

# **The 6th European Summer School On Experimental Nuclear Astrophysics**

**Sep. 18-27, 2011  
Santa Tecla, Sicily, Italy**

## **Second Announcement**

Nuclear astrophysics plays a key role for understanding energy production in stars, stellar evolution and the concurrent synthesis of the chemical elements and their isotopes. It is also a fundamental tool to explain the ashes of the early universe, to determine the age of the universe through the cosmo-chronometry, to predict the neutrino luminosity, e.g. for Sun and Supernovae.

The “bone structure” for the above aspects is based on nuclear reactions, whose rates need to be determined in laboratories. Although impressive progress has been made over the past decades, which was rewarded by Nobel prizes, several open questions are still unsolved, which challenge the basis of the present understanding.

We have the pleasure to announce a sixth European summer school on experimental nuclear astrophysics, devoted to the education of young researchers. This edition will also be the tenth year's one and will be a special one.

The school will deal with various aspects of primordial and stellar nucleosynthesis, including novel experimental approaches, indirect methods, and radioactive ion beams. Furthermore, we plan to have lectures on complementary subjects of astrophysics such as gamma ray astronomy, dark matter and cosmic rays and on cutting-edge facilities used to investigate nuclear reactions of interest for astrophysics.

The sixth edition, marking the tenth year's anniversary should be seen in the intention of the organizers as a cornerstone for young scientists formation in the field of nuclear astrophysics as well as the climax of the research activity in this decade. The previous editions of the school took place in 2001, 2003, 2005, 2007, 2009. In each edition and, of course, in the sixth one, particular attention will be devoted to the participation of young students of less favoured countries especially to the ones coming from the southern coast of the Mediterranean Sea.

The 10 days of school include one day for arrival (18.09.11) and one day for departure (27.9.11). In the remaining days, there will be lectures every morning, while the afternoon will be scheduled both for lectures and seminars as well as young researcher contributions. A preliminary program is attached to the present announcement

We expect that the participants arrive in Santa Tecla on 18.09.11, where a registration desk will be set-up.

The school takes place at the Santa Tecla Hotel ([www.hotelsantatecla.it](http://www.hotelsantatecla.it)), about 15 km north-east of Catania. Catania has an international airport with connections to Rome and other European airports. Santa Tecla is located directly on the Mediterranean sea, in a comfortable and spectacular

environment. The hotel has a large lecture hall and many smaller sites for discussions and informal meetings. At the time of the school the weather is ideal in Sicily (around 25° C).

The organizers encourage the participation of young researchers from Europe and from non-European countries. The number of participants will be limited to 100. Participant are kindly requested to register to the school website (see below), providing the arrival and departure day and time. On the same website a link is available for hotel booking. The school attendants are kindly requested to fill in the hotel booking form for ease of organization. We ask for a registration fee of 300 € (which will cover the school expenses as well the social activities and shuttle service from/to airport) that should be paid upon arrival. Lodging expenses in full board are 85 € per day in a double room (120 € for a single room). A limited amount of funding will be available to cover the local expenses of the school attendants and to permit students from less favoured countries to waive the school fee.

As in the previous editions, room will be given to student and young researcher presentations. Those participants interested in presenting their latest results are invited to submit a short abstract to the school email address. About 15 minutes will be allocated for each talk.

The school is supported by the INFN-LNS, the University of Catania (PHD course in Nuclear and Particle Astrophysics), Provincia and Comune di Catania.

Updated information will be posted at the school web-site:  
<http://agenda.infn.it/conferenceDisplay.py?confId=3207>

