

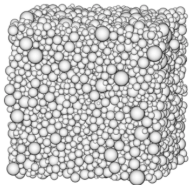


London Institute for Mathematical Sciences

A private academic research institute for the mathematical sciences

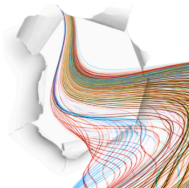
The London Institute supports research in
physics, mathematics and the theoretical sciences.

It gives scientists the freedom and support
to do what they do best: make fundamental discoveries.



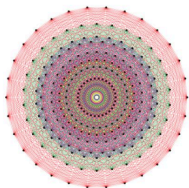
Extreme materials

Next generation structures and materials are key to aerospace, the built environment and exploring space. Hierarchical materials, fractal structures, and polydisperse systems offer dramatic gains in efficiency. Advances in 3D printing and self-assembly mean that these novel technologies can be practically manufactured.



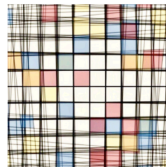
Quantum information

Information science underpins modern society. Quantum information science is creating the next generation of information technology, where effects like superposition and entanglement are exploited to envisage qualitatively new technologies. This field also gives an alternative perspective on physics, wherein information takes centre stage.



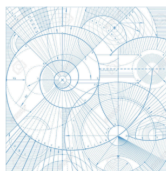
Graph theory

The global behaviour of local processes depends on the geometry of their underlying space. Studying processes on ideal graphs and on irregular networks derived from real data uncovers surprising behaviour in biological, social and financial systems. The tools of this field include spectral, replica, community and combinatoric techniques.



Low-energy computing

Silicon-based electronic computing is hitting energetic and technological barriers, and quantum computing remains a theoretical challenge of the future. To maintain an exponential increase in computing power, we require alternative frameworks. Two which we are studying are memristors and photonic computing.



Science of innovation

Innovation is to organizations what evolution is to organisms: it is how organisations adapt to changes in the environment and improve. New mathematical models of component recombination and the building blocks of economic complexity offer fundamental insights into how firms, countries and technologies develop.



Mathematics of risk

Institutional risk originates from ordinary economic uncertainties. But when these risks propagate across inter-connected institutions, internal amplification can lead to dramatic exposures. These systemic risks can be mitigated by applying ideas from cascading failures, diversification and extreme value theory.

Where we publish

Classical and
Quantum Gravity

**Discrete
Mathematics**



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Application for Independent Research Organisation Status

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Registered address 35a South St, London W1K 2XF
Solicitors Eversheds, 1 Wood St, London EC2V 7ES
Independent examiners Russell New, The Courtyard, Shoreham Rd, Upper Beeding BN44 3TN



Trustees (details are shown after §12)

Dr Thomas Fink (Director)
Dame Shirley Porter, Lady Porter
Martin Reeves
Sir Peter Williams, FRS

Please note

It will be highly appreciated if this application could be approved within six weeks. Certain researchers at the London Institute wish to transfer pre-existing grants to the Institute which are time-sensitive. Some of these grants fall under UKRI Councils and for this reason the Institute needs to be approved as an IRO in order to accept them. When these grants are received by the Institute the Institute's annual research capacity will approximately double.

1–5 Details

1 Name of organisation

London Institute for Mathematical Sciences (London Institute)

2 Mail address

35a South St, Mayfair, London, W1K 2XF

3 Head of organisation

Dr Thomas Fink

4 Name of contact

Miss Antonia Tingey 0203 417 4945 at@lims.ac.uk

5 Research Council

We wish for the EPSRC to assess our application.

The London Institute becomes an Independent Research Organization

November 2018

We're delighted to announce that the London Institute has been officially recognized as an Independent Research Organization by UK Research and Innovation. The Institute joins a small number of independent research centres which, alongside the universities, are responsible for conducting the nation's research. IRO status provides full access to research funding from the seven Research Councils. This is a momentous turning point for the Institute and an opportunity to expand its faculty and strengthen collaborations with universities and industry.



UK Research
and Innovation



Economic complexity: From useless to keystone

Serendipity and strategy in rapid innovation

Nature Physics, 5 Jan 2018



„Fake News“ an User-Interaktionen erkennen

Debunking in a world of tribes

Science ORF, 7 Dec 2017



A Better Way to Make Economic Forecasts

A new metric for countries' fitness and products' co...

