenia)
"Design of Protein Origami Cages"
- 10:10 am - 10:20 am Discussion
- 10:20 am - 10:30 am Short Talk Selected from Poster Abstracts
- 10:30 am - 10:35 am Discussion
- 10:35 am - 11:05 am Coffee Break
- 11:05 am - 11:30 am **Junghae Suh** (Rice University, USA)
"Designing Viruses as Biocomputing Nanodevices"

11:30 am - 11:40 am	Discussion
11:40 am - 12:05 pm	Michael Hagan (Brandeis University, USA) "Controlled Assembly and Dynamical Organization of Biomimetics"
12:05 pm - 12:15 pm	Discussion
12:15 pm - 12:25 pm	Short Talk Selected from Poster Abstracts
12:25 pm - 12:30 pm	Discussion
12:30 pm	Lunch
1:30 pm - 4:30 pm	Free Time
4:30 pm - 6:00 pm	<u>Poster Session</u>
6:00 pm - 8:00 pm	Keynote Session: Enabled Studies of Viruses
	Discussion Leader: Jeroen Cornelissen (University of Twente, The Netherlands)
6:00 pm - 6:10 pm	Introduction by Discussion Leader
6:10 pm - 6:45 pm	Todd Yeates (University of California, Los Angeles, USA) "Design Strategies and Structural Validation of Protein Cages and Other Symmetric Nanomaterials"
6:45 pm - 7:00 pm	Discussion
7:00 pm - 7:35 pm	Felix Rey (Institut Pasteur, France) "Virion Dynamics and Immunogenicity Profile: Combining These Data to Develop an Efficient Vaccine Against Dengue and Zika Viruses"
7:35 pm - 7:50 pm	Discussion
7:50 pm - 8:00 pm	Closing Remarks
8:00 pm	Dinner
Friday	
7:30 am - 8:30 am	Breakfast
9:00 am	Departure