Registration Deadline: 30.06.2011

**Preliminary list of lecturers:** M. Aliotta (Edinburgh), B. Balantekin (UW Madison), C. Bertulani (Commerce), S. Bishop (TUM), M. Busso (Perugia), R. Cyburt (MSU), A. Coc (CSNSM), R. Diehl (MPE), M. El Eid (Beirut), Y. Fujita (Osaka), Z. Fulop (ATOMKI), R. Gallino (Torino), L. Gialanella (Napoli), M. Gounelle (MNHN), A. Guglielmetti (Milano), F. Hammache (IPNO), S. Harissopoulos (Demokritos), M. Hass (Weizmann), W.R. Hix (UTK), J. Josè (Barcelona), T. Kajino (Tokyo), K.L. Kratz (Mainz), S. Kubono (Tokyo), K. Langanke (GSI), M. Limongi (INAF-OAR), T. Motobayashi (RIKEN), A. Mukhamedzhanov (TAMU), F. Nunes (MSU), O. Sorlin (GANIL), O. Straniero (Teramo), G. Rogachev (FSU), C. Rolfs (Bochum), P. Schiellbeeckx (IRMM-JRC), A. Szanto de Toledo (S. Paulo), L. Trache (TAMU), R. Tribble (TAMU), S. Wanajo (MPA), M. Wiescher (Notre Dame), P.J. Woods (Edinburgh)

**Scientific committee:** C. Rolfs (Director, Bochum), C. Spitaleri (Director, Catania), M. Aliotta, (Edinburgh), M. Busso (Perugia), A. Coc (Orsay), M. El Eid (Beirut), T. Kajino (Tokyo), K.L. Kratz (Mainz), S. Kubono (Tokyo), K. Langanke (GSI), J. Josè (Barcelona), T. Motobayashi (Riken), A. Mukhamedzhanov (TAMU), O. Straniero (Teramo), Rogachev (FSU), R. Tribble (TAMU), M. Wiescher (Notre Dame).

**Local committee:** G. Agnello, S. Cherubini, R.G. Pizzone, V. Potenza, S. Romano, A. Tumino

## **Scientific Secretaries**

M. La Cognata, L. Lamia,  
[astro2011@lns.infn.it](mailto:astro2011@lns.infn.it)  
<http://agenda.infn.it/conferenceDisplay.py?confId=3207>

## **Preliminary program**

### **Sunday, 18/09/2011**

08:00-18:00 Arrivals  
18:30-20:30 Welcome cocktail  
20:30-22:00 Dinner

### **Monday, 19/09/2011**

08:00-09:00 Breakfast  
09:00-10:10 Welcome from authorities  
10:10-10:55 R. Cyburt "Introduction to nuclear Astrophysics I"  
11:00-11:15 Coffee break  
11:15-12:00 R. Cyburt "Introduction to nuclear Astrophysics II"  
12:05-12:50 O. Straniero "Introductio to Stellar Evolution I"  
13:00-13:45 O. Straniero "Introductio to Stellar Evolution II"  
13:45-14:30 Lunch  
16:30-17:20 R. Gallino "Introduction to the s-process"  
17:20-17:40 Coffee Break  
17:40-18:30 S. Harissopoulos "p-process nucleosynthesis"  
18:30-19:20 K.L. Kratz "The r-process"  
20:00-22:00 Dinner

### **Tuesday, 20/09/2011**

08:00-09:00 Breakfast  
09:00-09:50 M. Busso "Introduction to AGB stars I"  
10:00-10:50 M. Busso "Introduction to AGB stars II"  
10:50-11:20 Coffee Break  
11:20-12:10 G. Rogachev "Detectors for experimental nuclear astrophysics I"  
12:20-13:10 G. Rogachev "Detectors for experimental nuclear astrophysics II"  
13:10-14:30 Lunch  
15:30-16:30 Contributions from young researchers  
16:30-17:20 M. Wiescher "Direct methods in nuclear astrophysics: recent results"  
17:20-17:40 Coffee Break  
17:40-18:30 A. Guglielmetti "Nuclear astrophysics at LUNA: recent results"  
18:30-19:20 P. Schillebeeckx "TOF experiments to support nuclear astrophysics"  
20:00-22:00 Dinner

### **Wednesday, 21/09/2011**

08:00-09:00 Breakfast  
09:00-09:50 T. Kajino "Big Bang Models I"  
10:00-10:50 T. Kajino "Big Bang Models II"  
10:50-11:20 Coffee Break  
11:20-12:10 A. Coc "Primordial Nucleosyntheis: theory vs observations I"  
12:20-13:10 A. Coc "Primordial Nucleosyntheis: theory vs observations II"