Bloomberg View, 1 Oct 2017



A Better Way to Make Economic Forecasts

On the predictability of growth

Bloomberg View, 1 Oct 2017



SPOKESman Paolo Barucca

SPOKESman Paolo Barucca

Spoke London, 24 Sep 2017



La tribù fa notizia

Debunking in a world of tribes

Növa, 24 Sep 2017



Curiosity is key in post-truth era

Debunking in a world of tribes

Winnipeg Free Press, 21 Sep 2017



Vérification des faits: cibler les groupes moins polar...

Debunking in a world of tribes

A Better Way to Make Economic Forecasts

[On the predictability of growth](#)

Bloomberg View, 1 Oct 2017



Economists are famously bad at predicting growth. A new technique might help them get a little better. When assessing a country's potential to prosper, economists typically look at aggregate measures such as education, investment or national debt. This hasn't worked particularly well: China's economy, for example, has kept growing at a fast pace even though they've been predicting a slowdown for nearly 30 years.

[Read full article](#)



Serendipity and strategy in rapid innovation

T. Fink, M. Reeves, R. Palma, R. Farr

Nature Communications

554 views



How much can we influence the rate of innovation?

T. Fink, M. Reeves

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316 views



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B. Monserrat, N. Drummond, C. Pickard, R. Needs

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Photonic Maxwell's demon

M. Vidrighin, O. Dahlsten, M. Barbieri, M. Kim, V. Ve...

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Y. Lin, O. Dahlsten

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Easily repairable networks: reconnecting nodes afte...

R. Farr, J. Harer, T. Fink

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Ultralight fractal structures from hollow tubes

D. Rayneau-Kirkhope, Y. Mao, R. Farr

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157 views



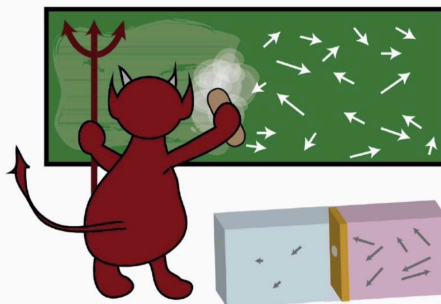
A measure of majorization emerging from single-sh...

Photonic Maxwell's demon

M. Vidrighin, O. Dahlsten, M. Barbieri, M. Kim, V. Vedral, I. Walmsley

Physical Review Letters 116, 050401 (02/16)

#photonics #quantumtheory #thermodynamics



By analogy with Maxwell's original thought experiment, the setup uses energy extracted from a thermal system.

We report an experimental realization of Maxwell's demon in a photonic setup. We show that a measurement at the few-photons level followed by a feed-forward operation allows the extraction of work from intense thermal light into an electric circuit. The interpretation of the experiment stimulates the derivation of an equality relating work extraction to information acquired by measurement. We derive a bound using this relation and show that it is in agreement with the experimental results. Our work puts forward photonic systems as a



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Complex derivatives

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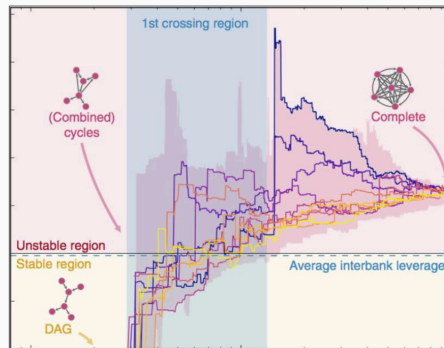
G. Schusteritsch, C. Pickard

Pathways towards instability in financial networks

M. Bardoscia, S. Battiston, F. Caccioli, G. Caldarelli

Nature Communications 8, 14416 (02/17)

#finance #systemicrisk #randomgraphs



Market integration can lead the financial system towards instability.

Following the financial crisis of 2007–2008, a deep analogy between the origins of instability in financial systems and complex ecosystems has been pointed out: in both cases, topological features of network structures influence how easily distress can spread within the system. However, in financial network models, the details of how financial institutions interact typically play a decisive role, and a general understanding of precisely how network topology creates instability



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