

## PREFACE

This Special Issue of Mathematical Biosciences and Engineering contains ten selected papers presented at the Neural Coding 2012 workshop. Neuroscience is traditionally very close to mathematics which stems from the famous theoretical work of McCulloch–Pitts and Hodgkin–Huxley in the middle of the previous century. Great progress has been made since those times and through the decades this fruitful combination of disciplines continue. The workshop was held in the beautiful town of Prague in the Czech Republic, September 2-7, 2012. This was the 10th of a series of international workshops on this subject, the first one also held in Prague (1995), then in Versailles (1997), Osaka (1999), Plymouth (2001), Aulla (2003), Marburg (2005), Montevideo (2007), Tainan (2009), and in Limassol (2010). As in the previous workshops, this was a single track multidisciplinary event bringing together experimental and computational neuroscientists with ample time for informal discussions in a convivial atmosphere. The Neural Coding Workshops are traditionally biennial symposia each lasting 5 or 6 days. They are relatively small in size, interdisciplinary with major emphasis on the search for common principles in neural coding. The workshop was conceived to bring together scientists from different disciplines for an in-depth discussion of model-building and computational strategies.

NC2012 gathered 79 participants representing 19 countries from Europe, Asia, Australia, North and South America. There were 77 presentations, divided into 42 oral and 35 poster presentations. The poster sessions were preceded by short poster spotlight oral sessions. Main emphasis was given on the exchange of ideas, which did continue during the various social and cultural events that were integrated into the workshop. Further information on the meeting can be found at the NC2012 website at <http://nc2012.biomed.cas.cz>. The meeting was supported by Institute of Physiology, Academy of Sciences of the Czech Republic and by Office of Naval Research Global, Grant No.: N62909-11-1-1111.

Understanding how the central nervous system codes and processes messages from the environment is one of the most challenging subjects in neuroscience. The articles contained in this issue give a hint of the huge diversity of this field, and illustrate how scientists with different backgrounds approach this vast subject. Blending theoretical and experimental studies, highlighting the necessity of modelling and comparing models to experimental data, bridging the function of single neurons to that of neural networks and linking membrane phenomena to higher order behaviours, these contributions are testimony to the variety of concurrent mechanisms that subserves information processing in the peripheral and central nervous systems. Equally remarkable is the diversity of disciplines engaged in these investigations: biologists, mathematicians, physicists, psychologists, computer scientists, and statisticians, all have original tools and ideas by which to try to elucidate the underlying mechanisms. A variety of problems in computational neuroscience

accompanied with a rich diversity of mathematical tools and approaches are presented in this volume. We hope it will inspire and challenge the readers in their own research.

We would like to thank the authors for their valuable contributions and the referees for their priceless effort of reviewing the manuscripts. Finally, we would especially like to thank Yang Kuang for supporting us and making this publication possible.

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