Australian Institute of Physics (SA branch)

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AIP members and all students of Physics are invited to attend the

2008 Student Night

at **8:00pm, Thursday August 14th**

in the **Kerr Grant** lecture theatre,

Physics Building, the University of Adelaide.

Note. Security restrictions require that entry to the building is supervised. It is therefore essential that attendees arrive before 8:00pm. Entry may not be possible after this time.

Postgraduate Physics students from South Australian Universities will talk about their research work:

Wendy Tuckwell

School of Chemistry and Physics, University of Adelaide

"**MODELLING OF TUMOUR GROWTH, OXYGEN LEVELS & RADIATION TREATMENT**"

Radiation therapy (RT) is a form of cancer treatment, which uses ionising radiation to kill tumour cells through DNA damage. There are many tumour properties that can vary from patient to patient, with many tumours e.g. head and neck cancers, exhibiting low oxygen levels (hypoxia), affecting the ability of radiation to damage DNA. It is the aim of many clinicians to individualise RT to improve patient outcomes by tailoring the treatment planning to specific tumour parameters, including the hypoxic cell percentage, as well as many other factors.

A model is in development to simulate cell division, using data such as: cell cycle times, stem cell percentages, and cellular oxygenation. Oxygen levels may be measured in tumours using a fibre optic probe which allows data from real tumour systems (e.g. genetically altered mice) to be input into the model. A RT module is in development to simulate different radiation schedules, as well as effects such as reoxygenation and accelerated cell repopulation which occur during treatment. This will allow for more specific RT planning, through predictions of cell kill for the individual patient.

Tristan Skawronski

School of Chemistry, Physics and Earth Sciences, Flinders University

"**TWO BODY CALCULATIONS WITH THE GAUGING OF EQUATIONS METHOD**"

One of the challenges faced in describing two body interactions with relativistic quantum fields is evaluating the infinite sums that arise from perturbation theory. Adding all the terms in these sums is impossible, and for many years it has been widespread practice to retain only those terms that can be generated by iterating potentials in integral equations. The problem with this is that it only permits a relatively small class of terms to be included and typically leads to models that violate basic symmetries. Recently, however, a new method of summation called Gauging of Equations has been developed. By including a wider range of terms, it more readily facilitates the preservation of symmetries. In this talk I shall outline this as yet untried method and my attempts to apply it to the examples of pion-nucleon scattering and photoproduction, where it permits crossing symmetry and gauge invariance to be included in a very natural way.

The Silver Bragg medals, awarded to the best 3rd-year Physics student at each SA University in 2007, will be presented during the meeting.

All students of Physics, particularly undergraduates, are invited to attend.