

**Second Open-Innovation  
Bio4Comp Award  
(5000 Euro)**



We hereby announce the second open-innovation Bio4Comp Award for novel ideas that conceptually or technically advance the field of parallel computing with biological agents in a substantial manner.

**Background:** The combinatorial nature of many important mathematical problems, including nondeterministic-polynomial-time (NP)-complete problems, places a severe limitation on the problem size that can be solved with conventional, sequentially operating electronic computers. While a number of parallel-computation approaches, such as DNA computation, quantum computation, and microfluidics-based computation, have been reported in the past, these approaches have so far not proven to be scalable and practical from a fabrication and operational perspective. One alternative is network-based computation (NBC) where a given combinatorial problem is encoded into a graphical, modular network that is embedded in a nanofabricated planar device. Exploring the network in a parallel fashion using a large number of independent agents (e.g. cytoskeletal filaments propelled by molecular motor proteins) then solves the mathematical problem. This approach uses orders of magnitude less energy than conventional computers, thus addressing issues related to power consumption and heat dissipation (see: *Nicolau et al., PNAS, 113(10), pp. 2591-2596, 2016*).

**Challenge: Design and Visualization of Network-Based  
Biocomputation (NBC) algorithms**

**The competition asks for 1) new algorithmic problems that can be realized with NBC including new NP complete problems or other difficult problems that have the potential to be efficiently solved (efficiency in time or energy) using NBC and the suggested designs of the networks; or 2) visualization methods and code that can help study the behavior of NBC designs or demonstrate to a non-expert audience the ideas behind NBC.**

**Who can participate:** All scientists, students or professionals interested in the field of biocomputation. Persons employed by partner institutions of Bio4Comp (Lund University, Technische Universität Dresden, Linnaeus University, Molecular Sense Ltd, Bar Ilan University, Fraunhofer Gesellschaft) are excluded from the awards. Each person can only get an award once. All participants agree that their contributions submitted to the contest will be placed in the public domain and will be free to be used by anyone, for maximum impact (open innovation). Publication before participating in the contest is possible.

**How to participate and award criteria:** Participants will submit a description of their idea (max. 3 pages) to the Innovation System Committee ([info@bio4comp.org](mailto:info@bio4comp.org)). Applications will be evaluated according to: (i) novelty and excellence of the idea, (ii) potential impact for the research area, and (iii) feasibility. Decision about the winner(s) of the contest will be made by the Innovation System Committee in agreement with the Bio4Comp General Assembly. After announcement, the decision will be final and cannot be contested. The winner will receive a 5000 Euro prize<sup>1</sup> (by bank transfer from Lund University).

**Deadline: 17 February 2020**

<sup>1</sup> Taxes depend on the winner's tax residence and will be deducted from the prize according to Swedish law.