The BRAINWAVES Club

Term 2 2021: Neutrinos – Years 5 and 6
Venue: Forest Hill College
Term Fee: $285

It's Not Rocket Science...

...it's a whole lot more than that! While you'll have a chance to explore forces and a myriad of other aspects of physics during our club meetings, you'll also delve into other areas of science including the fascinating fields of chemistry, biology and environmental science. The Neutrinos will wrestle with theoretical concepts before using experiments to prove or disprove their hypotheses, developing their capacity to design fair tests and their skills at applying the scientific method. Come prepared for an out-of-this-world semester!

Meeting 5: **The Stars in Our Sky**
Focus: **Astronomy**

Astronomy is the oldest science, with the first observations of the heavens dating back as far as 5000 years ago in ancient Mesopotamia. One of the earliest models used to describe the universe involves describing how the affairs of humans are controlled by the positions of the stars and planets. Although astrology is now regarded as a pseudo-science, it was the original motivation for the mapping of the stars and the assignment of constellations.

But astronomy is more than simply a mapping of stars and planets into outlines of gods and magical creatures. It is the scientific study of the contents of entire Universe - stars, planets, comets, asteroids, galaxies, and space and time, as well as its history. In this session, we will take a look at the stars in our sky and discover the history and myths of the constellations from the perspective of a variety of cultures. We will explore both the northern and southern skies, and compare the distances between stars within a constellation, as well as make our own 3D constellations.

Meeting 6: **Burning on the Inside**
Focus: **Chemistry/Engineering**

We've probably all heard of internal combustion engines, but what are they, and how do they work? Do they differ from a steam engine, and if so, how? In this session, we will explore the inner workings of the modern car engine, the combustion process, and how the energy generated is translated into motion of the wheels. We'll even construct a model engine of our own.

Meeting 7: **A Hot, Dense State**
Focus: **Cosmology**

Cosmology is the scientific study of the large- scale properties of the universe as a whole. It seeks to use the scientific method to understand the origin, evolution and ultimate fate of the entire Universe. Like any field of science, cosmology involves the formation of hypotheses about the universe which make specific predictions that can be tested with observations.

In this session, we will discover what the current prevailing theory about the origin of our Universe, the so-called Big Bang theory, actually says, what evidence we have to support it, and what predictions it makes for the future. We will also look at star formation and the life cycle of a star, what this means for our own suns future, and how it is that we are all made of 'star stuff'. Finally, we will make our own spectroscopes to learn one of the techniques that astronomers use to study the universe.

Meeting 8: **Whizz! Pop! Bang!**
Focus: **Chemistry/ Combustion**

Gunpowder was the first chemical explosive developed by humans. But what does this explosive black powder have to do with the search for immortality, or with scaring away evil spirits? Join us as we go in search of the origins of gunpowder and look at its many and varied uses over the centuries. We will also run a few scientific tests of our own to determine some of the essential properties of gunpowder, including the prerequisites for both good combustion and explosive combustion. Finally, we'll try adding a little colour to our burn as we explore how fireworks are made.

What to Bring: Each week please bring a well-stocked pencil case which includes scissors, textas or coloured pencils, grey lead pencils, sticky tape or a glue stick, ruler, rubber and pencil sharpener.

About the Presenter – Simon Matheson
Simon is a physicist by training and has been involved in education one way or another for most of his life; first as a student, then as a secondary school science and maths teacher, and most recently as a developer and presenter of science outreach programs with CSIRO Education. Simon's enthusiasm for science education is grounded in the belief that all citizens of the modern world need a firm grasp of the principles upon which science (and, by extension, the world around us) are built.