



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

“How to get beyond the Standard Model”

Dr Bruce Yabsley

University of Sydney

Tuesday 28th April 2009 @ 5.30PM

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

Summary of talk:

The Standard Model of particle physics --- describing the fundamental constituents of matter, and their interactions --- has been extraordinarily successful. Over decades it has passed every test set for it, and even now there are only a handful of measurements in conflict with its predictions: few-sigma effects of the kind that come and go, and are inevitable when many measurements are made. Any one of them might be the first sign of something new ... or they might all evaporate, as other presumed failings have done in the past. And yet we know that the Standard Model is incomplete. The mathematics itself tells us that something else must be going on, but doesn't determine what that "something" is. Experiment has to find a way. There are three broad strategies being pursued at accelerator laboratories around the world, to find that way forward. One can increase the energy of the particles in colliding beams, giving access to shorter distances, and more massive fundamental particles: this is the approach of the Large Hadron Collider at CERN. One can make the beams more intense ("more amps" rather than "more volts") as at labs in California and Japan, using precision measurements to probe for new phenomena hiding in the fine print of the theory. Or one can use neutrinos, whose very difficulty --- they interact only by the weak nuclear force --- makes them sensitive to certain kinds of new physics. In this talk I will review these three approaches, with examples of how they have worked in the past, and of the experiments that are currently bringing them to life. Until it happens, we can't know which approach (all of them with Australian involvement) will be the one to finally break the Standard Model, and show the new physics beyond it.





Brief Biography of the Speaker:

Bruce Yabsley is a particle physicist with interests in flavour physics, neutrinos, and statistical methods. In the nineties he worked as part of the Australian team on the NOMAD experiment at CERN, completing a PhD on neutrino oscillations. In 1999 he moved to the K.E.K. lab in Tsukuba, Japan, to join the Belle experiment, which was built to study CP violation (matter-antimatter asymmetries) and cited in the award of a share of the 2008 Nobel Prize to Kobayashi and Maskawa. Bruce held postdoctoral positions with K.E.K. itself and with Virginia Tech, and for many years was convener of the Belle experiment's Charm Studies group. He has presented reviews at international

conferences on new physics in charm decays, anomalous quarkonium-like states, and quantum entanglement; and serves on the advisory committee for the International Workshops on Charm Physics. Bruce is currently an ARC Australian Research Fellow at the University of Sydney, where he is pursuing research into the structure of mesons.



Detailed Schedule for Tuesday, 28th April 2009:

- 5.30-6.30 pm **LECTURE by Dr Bruce Yabsley.**
- 6:35-7.00 pm **REFRESHMENTS, Slade Lecture Theatre.**
- 7.00-8.00 pm **LECTURE by Prof Joe Wolfe.**
- 8.15 pm **DINNER with the Speakers at Buon Gusto (Italian), 368 Abercrombie Street, Chippendale.**
E-mail Dr Fred Osman (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:



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