Editorial

I am honoured to welcome you to JPhys Complexity, the new open access journal from IOP publishing reporting high-quality interdisciplinary research at the forefront of complexity science.

Complex systems are ubiquitous in both natural and man-made contexts; with examples including the brain, the climate, the economy, and society. All of these systems are formed by many elements, and their complex interactions can give rise to unexpected emergent properties. Borrowing the famous title of PW Anderson’s 1972 paper [1] we can say that for complex systems ‘more is different’, i.e. complex systems display collective phenomena that cannot be understood by studying their constituents in isolation. For instance, brain function cannot be understood by studying a single neuron in isolation and human culture cannot be explained if interactions and influences between individuals are not taken into account.

Understanding the fundamental laws that determine the response of complex systems to perturbations is a key challenge for the scientific community and has fundamental implications for human society. Progress in this direction will help us address major challenges, such as predicting and suppressing major pandemics, finding cures for complex diseases, devising new strategies to address climate change and reducing the risk of economic crises.

In recent decades we have witnessed a change of paradigm in the field, through the extremely rapid development of quantitative research in complexity. This is due both to the increased availability of large-scale datasets and important results obtained in network theory and machine learning. I am sure that the decades that lie ahead will unlock fundamental mechanisms that will allow us to face the major challenges of complexity.

It is now clear that complexity is a fundamental aspect of our reality, and that the scientific understanding of complex systems is key for addressing burning questions related to our future as a society.

The present launch of the IOP journal JPhys Complexity, entirely devoted to complexity is therefore particularly timely and I believe that its title provides an important and much needed recognition of the role that complexity science has within the natural sciences. At the same time, the diverse range of topics that JPhys Complexity will cover is represented by the broad range of expertise of our excellent board members.

JPhys Complexity welcomes submissions of high-quality quantitative research from many different disciplines including: physics, mathematics, computer science, engineering, biology and the social sciences. Some of the topics covered by the journal include:

- Artificial intelligence and machine learning
- Biological and physical systems
- City and regional planning
- Climate change and sustainability
- Cognitive, language, and informational networks
- Computational assembly science and engineering
• Economic and financial systems
• Human behaviour and social-evolutionary dynamics
• Network science
• Online social networks
• Quantum networks

In addition to publishing research articles that report results of significant importance to the field of complex systems, *JPhys Complexity* will also publish invited topical reviews and perspectives on themes of particular interest to the community.

The papers published in this first issue showcase the interdisciplinary nature of *JPhys Complexity*. This includes a Perspective article on the challenges of designing the next generation of ranking algorithms [2], a subject at the frontier between network science and AI. The regular articles cover very timely topics across network science [3, 4, 5], city and regional planning [6], and human and social behaviour [7].

I hope that you enjoy the first issue of *JPhys Complexity*, and I look forward to receiving your submission to this new and timely journal on complex systems.

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**References**

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