

SCHOOL OF PHYSICS

UNIVERSITY OF NEW SOUTH WALES



COLLOQUIUM

4-5 p.m., Tuesday, 9 June 2009

School of Physics Common Room

Room 64, Old Main Building

Dr Simon Ellis

School of Physics, University of Sydney

“Antimatter in Astrophysics”

Positronium is the short-lived exotic atom consisting of a bound electron and a positron. Its presence in the Galaxy has been observed through its annihilation signature, an emission line at 511 keV coming from a diffuse region in the direction of the Galactic centre. Our understanding of the origin of the annihilating positrons is limited by the poor spatial resolution, ~ 3 degrees, of gamma-ray observatories.

I will present the background to the physics of positronium formation and annihilation followed by a brief review of the current status of the 511 keV radiation observations. I will then demonstrate the feasibility of an alternative method of observing positronium, viz. via its recombination spectrum. This technique will allow the acuity of optical telescopes and instrumentation to be applied to observations of high energy phenomena, providing unprecedented spatial resolution of positron production processes. I will describe the benefits for our understanding of a range of astrophysical phenomena, e.g. the composition of jets and the origin of the Galactic positrons and I will examine the most fruitful strategies for an observational campaign.

The audience is invited to meet the speaker beforehand at 3.45 p.m. over coffee and biscuits in the Common Room.

Dr. Adam Micolich

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