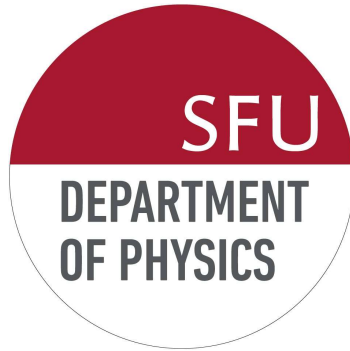
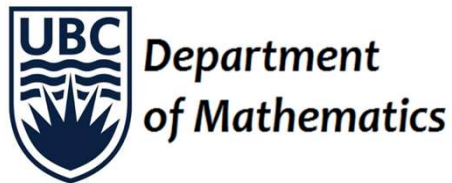


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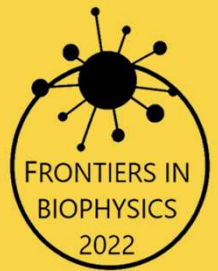
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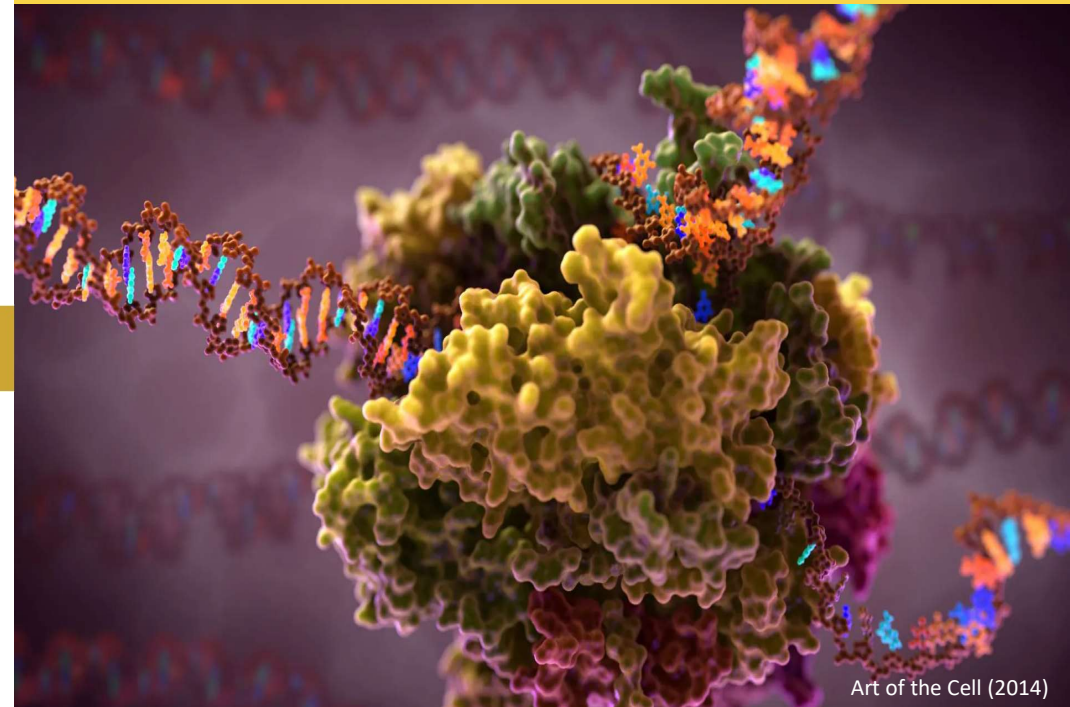


FRONTIERS IN BIOPHYSICS



Friday June 17th, 2022

Simon Fraser University – Harbour Centre Vancouver BC



Art of the Cell (2014)

KEYNOTE SPEAKER:

Pallav Kosuri

(The Salk Institute, California, USA)



Speaking on
“Origami Movement Microscopy”

WELCOME TO FRONTIERS IN BIOPHYSICS!



Frontiers in Biophysics is a one-day conference designed to promote collaboration and networking within the quantitative biology community in the Pacific Northwest and beyond. Participants in all stages of their careers and from academic backgrounds such as math, physics, biology, chemistry, medicine, computer science and engineering are welcome. The informal atmosphere encourages discussion and networking across departments, which is a rare opportunity for these various local groups. Students benefit greatly from learning of the diverse research being performed in the Pacific Northwest in experimental, theoretical, and applied quantitative biology.

Want to see more? Check out our Youtube channel "*Frontiers in Biophysics*" to see recordings of today's presentations and last year's conference!

Want to learn more? Check out our website "<https://frontiers2022.ca/>" to find all the talk and poster abstracts from today!



