

# New Directions in Biocomputation

## Program

### September 12

- 8:30 – 9:30 Arrivals, registration (coffee available)  
9:30 – 9:45 Welcome: **Stefan Diez** (B CUBE, TU Dresden) and **Heiner Linke** (Heiner Linke, NanoLund and Lund University, Coordinator of Bio4Comp)

#### Alternative parallel computation

- 9:45 – 10:15 **Yoshihisa Yamamoto** (Stanford University): Optical neural network at quantum limit for NP-hard Ising problems and NP-complete SAT problems  
10:15 – 10:45 **Eric Lutz** (Univ. Erlangen-Nürnberg): The physics of information: from Maxwell's demon to Landauer  
10:45 – 11:00 Coffee

#### Network-based biocomputation (NBC)

- 11:00 – 11:35 **Dan Nicolau Jr** (Molecular Sense, Oxford): Network-based biocomputation (NBC): mathematical basis and vision  
11:35 – 12:10 **Heiner Linke** (Heiner Linke, NanoLund and Lund University, Coordinator of Bio4Comp): Status and technological challenges of NBC  
12:10 – 12:30 **Dan Nicolau Sr.** (McGill, Montreal) Bacteria for network-based biocomputation  
12:30 – 13:30 Lunch

#### Biological tools for computation

- 13:30 – 14:00 **Zev Bryant** (Stanford University): Engineering controllable biomolecular motors  
14:00 – 14:30 **Beáta Bugyi** (University of Pécs): Activities of actin-binding proteins: principles and approaches  
14:30 – 14:45 **Günther Woehlke** (TU Munich): Microtubule severing proteins  
14:45 – 15:00 Coffee  
15:00 – 16:30 Parallel workshops  
    (1) Biological agents and micro/nanofluidics: tagging and agent multiplication  
    (2) Architectural elements: tunnels, detectors, and gates  
    (3) Networks and real-life applications  
16:30 – 17:00 Plenary session – conclusions from workshops  
**17:00** **Poster session**  
**18:30** **Dinner**  
**21:00 – 22:00** **Announcement of the first Bio4Comp Award and get together**

## September 13

8:45 – 9:00 Coffee

### Nanotools for biocomputation

9.00 – 9.30 **Irene Fernandez-Cuesta** (Univ. Hamburg): DNA Optical mapping: labelling and reading single molecules

9.30 – 10.00 **Adam Micolich** (UNSW, Sydney) Nanowire-based field-effect transistors for single-molecule detection

10.00 – 10:15 **Santiago Muiños Landin** (Univ. Leipzig): Reinforcement learning of Artificial Microswimmers

10.15 – 10:30 Coffee

### Applications and theory of biocomputation

10.30 – 11.00 **Francis Woodhouse** (Univ. Cambridge): Active matter logic

11.00 – 11.30 **Boyan Yordanov** (Microsoft Research): topic: modelling and analysing biological systems and biological computation

11.30 – 11.50 **Benjamin Friedrich** (TU Dresden): Percolation in time-varying networks using renormalization group theory

11.50 – 12.10 **JunKyu Lee** (Queen's University of Belfast): Transprecision Computing Towards Energy Saving

12.10 – 12.30 **Carlo Vittorio Cannistraci** (TU Dresden): Brain active-matter bioinspired algorithms for prediction of self-organization and evolution in complex networks

12.30 – 12.45 Conclusions and next steps: **Heiner Linke** (Lund University)

12:45 – 14:00 Lunch and get together

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