



**Australian Institute of Physics  
NSW Branch (April Public Talk)**

**“Multiscale Brain Dynamics: Towards a First-Cut ‘Working-Brain’ Model”**

**Professor Peter Robinson**

**University of Sydney**

**Tuesday 22<sup>nd</sup> April 2008 @ 6.00PM**

**At the**

**Slade Lecture Theatre, School of Physics, University of Sydney**

**Public talk arranged by: The Australian Institute of Physics (NSW Branch)**

***Entrance is FREE***

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***Summary of talk:***

The electrical activity of the brain has been observed for over a century and is widely used to probe brain function and disorders, chiefly through the electroencephalogram (EEG) recorded by electrodes on the scalp. Indirect probes like functional MRI measure activity via its metabolic effects. However, the connections between physiology and measurements have been chiefly qualitative until recently, and most uses of the EEG and fMRI have been based on phenomenological correlations. A quantitative model of brain activity is described that spans the range of physiological and anatomical scales from microscopic synapses to the whole brain. Its parameters measure quantities such as synaptic strengths, signal delays, cellular time constants, and neural ranges, and are all constrained by independent physiological measurements. Application of standard techniques from wave physics allows successful predictions to be made of a wide range of EEG and other phenomena, including time series, spectra, evoked responses to stimuli, seizure dynamics, measurement effects, sleep dynamics, and pharmacological influences, leading toward a first-cut "working-brain" model that reproduces salient dynamics across all scales from sub-mm to the whole brain. Fitting to experimental data also enables physiological parameters to be inferred in normal and abnormal conditions, a technique that is now being commercialized.





### ***Brief Biography of the Speaker:***

Peter Robinson did his BSc and PhD in Theoretical Physics at the University of Sydney, graduating in 1987. He then worked at the University of Colorado at Boulder, returning to Sydney on a QEII Fellowship in 1990. He was appointed as a Senior Lecturer in Physics in 1994 and became a Professor in 2000. Since 2003 he has been an ARC Federation Fellow.

His work spans several areas of wave physics and its applications, including brain dynamics, space physics, plasmas, photonics, astrophysics, and biological physics. Among these projects, he is currently involved in work with the Brain Resource Company, which he helped found, and in the STEREO spacecraft launched by NASA in 2006.

### ***Detailed Schedule for Tuesday, 22<sup>nd</sup> April 2008:***

- 6:00-6.30 pm **REFRESHMENTS, Slade Lecture Theatre.**
- 6.35-7.30 pm **LECTURE by Professor Peter Robinson.**
- 8.00 pm **DINNER with the Speaker at Buon Gusto (Italian),  
368 Abercrombie Street, Chippendale.**  
*E-mail Dr Fred Osman ([fred\\_osman@exemail.com.au](mailto:fred_osman@exemail.com.au))  
if you will be able to join us for dinner.*

### ***Travel Directions:***

- Train to Redfern station and walk to the **School of Physics.**
- Buses 422, 423, 426, 428, 448, and 450 from Circular Quay to City Road / King, or 412, 435, 438, 470, 483 etc. along Parramatta Road from Circular Quay.
- Drive and park in various parking lots. You will need to pay for parking (**\$6 flat-rate after 4 pm**) and display the ticket in your car. You may also find parking places on public roads outside the Uni.

### ***Event sponsored by:***



***The Australian Institute of Physics – NSW Branch  
& The University of Sydney.***

