Pascal Grange

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Scientific interests. Data analysis, quantitative biology, mathematical physics.

PROFESSIONAL EXPERIENCE

1/2014– : Xi'an Jiaotong-Liverpool University, Department of Mathematical Sciences.
Senior lecturer (honorary lecturer at the University of Liverpool).
Module leader for Quantum Mechanics (MTH311) and Cartesian Tensors (MTH308).
Fellow of the UK Higher Education Academy since 2016.

2009–2013: Cold Spring Harbor Laboratory. Computational postdoc.
PIs: Michael Hawrylycz (Allen Institute for Brain Science) and Partha P. Mitra.
Analysed brain-wide expression profiles of genes related to autism and addiction (reported on NIH-NIDA grant *Co-expression networks in the brain*, for yearly funding).

2008–2009: Goldman Sachs, London. Associate strategist.
Priced options and monitored risks.

2006–2008: University of Hamburg, Zentrum für mathematische Physik.
Postdoctoral fellow.
Published work on mirror symmetry with magnetic fluxes.

2005–2006: Institute for Advanced Study, Princeton.
Member, School of Natural Sciences.
Published work on phase transitions and mirror symmetry.

EDUCATION AND TRAINING

2002–2005: École Polytechnique, Paris.
PhD in theoretical physics, with highest honours. Adviser: Ruben Minasian (Saclay).
Thesis: *D-branes, effective actions and mirror symmetry.*

2001–2002: CERN Theory Division, Geneva. Research internship.

2000–2001: Université Paris 7. M.S. in mathematics (geometry, integrable models), with honours.

2000–2003: École des Ponts, Paris. Degree in mathematical engineering.

1997–2000: École Polytechnique, Paris. Degree in engineering. Ranked 12/398.
Majoring in physics, minoring in mathematics.
L.-E. Rivot Prize awarded in 2000 by the **Académie des Sciences**, Paris (four prizes awarded annualy for scientific excellence at École Polytechnique).

RESPONSIBILITIES AND ACADEMIC SERVICE

- Referee for **PLoS Computational Biology**, **Frontiers in Computational Neuroscience**, **Bioinformatics**, **Journal of High Energy Physics**.
- External grant reviewer for the **Israel Science Foundation** (2016), **Natural Sciences and Engineering Research Council of Canada** (2018), **Canada Foundation for Innovation** (2018).
- **Academic service at XJTLU**: internal assessor of Mr Zhen Wei's PhD thesis (*Topological analysis of cytosine methylation*), final-year leader, member of the Committee for Module and Programme Review (2014–2016), panel member for student admission, peer-review coordinator.
- **Funded projects at XJTLU**: *Statistical modelling of brain connections* (internal grant), *Statistical arbitrage and high-frequency trading* (Summer undergraduate research programme, three students).

PUBLICATIONS AND PREPRINTS

Bibliometric records and links to papers are available from Google Scholar.

- **Quantitative biology.**
  1. M. Hawrylycz *et al.*, *Canonical genetic signatures of the adult human brain*, Nature Neuroscience (2015) **18 (12)**, 1832–1844.
  2. **P. Grange**, I. Menashe and M. Hawrylycz, *Cell-type-specific neuroanatomy of cliques of autism-related genes in the mouse brain*, Frontiers in Computational Neuroscience **9**, 55.
  3. **P. Grange**, J.W. Bohland, B.W. Okaty, K. Sugino, H. Bokil, S.B. Nelson, L. Ng, M. Hawrylycz and P.P. Mitra, *Cell-type–based model explaining coexpression patterns of genes in the brain*, Proc. Natl. Acad. Sci. USA 2014 111 (14) 5397–5402.
  4. I. Menashe, **P. Grange**, E.C. Larsen, S. Banerjee-Basu and P.P. Mitra, *Co-expression profiling of autism genes in the mouse brain*. PLoS computational biology, 9(7), e1003128.
  5. **P. Grange**, M. Hawrylycz and P.P. Mitra, *Computational neuroanatomy and co-expression of genes in the adult mouse brain, analysis tools for the Allen Brain Atlas*, Quantitative Biology 2013, **1(1)**: 91–100, `[arXiv:1301.1730 [q-bio.QM]]`.
  6. **P. Grange** and P.P. Mitra, *Computational neuroanatomy and gene expression: optimal sets of marker genes for brain regions*, IEEE, CISS Princeton 2012, `[arXiv:1205.2721 [q-bio.QM]]`.
- **Statistical mechanics and high-energy physics.**
  1. **P. Grange**, *Crossover in the log-gamma polymer from the replica coordinate Bethe Ansatz*, submitted, `[arXiv:1707.03521 [cond-mat.dis-nn]]`.
  2. **P. Grange**, *Log-gamma directed polymer with one free end via coordinate Bethe Ansatz*, J. Stat. Mech. (2017) 073102, `[arXiv:1701.08606 [cond-mat.dis-nn]]`.
  3. **P. Grange**, *Quantum centipedes with strong global constraint*, Journal of Physics A: Mathematical and Theoretical **50** 22, 5302 (2017), `[arXiv:1608.04711 [cond-mat.dis-nn]]`.
  4. **P. Grange** and S. Schäfer-Nameki, *Towards mirror symmetry à la SYZ for generalized Calabi–Yau manifolds*, JHEP **0710**, 052 (2007), `[arXiv:0708.2392 [hep-th]]`.
  5. **P. Grange** and S. Schäfer-Nameki, *Noncommutativity, T-folds and $G \times G$ structure*, Nucl. Phys. **B770**, 123 (2007), `[arXiv:hep-th/0609084]`.
  6. **P. Grange** and R. Minasian, *Tachyon condensation and D-branes in generalized geometries*, Nucl. Phys. **B741**, 199 (2006), `[arXiv:hep-th/0512185]`.
  7. **P. Grange** and R. Minasian, *Modified pure spinors and mirror symmetry*, Nucl. Phys. **B732**, 366 (2006), `[arXiv:hep-th/0412086]`.
  8. **P. Grange**, *Tachyon potential in a magnetic field with anomalous dimensions*, JHEP **0506**, 018 (2005), `[arXiv:hep-th/0410180]`.
  9. **P. Grange**, *Deformation of p-adic amplitudes in a magnetic field*, Phys. Lett. **B616**, 135 (2005), `[arXiv:hep-th/0409305]`.
  10. **P. Grange**, *Branes as stable holomorphic line bundles on the noncommutative torus*, JHEP **0410**, 002 (2004), `[arXiv:hep-th/0403126]`.
  11. **P. Grange**, *Modified star-products beyond the large-B limit*, Phys. Lett. **B586**, 125 (2004), `[arXiv:hep-th/0304059]`.
  12. **P. Grange**, *Derivative corrections from boundary state computations*, Nucl. Phys. **B649**, 297 (2003), `[arXiv:hep-th/0207211]`.

