School of Physics and Astronomy

COLLOQUIUM

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The Origin of Elements and Their Evolution in Galaxies

At the beginning of the Universe, the Big Bang, only light elements such as hydrogen, helium, and lithium are formed. Elements heavier than carbon are formed only in stars and are distributed into the cosmos when the stars die. Among them, so-called alpha elements (O, Mg, Si, S, and Ca) are produced by core-collapse supernova explosions of massive stars, while iron-peak elements are produced predominantly by Type Ia supernovae - thermonuclear explosions of binary star systems. Elements heavier than iron are formed by neutron-capture processes, two extreme cases of which are the slow neutron-capture process in low-mass stars and the rapid neutron-capture process in a binary of compact objects (neutron stars and black holes), which have been recently detected as gravitational wave sources. Individual elemental abundances have been well measured in the atmosphere of nearby stars, and from such observations it is possible to test the origin of these elements. We find that stellar rotation and/or magnetic fields are important in producing the observed abundance of heavy iron-peak elements (such as zinc) and some neutron-capture elements. With future astronomical telescopes, it will also be possible to map elemental abundances over a range of cosmic times from nearby to distant galaxies, and I will also present computer simulations on the evolution of elements in the Universe.

Date:	Wednesday 12 February
Time:	2pm
Venue:	L1, Seminar Room 107, 10 College Walk, Clayton