

**Report of September Meeting
Royal Society
Southern Highlands Branch**

**Speaker: Professor Heinrich Hora D.Sc. (UNSW 1981), FAIP,
FInstP (Lon)**

**Professor of Theoretical Physics and Head of Department
(UNSW) from 1975, Emeritus 1992**

Topic: Nuclear Energy Without Dangerous Radiation

The Southern Highlands Branch meeting of 16 September 2010 was held at 6.30pm in the Drama Theatre, Frensham School, Mittagong. An audience of 55 began arriving early on a cold, windy night to hear the latest research on a new process of radiation-free nuclear fusion, which could in future lead to the development of clean and sustainable electricity production.

Heinrich Hora began his lecture by explaining the benefits of nuclear fusion, in particular its potential to provide vast quantities of electricity cleanly and sustainably. However, to date, the complications with nuclear energy are the serious and well-recognised adverse environmental and health issues due to side effect radiation. If fusion could be conducted so that the energy produced was free of radiation, then a whole new world of possibilities would be opened for generations to come.

Conventionally, deuterium and tritium are used as fuel in the fusion process. Laser irradiation is used to spherically compress the fuel which then ignites, producing helium atoms, energy, and neutrons which cause radiation. Hora described how fusion is also possible with a fuel of hydrogen and boron-11, a method which does not release neutrons. However, the disadvantage of this process is that the fuel requires much greater amounts of energy to initiate, and for this reason, the process has remained unpopular.

A breakthrough has now been made by Hora's team who have demonstrated that new laser technology capable of producing short but high energy pulses could be used to ignite the hydrogen-boron11 fuel using side-on ignition. In this process, the fuel would not need to be compressed, with the result that the energy required would be less than previously thought. Hora said, "It was a surprise when we used hydrogen-boron instead of deuterium-tritium. It was not 100 000 times more difficult, it was only 10 times."

Professor Hora said that hydrogen-boron11 process would produce less radiation than that emitted from current power stations that burn coal, which itself contains trace

amounts of uranium. He added that hydrogen and boron are both plentiful and readily accessible, and that the waste product from their ignition would be clean helium gas.

Hora quoted Steve Haan, an expert in nuclear fusion at Lawrence Livermore National Laboratory in California, who stated recently that Hora's method has the potential to be the best route to fusion energy seen so far. However, both Haan and Hora are well aware that there is much work to be done before this technology is at hand. Hora concluded his lecture with the statement that the practical achievement of the new process will be heavily dependent on ongoing advances in laser optics, target physics and power conversion technology.

At the conclusion of the lecture, the audience showed their appreciation by asking Heinrich Hora as many questions as time allowed.

The vote of thanks was given by Anne Wood.

Anne Wood