



Luís M. A. Bettencourt  
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April 30, 2012

Dear Chair of the Search Committee,

This is a letter of recommendation in support of Dr. Peter Loxley's application for an Assistant Professor position in computational neuroscience at Brown University.

I've known Peter for about two years now, as a postdoctoral fellow working with me on statistical field theoretical models of visual cognition. Peter has a PhD in statistical and condensed matter theoretical physics, and over the last 4 years has been engaged in the development of statistical field theoretical models in biological complex systems. For example, he has very successfully developed a new class of population models of neural activity and their application to problems in vision, from binocular rivalry to the role of horizontal connection in cortical association maps and learning of features in primary visual cortex.

Peter's work has mostly been published in Physics journals, reflecting his background and also a growing interest of physicists in mechanisms of information processing in complex systems. His work has appeared in the top journals of the field such as several papers in Physical Review Letters. More recently Peter, in collaboration with me, has started to develop probabilistic population models of visual cognition. He started by developing an original approach to the role of horizontal connection in V1, showing that these could support object recognition on very fast time scales. This work was recently published in European Physics

Letters B, a main venue of theoretical physics models of complex systems. He was the main contributor to this work, both conceptually and operationally.

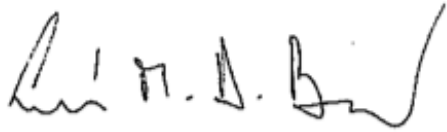
He is now working on probabilistic (generative) statistical models of vision, more specifically on receptive field learning and the implementation of viewpoint invariance. These are important problems pertaining not only to systems neuroscience, but much more fundamentally to the mechanisms by which complex biological systems and networks store, process and generate new information. This is a growing interdisciplinary field of research, often lead by physicists, which I expect will become fundamentally important scientifically and technologically as problems of information move to the center of theoretical physics.

Besides this work Peter has been developing another line of research in two- dimensional turbulence at the Center for Nonlinear studies at Los Alamos (a world renowned center of excellence in non-linear dynamics and the physics of complex systems). This work investigates transitions between unidirectional flow states and vortex-dipole states as a model for dynamical changes in flow topology .

I have an excellent opinion of Peter as an independent, careful and thoughtful researcher in a variety of subjects in physics, applied mathematics, information theory and statistics and believe that he has reached a level of accomplishment and independence that would make him ideal for a senior lectureship position in an Australian top school. He is mature, responsible and tenacious and ready to form his own group, and share his knowledge with undergraduate and graduate students.

Peter is a pleasant and thoughtful colleague that I am sure you will enjoy having in your group. I recommend him strongly. Please don't hesitate to contact me if I can be of any further help.

Sincerely,  
Luis M. A. Bettencourt, PhD

A handwritten signature in black ink, appearing to read "L. N. D. B." with a stylized flourish at the end.

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