SOFTWARE

`Brain Gene Expression Analysis`, MATLAB software for analysis of brain-wide gene-expression data, see `http://pjgrange.github.io` for download instructions and manual.

MAIN CONFERENCES AND PRESENTATIONS

2017: – **Multiscale modelling and experimental approaches to genome organization**, Les Houches. Poster: *From genome-wide data to cell-type-specificity maps of the brain.*

2016: – **Genomics of Brain Discorders, Wellcome Genome Campus**, Cambridge. Poster: *Cell-type-specificity of brain-wide expression profiles of cliques of autism-related genes.*
– **1st XJTLU Research Festival**, Suzhou. Invited talk (as the representative of the mathematics cluster): *Computational maps of complex systems, putting coordinates on the brain.*

2014: **Analyzing Brainomics (NIPS, Neural Information Processing Systems)**, Montreal. Invited talk: *Region-specificity of cell types in the mouse brain.*

2012: – **Neuroinformatics 2012, Marine Biological Laboratory**, Woods Hole. Lecture: *Analysis of brain-wide gene-expression data.*
– **46th Conference on Information Sciences and Systems**, Princeton. Invited talk: *Computational neuroanatomy and gene expression.*

2011: – **Neuroscience 2011**, Washington, D.C. Poster: *Distribution of cell types in the mouse brain from the Anatomic Gene Expression Atlas.*
– **Circuits and connectivity in the vertebrate brain**, Cold Spring Harbor. Lecture: *Computational methods for neuroanatomy.*
– **Network architecture of brain structures, KITP**, Santa Barbara. Talk: *The Allen Gene Expression Atlas and neuronal cell types.*

2010: **Neuroscience 2010**, San Diego. Two posters:
– *Marker genes and the anatomy of the mouse brain*,
– *Computer-guided stereotactic injections.*

2007: – **Workshop on Poisson geometry, Erwin Schrödinger Institut**, Vienna. Talk: *Magnetic fluxes and generalized geometry.*

ADDITIONAL INFORMATION

- **Computing**: MATLAB (seven years of regular use), notions of Python.
- **Languages**: French (mother tongue), English, German, elementary Mandarin Chinese (HSK3, obtained in March 2018 with a score of 398/400).
- **Extra-scientific interests**: middle and long-distance running (2009 Paris Marathon finisher), Chinese scholar's objects of the Ming and Qing dynasties (paper *Supporting Treasures* published in Orientations, the magazine for collectors of Asian art, March-April 2018).

REFERENCES

- Jason W. Bohland, Associate director, Cognitive Neuroimaging Center, Boston University, USA, `jbohland@gmail.com`
- Michael Hawrylycz, Senior director of informatics, Allen Institute for Brain Science, Seattle, USA, `MikeH@alleninstitute.org`
- Ruben Minasian, Senior investigator, Institut de Physique Théorique, CEA Saclay, France, `Ruben.Minasian@cea.fr`
- Sakura Schäfer-Nameki, Professor of mathematical physics, University of Oxford, UK, `Sakura.Schafer-Nameki@maths.ox.ac.uk`