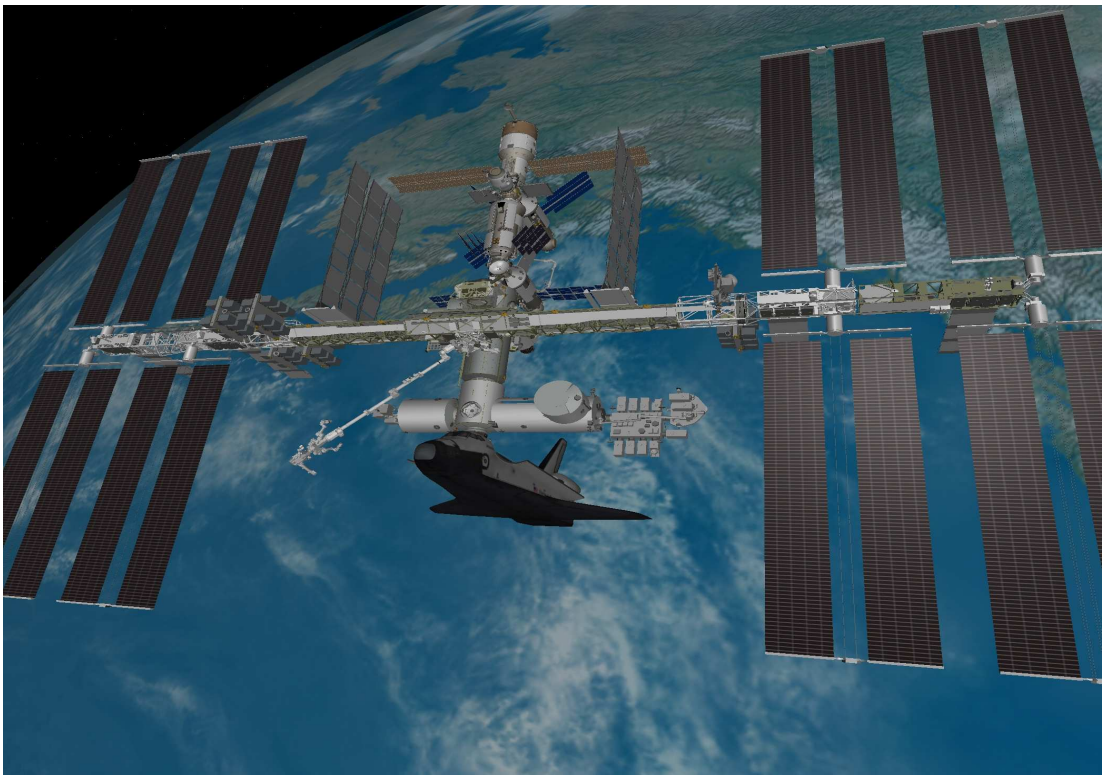
Seventh Annual Undergraduate Mini-Symposium

Department of Astronomy and Physics
Saint Mary's University
Friday September 10, 2010, Atrium 101



The ISS and Space Shuttle, as rendered in the ACEnet data cave (Beslin, Deupree)

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Friday September 10, 2010, 10:00 am – 1:00 pm

Atrium 101

Programme

Opening remarks (Clarke)			10:00 – 10:10
1	W. Beslin (Deupree)	*3-D visualization development for the ACEnet data cave*	10:10 – 10:30
2	D. Robertson (Gallo)	*Exploring the relationship between X-ray and UV radiation in Type 1 AGN*	10:30 – 10:50
3	A. Mott (Short)	*Synthetic Photometry of Late-type Giant Stars*	10:50 – 11:10
4	S. Campbell (Kanungo)	*Particle identification in the study of soft dipole resonance of* ^{11}Li	11:10 – 11:30
5	A. Valencik (Kanungo)	*Exploring the elastic scattering and one-neutron transfer from* ^{11}Li	11:30 – 11:50
6	P. McLeod (Dunlavy)	*"Cool physics demonstrations", Drawdio, and more!*	11:50 – 12:10
Lunch (AT305)			12:10 – 12:50
Award presentations (Clarke)			12:50 – 1:00

1. *3-D visualization development for the ACEnet data cave*

Wilfried Beslin (Deupree)

The data cave is a 3-D immersive environment consisting of three walls and a floor, each lit by two projectors. Users step into the room equipped with a pair of shutter glasses synchronized with shutters on the projectors, as well as a virtual wand for navigating through and manipulating the virtual world. The data cave provides a sense of immersion and depth perception that is simply not possible on a 2-D screen. My goal this summer was to develop displays to demonstrate the capabilities of the data cave and its potential as a scientific research tool. I worked on three different demos. The first is a 3-D hydrodynamic simulation of a stellar core helium flash, the second is a scale model of our solar system, and the third is a very detailed world consisting of the Earth, the International Space Station (ISS), and the space shuttle Atlantis. For this talk, I will describe how these displays work and were created, with particular focus on the Earth, ISS and shuttle world (see cover image).