13:10-14:30 Lunch  
16:30-17:20 M. Hass “The  ${}^3\text{He}(\alpha,\gamma){}^7\text{Be}$  reaction: current status and perspectives”  
17:20-17:40 Coffee Break  
17:40-18:30 M. Aliotta “Underground laboratories”  
18:30-19:20 L. Gialanella “Nuclear astrophysics with recoil separators”  
20:00-22:00 Dinner

### Thursday, 22/09/2011

08:00-09:00 Breakfast  
09:00-09:50 A. Mukhamedzhanov “General Theory on indirect methods in nuclear astrophysics I”  
10:00-10:50 A. Mukhamedzhanov “General Theory on indirect methods in nuclear astrophysics II”  
10:50-11:20 Coffee Break  
11:20-12:10 R. Tribble “The ANC indirect method for nuclear astrophysics I”  
12:20-13:10 R. Tribble “The ANC indirect method for nuclear astrophysics II”  
13:10-14:30 Lunch  
15:30-16:30 Contributions from young researchers  
16:30-17:20 F. Nunes “Application of transfer reactions to nuclear astrophysics”  
17:20-17:40 Coffee Break  
17:40-18:30 L. Trache “Recent results from the application of ANC to nuclear astrophysics”  
18:30-19:20 O. Sorlin “Nuclear astrophysics with RIBs”  
20:00-22:00 Dinner

### Friday, 23/09/2011

08:00-09:00 Breakfast  
09:00-09:50 M. El Eid “Heavy-ion element synthesis and cosmology”  
10:00-10:50 K.H. Langanke “Core collapse Supernovae”  
10:50-11:20 Coffee Break  
11:20-12:10 S. Wanajo “Core-collapse supernovae (and neutron star mergers) as the origin of elements beyond iron”  
12:20-13:10 M. Limongi “ ${}^{12}\text{C}+{}^{12}\text{C}$  reaction and astrophysical implications”  
13:10-14:30 Lunch  
16:30-17:20 W.R. Hix “Core-collapse Supernovae”  
17:20-17:40 Coffee Break  
17:40-18:30 Y. Fujita “Weak interaction in nuclear astrophysics”  
18:30-19:20 B. Balantekin “Neutrino Physics”  
20:00-22:00 Dinner

### Saturday, 24/09/2011

08:00-09:00 Breakfast  
09:00-09:50 C. Bertulani “Theory of the Coulomb Dissociation I”  
10:00-10:50 C. Bertulani “Theory of the Coulomb Dissociation II”

10:50-11:20 Coffee Break  
11:20-12:10 T. Motobayashi “Recent results from CD experiments”  
12:20-13:10 S. Kubono “Recent results on explosive nucleosynthesis with low-energy RI-beams”  
13:10-14:30 Lunch  
15:30-16:30 Contributions from young researchers  
16:30-17:20 F. Hammache “Transfer reactions as a tool for nuclear astrophysics”  
17:20-17:40 Coffee Break  
17:40-18:30 P. Woods “Experimental studies for nuclear astrophysics with TECSA”  
18:30-19:20  
20:00-22:00 Dinner

### **Sunday, 25/09/2011**

08:00-09:00 Breakfast  
09:15-18:30 Social Trip  
20:00-22:00 Dinner

### **Monday, 26/09/2011**

08:00-09:00 Breakfast  
09:00-09:50 J. Josè “General Theory on Novae I”  
10:00-10:50 J. Josè “General Theory on Novae II”  
10:50-11:20 Coffee Break  
11:20-12:10 R. Diehl “Astronomy with cosmic nuclei”  
12:20-13:10 S. Bishop “Recent results on novae nucleosynthesis”  
13:10-14:30 Lunch  
16:30-17:20 M. Gounelle “Short-lived radionuclides”  
17:20-17:40 Coffee Break  
17:40-18:30 Z. Fulop “General Introduction to the p-process”  
18:30-19:20 C. Rolfs “Concluding remarks”  
20:00-22:00 Dinner

### **Tuesday, 27/09/2011**

Departures