

**7th International Conference on the
Foundations of Systems Biology in Engineering
FOSBE 2018**

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Neda Bagheri, co-Chair (Northwestern University)

Matthew Chang, co-Chair (National University of Singapore)

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The 7th FOSBE conference was held August 5-8 at the Hilton Chicago Oak Brook Hills Resort & Conference Center, in Chicago, Illinois. The conference was sponsored by CACHE, with technical co-sponsorship from IFAC Biosystems and Bioprocesses (TC 8.4), AIChE's Society of Biological Engineering, and IEEE's Control Systems Society. 83 participants from 11 countries met for the event; approximately 5% of participants were from industry and 43% were from countries outside the U.S. The meeting opened with a welcome reception Sunday evening, which was followed by **Dr. Nathan Price**, Systems Biology Institute, delivering the conference-opening lecture, "Mining Personal, Dense, Dynamic Data Clouds to Enhance Health and Drive Discovery".

The Monday program started with the session "Modelling of Complex Biological Systems" which included presentations from **Dr. Laurence Yang** (Dr. Bernhard Palsson's group, UCSD), **Dr. Chris Rao** (UIUC), and **Dr. Alejandro Fernandez Villaverde** (Dr. Julio Banga's group, IIM-CSIC, Spain). This was followed by the session "Industrial Applications of Systems and Synthetic Biology" to highlight industry needs and success stories in this field. The three presenters of this session were **Dr. Steve Brown** (Lanzatech), **Dr. Loveleena Bansal** (GSK), and **Dr. Will Cao** (Ginkgo Bioworks). The first of two poster sessions took place over lunch (more details below). "Multi-scale and Multi-omics Experimentation, Data Integration, and Modelling" was the early afternoon session theme, with presentations from **Dr. Uwe Sauer** (ETH Zurich, Switzerland), **Dr. Casim Sarkar** (University of Minnesota), and **Dr. Jin Wang** (Auburn University). The late afternoon session was entitled "Network Inference and Modeling" and included presentations by **Dr. Chris Henry** (Argonne), **Dr. Steffen Klamt** (Max Planck Institute, Magdeburg, Germany), and **Mr. Joseph Muldoon** (Dr. Neda Bagheri's group, Northwestern University). Conference participants were given Monday evening to enjoy the Chicago area.

The Tuesday morning program kicked off with a session focusing on "Synthetic Biology" and speakers **Dr. Huimin Zhao** (UIUC), **Dr. Joshua Leonhard** (Northwestern University), and **Dr. In Young Hwang** (Dr. Matthew Chang's group, National University of Singapore). This was followed by presentations by **Dr. Yann Dafour** (Michigan State University), **Dr. Hana El-Samad** (UC San Francisco), and **Mr. Yannik Schaelte** (Dr. Jan Hasenauer's group, Helmholtz Zentrum-Munich, Germany) in the session "Next Generation Networks and Tools". For the second time, posters were presented alongside lunch. A panel discussion on "Future Funding Directions" was held on early Tuesday afternoon. The panel discussion

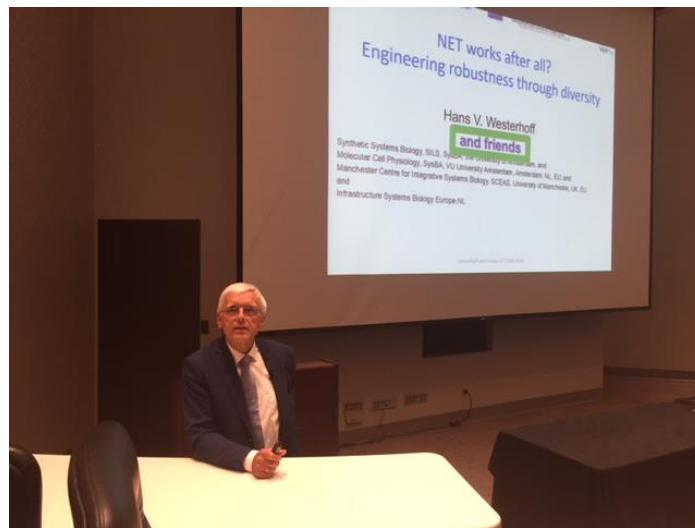
included panelists **Dr. David Babson** (DoE/USDA), **Dr. Haluk Resat** (NIH), and **Dr. Ruth Shuman** (NSF). This discussion forum was followed by the late afternoon session focusing on "Systems Biology of Cellular Functions". This session included presentations by **Dr. Matthias Heinemann** (University of Groningen, The Netherlands), **Dr. Brian Ingalls** (University of Waterloo, Canada), and **Ms. Lindsey Brown** (Harvard University), a doctoral student in **Dr. Frank Doyle's** group.

The **Systems Biology Foundation Award** recognizes an individual who has made pioneering contributions to engineering approaches in systems biology. The 2018 Foundation Award was

presented to **Prof. Hans Westerhoff**, at the Universities of Amsterdam and at the University of Manchester. His award talk was entitled, "Non-Equilibrium Thermodynamics after all? Engineering Robustness through Diversity", which provided historical perspective, and glimpses of a potential future, in systems biology, while highlighting key insights derived from understanding biology across multiple scales from genes to systems. Tuesday evening ended with the conference banquet.

Wednesday began with talks from **Dr. Krishna Mahadevan** (University of Toronto, Canada), **Dr. Jennifer Reed** (University of Wisconsin), and **Dr. Robert Duerr** (Dr. Achim Kienle's group, Max Planck Institute Magdeburg, Germany) in the area of "Systems and Synthetic Biology for Biotechnology". This was followed by the last session of the conference on "Systems Medicine". The presenters were **Dr. Ali Cinar** (IIT), **Dr. Marc Birtwistle** (Clemson University), and **Mr. Florencio Serano Castillo** (Dr. Bob Parker's group, University of Pittsburgh). This was followed by the closing remarks.

43 Contributed papers, selected from 55 submissions, were presented in two poster sessions during the meeting. The FOSBE student poster competition was coordinated by **Dr. Neda Bagheri** (Northwestern University), who recruited half a dozen judges to evaluate the posters for technical and presentation quality. The final selection of winners was challenging because of the overall quality of work done by the students. Poster awards were given to **Ms. Nan Papili Gao** from



Prof. Hans Westerhoff's Systems Biology Foundation Award Lecture



Presentation of the Student Poster Presentation Award

ETH Zurich and **Ms. Jessica Yu** from Northwestern University.

The educational and training mission of the FOSBE meeting was accomplished through a half-day pre-meeting workshop for graduate students, post-doctoral researchers, junior faculty, and industry participants. Talks highlighted a variety of tools and approaches to systems biology research challenges. The workshop faculty included **Drs. Joshua Leonard, Marc Birtwistle, Chris Rao, Casim Sarkar, and Jennifer Reed**.

The overall quality of the presentations and posters made the 2018 FOSBE meeting an unqualified technical success. We gratefully acknowledge the **Department of Defense Army Research Office**, the **National Science Foundation**, and the **US Department of Energy** for their generous support. Other sponsorship and financial support of the FOSBE meeting was generously provided by **Northwestern University** and the journal **Processes**.

Thank you to all FOSBE attendees and supporters for making the 2018 meeting a success. We especially thank Ms. Robin Craven, who provided outstanding logistical and organizational support up to and through the conference.

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Matthew Chang
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