

— 第839回九大原子核セミナー —

講師 : Prof. Dr. Claus Rolfs (Ruhr-University Bochum, Germany)

演題 : The alpha-capture by ^{12}C : the holy grail of astrophysics

日時 : 2月19日(火) 16時00分～

† 今回は通常と曜日が異なりますのでご注意ください。

場所 : 理学部 物理大学院講義室 (理学部 2号館 2階 2263室)

概要

Investigations during the last 50 years have shown that we humans are connected with distant space and time not only by our imagination but also through a common cosmic heritage: the chemical elements that make up our bodies. These elements were created by nuclear reactions in the hot interiors of remote and long-vanished stars over many billions of years. When these giant stars had finally consumed their nuclear fuels, they met death in cataclysmic explosions, known as supernovae, in which they scattered into space the elements synthesized deep within their cores. Eventually this material collected into clouds of gas in interstellar space; and these clouds, in turn, slowly collapsed giving birth to new generations of stars, thus leading to a cyclic evolution that is still going on today.

In this scenario, the sun and her planets were formed some 5 billion years ago. Drawing upon the material gathered from the debris of its stellar ancestors, the planet earth provided the conditions that eventually made life possible. Thus, each living creature on earth embodies elements from distant corners of our Galaxy and from a past thousands of times more remote than the beginning of human evolution. Thus, in a sense, each of us has been inside a star and truly and literally consists of stardust. Every piece in our bodies contains matter that once was subjected to the tremendous temperatures and pressures at the center of a star. This is where the iron in our blood cells originated, the oxygen we breathe, the carbon and nitrogen in our tissues, and calcium in our bones.

The detailed understanding of our cosmic heritage combines astrophysics and nuclear physics, and forms what is called nuclear astrophysics. Nuclear reactions are clearly at the heart of this field: they influence sensitively the synthesis of the elements and control the associated energy generation and evolution of stars. A good knowledge of these reactions is thus essential to understanding this broad and exciting picture of our cosmic heritage.

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