Faculty of Science is a leader in research and education in traditional areas such as biomedical, earth, life and physical sciences, and mathematical disciplines. We also embrace niche subjects like actuarial science, bioinformatics, and management and systems science.

At SFU, our faculty are skilled researchers who seek solutions to some of the most significant challenges of our time while sharing their knowledge and experience with graduate students. Graduate students collaborate closely with faculty on new research initiatives and benefit from valuable mentoring and advice.

In addition, we leverage our strong academic reputation, partnerships with educational and research institutions around the globe and relationships with regional Indigenous communities to provide our graduate students with experiential learning opportunities. These include paid co-op work, graduate research internships, full-term to year-long exchanges, and field schools which enrich classroom learning and provide glimpses into careers and interdisciplinary research areas that change students lives. Our students have worked with organizations and industry leaders such as CERN, BC Cancer Agency, Genome BC, TRIUMF, Providence Healthcare, BC Women's and Children's Hospital, Stemcell Technologies, Amgen, D-Wave Systems, and Ballard Power Systems.



The Biophysical Society of Canada (BSC) was founded in 1985 to advance the development and growth of biophysics research in Canada through programs, meetings, awards, and outreach events. The BSC offers in particular many awards to trainee members, including conference travel awards, poster awards at our annual meeting, and awards for theses and publications by trainees. Awards for principal investigators include the Early Career Investigator and BSC Fellow awards, for outstanding contributions to Biophysics research, and the Michèle Auger Service award, for exceptional service towards the growth and development of the Biophysical Society of Canada. The BSC annual meeting offers an excellent opportunity to connect with the Biophysics community in Canada. Membership is very affordable and allows to stay informed about events and opportunities of relevance to Canadian Biophysicists



AbCellera is a technology company that searches, decodes, and analyzes natural immune systems to find antibodies that its partners can develop into drugs to prevent and treat disease. AbCellera partners with drug developers of all sizes, from large pharmaceutical to small biotechnology companies, empowering them to move quickly, reduce costs, and tackle the toughest problems in drug development. For more information, please visit www.abcellera.com.

SPONSOR INFORMATION



The Department of Physics was one of the founding departments of Simon Fraser University in 1965, and biological and soft matter physics have been an integral part of the department since 1988. SFU Physics was one of the first Physics departments in Canada to expand in the direction of Soft Matter and Biophysics, and our

program is one of the best developed in Canada. This strongly interdisciplinary group interacts with other departments such as Chemistry, Biological Sciences and Molecular Biology and Biochemistry through joint and associate appointments, seminar series and special workshops. We welcome and encourage applications for graduate study, USRAs, PDFs and visiting faculty to further strengthen and diversify this research area. We are proud to be a supporter of Frontiers in Biophysics.



OFFICE OF THE
VICE-PRESIDENT, ACADEMIC

The purpose of SFU's Vice-President, Academic and Provost area is to resource and support an outstanding

education for SFU students and to provide a productive research environment for faculty. Our 2019-2024 Academic Plan outlines the strategies SFU will need to focus on to continue to be a leading engaged university and an active participant in the innovation and dialogue that shapes our future. Each year, the Office of the Vice-President, Academic grants financial assistance for academic conferences sponsored by the University or by its faculty, and in some cases for conferences in which there is either substantial participation by or partnership with SFU co-sponsors. In this way, Simon Fraser University helps enhance the national and international visibility of our academic community and its commitment to excellence and innovation.



Department
of Mathematics

The UBC Mathematics Department is pre-eminent in Canada. We perform groundbreaking research in many areas of mathematics including a large presence in mathematical biology. We contribute to

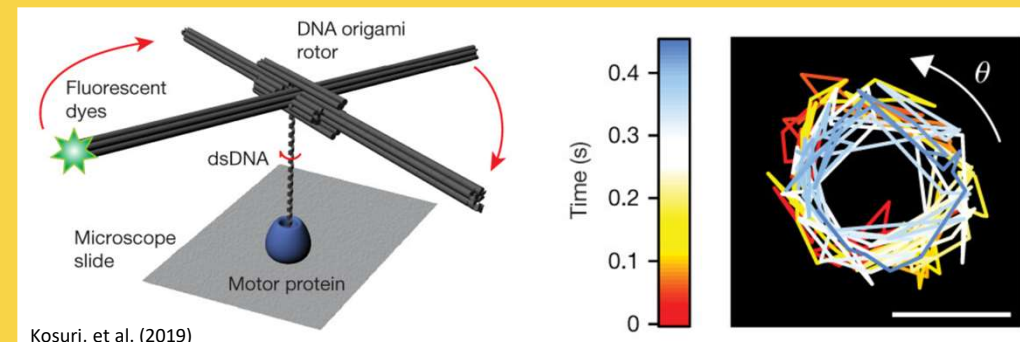
interdisciplinary projects across science, medicine and engineering at UBC, as well as collaborating with a diverse set of local and international companies. We provide high-quality instruction, from beginning calculus to advanced graduate topics, to many thousands of students every year. We host a variety of outreach projects, especially for children and teachers. We strongly affirm that mathematics is for all people and promote equity and diversity in all we do.

