Preface

The Third International Conference on **Unconventional Models of Computation, UMC 2002** was organized by the Center for Discrete Mathematics and Theoretical Computer Science and the Kansai Advanced Research Center of the Communications Research Laboratory, Kansai, Japan. The venue was held in the "unconventional" multipurpose Orbis Hall from 15 to 19 October 2002. Being part of the Kobe Fashion Museum, a disk-shaped building in the center of Kobe's Rokko Island, the Hall is conveniently located near the Hotel Plaza Kobe and the Kobe Bay Sheraton hotel.

Various natural processes motivate the construction of radically new models of computation. For example, the paper "Not Just a Pretty Face" published in the July 27, 2002 issue of *New Scientist* discusses the hypothesis that plants may have the power to compute without the benefit of a brain. This prompts the question of what sort of computation capability and complexity human bodies may be capable of, even without the help of the nervous system. Although thriving, the realization of powerful unconventional models of computing is still at an early stage in its development, and a huge and concerted effort is required to assess and exploit its real potential. This volume reports the main ideas, results, directions of research, and open questions, discussed at a highly intellectual gathering of leaders in this new field of research. The flow of discussion varies from theoretical aspects to practical implementations and philosophical reflection.

The eight invited speakers at the conference were: M.L. Campagnolo (Lisbon, Portugal), J. Copeland (Canterbury, New Zealand), A. DeHon (CalTech, USA), M. Ogihara (Rochester, USA), M. Ohya (Japan), M. Ozawa (Tohoku, Japan), P. Siwak (Poznan, Poland), and T. Toffoli (Boston, USA).

The Program Committee, consisting of L. Accardi (Roma, Italy), C.S. Calude (Chair; Auckland, NZ), M.J. Dinneen (Secretary; Auckland, NZ), R. Freivalds (Riga, Latvia), L.K Grover (Murray Hill, USA), J. Gruska (Brno, Slovak Republic), K. Morita (Hiroshima, Japan), M. Ogihara (Rochester, USA), F. Peper (Kobe, Japan), G. Rozenberg (Leiden, The Netherlands), P. Siwak (Poznan, Poland), T. Toffoli (Boston, USA), H. Umeo (Osaka, Japan), and T. Yokomori (Waseda, Japan), had the serious task of selecting 18 papers out of 36 submissions covering all major areas of unconventional computation, especially quantum computing, computing using organic molecules (DNA), membrane computing, cellular computing, and possibilities for breaking Turing's barrier.

The conference would not have been possible without the assistance of the following referees:

Luigi Accardi	Jozef Gruska	George Păun
Joshua Arulanandham	Peter Hertling	Ferdinand Peper
Cristian S. Calude	Lila Kari	Pawel Siwak
B. Jack Copeland	Fred Kroon	M. Thakur
Michael J. Dinneen	Cris Moore	Hiroshi Umeo
Claudio Ferretti	Mitsunori Ogihara	H. Todd Wareham
Rudolf Freund	Andrei Păun	Takashi Yokomori
		Claudio Zandrom

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C.S. Calude
M.J. Dinneen
F. Peper