

## FINAL REPORT ON THE SYMPOSIUM: *PHYSICS OF INFORMATION*

The symposium '*Physics of Information*' was held at the Fakultät für Physik und Astronomie der Universität Heidelberg January 10<sup>th</sup> –11<sup>th</sup> 2003. The aim of the symposium was to provide an overview of current research activities in defining, understanding and processing information from the viewpoint of physics. Two different avenues beyond the classical Turing approach were selected as the major topics of the lectures: Information in quantum systems and information processing in biological and biologically inspired systems. The symposium was designed to give ample time for the participants to discuss the differences and similarities and find possible synergies between the two seemingly disjunct approaches.

In its final form the symposium brought together 8 external invited speakers and two speakers from Heidelberg. 4+1 to present quantum information and 4+1 to present biologically inspired systems. The program is attached at the end of this report. In each topic the lectures gave both an introduction to the field and described cutting edge research. Provocative statements to start discussions were strongly encouraged.

The symposium was attended by a broad audience of more than 250 scientists and students, many of them from outside Heidelberg. The lectures were followed by lively discussions and the special discussion session also drew a large number of participants.

The workshop was very stimulating, and speaking for the large majority of the participants, we learned a lot from the interdisciplinary talks. Even though I was hoping on more openness on the side of the speakers to the physics of the 'other side'. I was a bit disappointed, that there was not much willingness, mostly on the side of the biologically inspired information processing, to discuss similarities and differences and where the different fields, their viewpoints and physics can come together. I saw more willingness to go out, discuss and confront the others views and problems, and to import and integrate them from the participants on the quantum information side. This was probably caused by the specific persons involved, which were more hands on the bio-information side.

Overall the symposium was very fruitful, brought new insights in the similarities and differences between the physics of information and the information content in physical systems, and gave participants the possibility to interact and freely exchange ideas.

Jörg Schmiedmayer

## PROGRAM

### Friday, 10.1.2003

#### Morning Session

9:00	Welcome	K.Meier (Heidelberg)
9:15	Physics and Information	C.v.d. Malsburg (Bochum, USC)
10:00	Information in Quantum Mechanics	R. Werner (Braunschweig)
10:45	Coffee	
11:15	Artificial Neural Systems	R. Douglas (ETH Zürich)
12:00	Entropy, information and the predictability of complex processes	W. Ebeling (HU Berlin)

12:45 – 14:00 Buffet Lunch

#### Afternoon Session

14:00	Quantum and Classical Control Theory and Experiment	H.Mabuchi (Caltech)
14:45	Evolvable hardware and exploitation of emergent physics	J.Miller (Birmingham)
15:30	Coffee	
16:00	Quantum Games – From Dawkin to Darwin	M.Wilkins (Potsdam)
16:45	Break	
17:15	<a href="#">Heidelberg Physics Colloquium</a> Expressions of Quantum Physics	A.Zeilinger (Wien)
18:15	General open discussion with Wein und Brezel	

20:00 Symposium Dinner (*Haus Buhl* Old Town Heidelberg)

### Saturday, 11.1.2003

#### Morning Session

9:00	Bio-Inspired Electronics	J.Schemmel (Heidelberg)
9:45	Atom Chips	Ron Folman (Heidelberg)
10:30	Coffee	
11:00	Discussion Session : Options and Perspectives for Heidelberg	Convenor : D. Dubbers

13:00 – 14:00 Buffet Lunch

14:00 Lab tours and further discussions