KEYNOTE: Pallav Kosuri

Origami Movement Microscopy

Mechanical movements of DNA are integral to human biology: Polymerases pry apart the double-stranded helix to transcribe or replicate DNA; chromatin factors bend DNA to restrict or enable access to specific regions of the genome. Collectively, dynamic reactions like these shape the physical organization of our genome and determine the fate of every cell. If we could measure these DNA movements, then we would be able to shed new light on genetic processes and the emerging role of DNA mechanics in gene regulation. However, most DNA movements have never been observed due to the challenge of measuring such minute motions.

To meet this challenge, we are developing Origami Movement Microscopy (OMM), a new technology that enables direct observation of previously invisible DNA movements. Our technology works by structurally amplifying DNA movements with the help of lever-arm-like DNA origami devices. We have designed a set of such devices where each device amplifies a specific mode of DNA movement and makes this movement visible in a standard fluorescence microscope. Using our new approach, we can now observe protein-DNA movements at a resolution of single base pairs, revealing the mechanics of these reactions in rich detail. We envision OMM to become a standard method in our pursuit to illuminate the largely unexplored universe of protein-DNA interaction dynamics.



Kosuri, et al. (2019)

SCHEDULE

Time	Activity
9:00 AM – 9:20 AM	Coffee and chat
9:20 AM – 9:45 AM	Icebreaker and networking
9:45 AM – 11:00 AM	Talks – Session 1
11:00 AM – 11:15 AM	Coffee break
11:15 AM – 12:15 PM	Talks – Session 2
12:15 PM – 12:45 PM	Lunch break*
12:15 PM – 2:00 PM	Poster Session
2:00 PM – 2:20 PM	SFU Faculty of Science: STEMCELL TECHNOLOGIES
2:20 PM – 3:20 PM	Keynote Speaker
3:20 PM – 3:30 PM	Coffee break
3:30 PM – 4:30 PM	Talks – Session 3
4:30 PM – 4:45 PM	Awards

*A group photo will be taken during this time

Have any questions?

Feel free to reach out to a member of our organizing committee:

- Alaa Al-Shaer
- Emma Lee
- Matthew Leighton
- Miranda Louwerse
- Mark Rempel

TALKS - SESSION 1

1. Thermodynamic Limits of Cytoskeletal Gel Contraction – **MATTEO FERRARESSO**
2. Single-Molecule Force Spectroscopy Studies of Missense Titin Mutations That Are Likely Causing Cardiomyopathy – **JIACHENG ZUO**
3. Protein Hydrogels with Reversibly Patterned Multidimensional Fluorescent Images for Information Storage – **TIANYU DUAN**
4. Intrinsic Protein Structural Properties Regulate Physiological Amyloid Aggregation – **DANE MARIJAN**
5. First Principles Calculation of Protein–Protein Dimer Affinities of ALS-Associated SOD1 Mutants – **SHAWN HSUEH**

TALKS - SESSION 2

1. Inference of the DNA Replication Kinetics in Human Genomes – **SINA FALAKIAN**
2. Ratchets, Ratchets Everywhere! How Information Can Fuel Molecular Machines and Why You Should Care – **JANNIK EHRICH**
3. Brownian Dynamics Simulation of Nanoparticle Transport Through Mucus – **MOHAMMAD-REZA ROKHFOROUZ**
4. Dynamic and Thermodynamic Bounds for Collective Motor-Driven Transport – **MATTHEW LEIGHTON**

TALKS - SESSION 3

1. Multidimensional Minimum-Work Control of a 2D Ising Model – **MIRANDA LOUWERSE**
2. Efficient Two-Dimensional Control of Barrier Crossing – **STEVEN BLABER**
3. Templated Folding of the RTX Domain of the Bacterial Toxin Adenylate Cyclase Revealed by Single Molecule Force Spectroscopy – **GUOJUN CHEN**
4. How Do Organisms Acquire Their Gut Microbiomes? – **ERIC JONES**