2. *Exploring the relationship between X-ray and UV radiation in Type 1 AGN*

Damien Robertson (Gallo)

Space telescopes allow us to study certain properties of objects that would otherwise be invisible to observers on the ground. By using the space telescope XMM-Newton, which has multiple instruments and observational filters, simultaneous X-ray and UV measurements can be collected. In this presentation, I will summarize two years of continuous work in which we collect and examine data derived from simultaneous X-ray and UV observations from a sample of unobscured type 1 AGN. I will also discuss the new direction this research has taken by cross correlating the X-ray and UV light curves as a means of determining the physical mechanism responsible for the observed radiation.

3. *Synthetic Photometry of Late-type Giant Stars*

Alexander Mott (Short)

We investigate the $B-V$, $V-R$ and $V-I$ colour indices of the Johnson system, and the $b-y$ index of the Stromgren system for late-type giant stars. The input synthetic spectra were computed with the PHOENIX stellar atmosphere code for a model grid spanning a $T_{\rm eff}$ range of 3,250 to 4,750 K with a sampling interval of 125 K, and a $\log(g)$ range of 1.0 to 2.5 with a sampling interval of 0.5. We explored models of solar and 1/3 metallicity. Resultant colours are then plotted as colour-$T_{\rm eff}$ relations. Finally, we compare our results to those of VandenBerg & Clem (2003, 2004). We find that for $\log(g)$ greater than 1.5 and $T_{\rm eff}$ greater then 4,000 K for most colour indices, our results are in good agreement with those of VandenBerg & Clem.

4. *Particle identification in the study of soft dipole resonance of ^{11}Li*

Stephen Campbell (Kanungo)

The exotic nuclear halo in the most neutron-rich isotope of Lithium, ^{11}Li, has raised interest in the possible existence of a new mode of excitation, namely the soft dipole resonance. We performed an experiment to search for the existence of such a resonance by inelastic scattering of ^{11}Li from a proton target. The experiment was performed at the TRIUMF-ISAC-II facility where an accelerated ^{11}Li beam was incident on a polyethylene target. In order to study this mechanism, we needed to separate the different reaction products.

It will be shown that we have identified particles in this experiment using the Saint Mary's Silicon Telescope (segmented silicon) detector. The successful identification of the particles is a crucial step for further analysis to find the excitation energy spectrum of ^{11}Li.

5. *Exploring the elastic scattering and one-neutron transfer from ^{11}Li*

Andrew Valencik (Kanungo)

The isotope ^{11}Li is an unusual nucleus forming a two-neutron halo. To better understand the properties of ^{11}Li we need to study its sub-system ^{10}Li, accomplished by transferring one neutron from ^{11}Li. Additionally, the elastic scattering of ^{11}Li on protons is investigated to yield knowledge on the interaction potential of such exotic nuclei, which is not yet well known. To obtain this information, it is necessary to determine the cross section for these processes. This presentation will outline the ascertainment of two most important ingredients, namely the number of incident ^{11}Li ions (in the beam) and the CH_2 target thickness. These values are essential for finding the cross section of the different reaction channels of interest.

6. *"Cool physics demonstrations", Drawdio, and more!*

Pauline McLeod (Dunlavy)

This summer, the tools *Google Analytics* and *YouTube Insight* were used to monitor the traffic coming to the Astronomy and Physics Demonstration Website. *Google Analytics* and *YouTube Insight* are analysis tools that give detailed information on the website being tracked and enable users to gain valuable knowledge on how to improve their website in terms of attracting users. These tools monitor the website as a whole and on individual pages in order to see what content is valuable. Thirty seven demonstrations were added to the website this summer, many of which proved to be immediately popular, with two of those being an improved high speed version of the Mousetrap Reactor, and a video showing a model of Galactic Formation (contributed by Dr. Rob Thacker's research group). Both of these videos were shown to be popular both on YouTube and on the website itself. One other project that was carried out this summer was the "Drawdio". The Drawdio is an "electronic pencil" that allows a person to draw on a piece of paper and make music. This project is an example of what a physics experiment should inspire. It is an interesting toy that provokes questions, and makes people want to know more.