

FIRST CIRCULAR

XXIII Trobades Científiques de la Mediterrània

Supernovae: light in the darkness

Maó, Menorca (Spain)
3rd – 5th October, 2007

Presentation

Every year, just at the end of the summer, the Section of Physics and Technique of the “Institut Menorquí d' Estudis” and the “Societat Catalana de Física” organize the “Trobades Científiques de la Mediterrània” with the support of diverse academic institutions.

The primary goal consists of providing a frame of interchange of experience and knowledge on a current research topic in the field of Physics. Aside from constituting a scientific forum, these encounters also try to facilitate the relationship and communication between scientists and technicians working in similar areas.

The 2007 edition

Stellar explosions are the true evolutionary engines of galaxies. Whenever a star explodes, it injects in the interstellar medium a kinetic energy of 10^{51} erg and between one and several tens of solar masses of elements just synthesized as a result of the thermonuclear reactions that have taken place in their interior.

There are two mechanisms able to provide these enormous amounts of energy: the thermonuclear and the gravitational one.

The thermonuclear supernovae are the result of the incineration of a white dwarf of carbon oxygen that is the compact star of a binary stellar system. If the two stars are sufficiently close, the white dwarf takes matter from its companion, it is compressed, it approaches the Chandrasekhar's mass and ends up exploding. The processes previous to the explosion and the explosion itself, as well as the exact nature of the double stellar system that explodes, are still a matter of debate. This point is particularly important because these explosions, known as Type Ia Supernovae, are very homogenous and can be used to measure cosmological distances. The most spectacular result obtained with them is the discovery of the accelerated expansion of the Universe, but it is still uncomfortable that such a fundamental result is based on a “measuring system” whose origin and behaviour along time is unknown. In particular, the problems that we propose to discuss are:

- What binary systems explode as supernovae?
- How does the white dwarf approach the instability?
- How does the ignition take place?

- How does the front of thermonuclear combustion propagate?

At the end of their lives massive stars generate an iron nucleus that gets unstable when approaching the Chandrasekhar mass. Its collapse gives rise to the formation of a neutron star or a black hole, and the external manifestation of the energy that is released, about a 10^{53} erg, consists of a supernova of type II or Ib/c or of a Gamma Ray Burst (or GRB) or both things. From the beginning of the nineties, when CGRO discovered the cosmological character of these phenomena, the GRB have constituted one of the most exciting problems of modern Astrophysics. In particular, the problems that we propose to approach are:

- What is the structure of massive stars before the instability?
- What is the dynamics of the collapse?
- Can the acoustic instabilities transfer enough energy to transform the collapse into an explosion?
- What is the influence of rotation?
- Under what circumstances a GRB forms and which are its properties?

The stellar end products that leave the supernovae are as interesting as themselves. On the one hand, as said before, they completely determine the chemical evolution of the Galaxy, which is fundamental for the formation of planets or, even, for the appearance of life. On the other hand, they leave collapsed objects such as neutron stars and black holes that give rise to an ample range of violent phenomena: x-rays eruptions, microquasars, acceleration of particles to high energies, etc. In this field the problems that we propose to approach are:

- Which is the net production of chemical elements during the supernova explosions?
- How can supernova remnants be used to diagnose the mechanisms that have caused the explosion?
- Which are the properties of the x-rays eruptions?
- Which are the properties of microquasars?
- Which are the mechanisms of particle acceleration?

Scientific topics

- Thermonuclear Supernovae
- Gravitational Supernovae
- Gamma Ray Bursts
- Cosmological implications
- Remnants

Scientific programme

There will be 5 invited reviews (50 min + 10 min), 12 contributed talks (25 min + 5 min) and posters (see the conference website for the program and confirmed speakers).

Abstract submission :

The deadline is 14th September 2007. See web page for instructions

Proceedings

The publication of the workshop contributions is under study

Conference website

<http://www.ieec.cat/mediterrania>

Scientific Organizing Committee

- D.García-Senz (IEEC/Universitat Politècnica de Catalunya)
- J.M. Ibáñez (Universitat de València)
- J. Isern (ICE-CSIC/IEEC)
- R. Miquel (IFAE/ICREA)
- J. Miralda (ICE-CSIC/IEEC)/ICREA
- J.M. Paredes (ICC/IEEC/Universitat de Barcelona)
- J.A. Pons (Universidad de Alicante)
- A. Sintès (Universitat Illes Balears)

Registration

Registration deadline: September 1st, 2007

The registration fee is of 150 €(only cash if paid at the registration desk)
If paid in advance, before the deadline, 100 €(see the web page for details).
Free for PhD students with a letter of presentation of their advisor.
Accompanying persons: 50 €

Social events and coffee break are included in the fees.

Depending on the available final funding, few grants will be available for students and participants coming from non developed countries.

Venue

The workshop will take place from wednesday 3rd October to 5th October 2007 at the “Institut Menorquí d’Estudis”, Camí des Castell 28, Maó (Menorca).

Travel information

Menorca Island is the northern island of the Balearic Islands and can be easily reached from the most important European cities. In order to get the best prices please contact the travel agency VMAGON (Maó) for both airplane tickets and lodging at the e-mail congresos@vmagon.es indicating you are participating at the “XXIII Trobades Científiques de la Mediterrània” . Additional information will be posted at the web page when available.