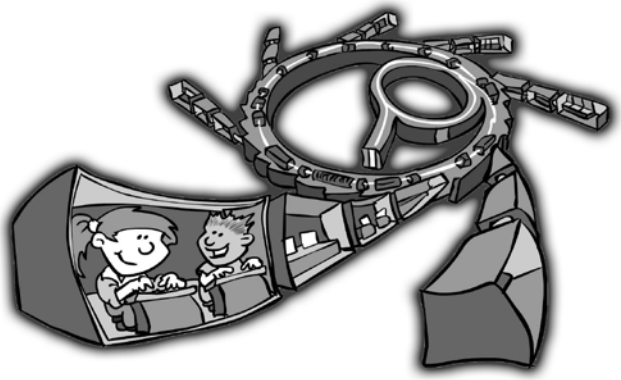

G.A.T.E.WAYS AND THE SYNCHROTRON

invite gifted Year 5 and 6 children with a

love of science and maths to

'BEAM ME UP!'

at The Synchrotron, 800 Blackburn Road Clayton

G.A.T.E.WAYS is an independent organization offering challenging and enriching activities and experiences to develop and extend highly able children. This challenging *ON LOCATION* for both girls and boys will run over two full days. It will suit mature students capable of assimilating advanced concepts and who have good concentration spans**.** Will it ever be possible that we will live on Mars, cure all diseases, or prevent climate change? To help answer these questions scientists need to understand what is happening in the world around us. In order to do this they have developed some very powerful instruments. **The Australian Synchrotron is one of these great instruments.** A synchrotron is a large machine (a bit smaller than the MCG) that can accelerate electrons to almost the speed of light. This super microscope helps researchers investigate matter down to the level of an atom.

Do you have a thirst for knowledge that drives you to explore the world around us? Do you have a passion for science and love mathematics? Then come and explore the Australian Synchrotron. G.A.T.E.WAYS is very excited to be offering a program at such a world-class facility.

Broadly, a Synchrotron is used for two different techniques. Firstly, it can look at how light is absorbed in order to give scientists information about the elemental and chemical composition of a sample. This is what we will explore on Day 1. Secondly, it can look at how light is scattered, which yields information on the atomic structure of a sample. This will be the focus of our investigations on Day 2.

DAY 1 LOOKING FOR ELEMENTS

Session 1: What A Machine

What is a synchrotron? What does it do? What it is used for? Before we can answer these questions, we need to learn a bit about light and atoms. You will work in small groups to learn everything you can about light, atoms and the history of discovering both. We will tour the synchrotron and learn what makes this large scientific machine tick. You will meet with experts in different areas and learn what they do.

Session 2: Neon Lights

Synchrotron light sources generate brilliant light so that scientists can measure the elements in a sample, but how do they do that? It's time to find out by building your own detector to measure the light given off by different elements. Here you will build a reference library by measuring the spectra from known elements and use this information to determine the elements in unknown samples. Following this, you will test your handmade detector against a computer based spectrometer.

Session 3: Cracking the Code

It's time to think logically and use mathematical logic to create controls. It is not always the case that the software to analyse is ready made, and often you need to write your own. In this session you will build a Microsoft Excel tool to help you graph your results easier and write computer code to control buttons which will enable you to manipulate your data to get to the right answer quickly.

DAY 2: WAVES, LIGHTS AND CRYSTALS

Session 1: What is a Crystal?

Have you ever grown your own crystals at home? They are beautiful structures but what makes them so interesting? You will work in groups to find out as much as you can about crystals and waves. Each group will report back to the class on what you find out.

Session 2: Diffract This!

How do waves enable us to understand the structure of objects such as crystals? This session begins with the basics of the physics phenomenon, diffraction.

Single slit and double diffraction: What will you observe when you shine light through a thin slit? Will it be the same or different if you have two slits? You might be very surprised with the results! You will produce patterns from single and double slits and investigate what this tells us about light and matter.

Session 3: The Mathematics

Mathematics is often a very useful tool that helps us formalise observations and can allow us to predict future results or determine unknowns. Put on your thinking hats as you develop a mathematical rule that will allow you to predict patterns/determine the size of unknown objects.

Session 4: What About Crystals?

Armed with your newfound knowledge on diffraction, you will determine the size, shape and arrangement of tiny crystallographic objects by measuring their diffraction pattern

About the Presenter : **Luther Vasic** is a science professional who teaches physics classes for VCE students at the Synchrotron, and gives tours to the public. Luther's educational experience is complemented by over three years of work at the Melbourne Centre for Nanofabrication as a technical assistant, where he assists with lab-work in a cleanroom environment. His in-depth knowledge of the mechanics behind particle accelerator physics gives a view into the inner workings of the Australian Synchrotron and the science practised there, and experience in the classroom allows for a dynamic and personal lesson for every class that walks in the door.

Zoran Vasic is an education and science professional with over six years classroom experience in secondary and tertiary educational environments. Zoran's educational experience is complemented by nearly two decades of laboratory work, at CSIRO and more recently the Melbourne Centre for Nanofabrication, as a member of teams developing continuous-wear contact lenses, elastomeric sutures for vascular surgery, flexible electronics and optical security features for polymer banknotes. This range of skills and knowledge help him bring something exciting to the classroom where he creates a warm learning environment in which hands-on experiments connect students with science practised at the Australian Synchrotron.

Requirements: Bring a blank exercise book or notebook and writing materials; snacks and lunch (no nut products please)