



Univers. di Perugia, Dipart. di Fisica,  
DOTTORATO DI RICERCA IN:  
FISICA E TECNOLOGIE FISICHE  
&  
Istituto Nazionale di Fisica Nucleare  
I.N.F.N. – SEZIONE DI PERUGIA



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## **AVVISO DI SEMINARIO**

**Giovedì 21 Marzo 2013, ore 15:15**

**Sala Riunioni (Dipart. di Fisica, 3° p.)**

**Franz Käppeler**

Karlsruhe Institute of Technology

### ***“Experimental Neutron Capture Rates for the $s$ Process”***

**Abstract:**

Neutron reactions are responsible for the formation of all elements heavier than iron. The corresponding scenarios relate to helium burning in Red Giant stars ( $s$  process) and to supernova explosions ( $r$  and  $p$  processes). So far, laboratory studies have concentrated on the  $s$  process, which operates in or near the valley of  $\beta$ -stability and has produced about half of the elemental abundances between Fe and Bi. The resulting abundance distribution is essentially determined by the respective neutron capture cross sections, which are reflecting the physical conditions at the stellar site. In explosive scenarios nucleosynthesis yields are determined by reaction and decay rates far from stability, with some mild modifications due to neutron reactions during the freeze-out phase.

The present status of the relevant nuclear physics data required for the various scenarios will be briefly summarized, followed by an outline of the essential experimental techniques, starting with the time-of-flight technique, which will be discussed in terms of neutron sources and modern detector systems for neutron capture measurements. The activation method represents an important complement to the TOF technique because of the possibility to approximate stellar neutron spectra in the laboratory. Both methods will be illustrated by typical examples of neutron capture experiments.

**IL COORDINATORE  
DEL DOTTORATO**

*Maurizio Busso*

**IL DIRETTORE  
DELLA SEZIONE**

*Pasquale Lubrano*

**N.B.:** Seminario obbligatorio per gli studenti del XXVIII ciclo, vivamente suggerito ai dottorandi dei cicli precedenti, aperto a tutti gli interessati.