Final report on the II Iberian nuclear astrophysics meeting .

1) Summary (up to 1 page)

The second Iberian nuclear astrophysics meeting has taken place in the Faculty of Science (Salón de Grados) at University of Salamanca, Spain, from September 22 to 23, 2011. This meeting followed the pioneer previous I encuentro ibérico de Compstar, held at University of Coimbra in 2010 in the context of the COMPSTAR European network. There were 22 participants, in line with previous attendance in the former edition, including senior researchers, postdocs and Ph. D. students. Regarding international origin of participants around 12 (54%) were not at Spanish institutions. This was one of the main goals since this meeting was thought as an effort to increase the number and quality of international collaborations. The local organizing committee was formed by three locals: Dr. M A Pérez, Dr. C. Albertus and Dr. F. Atrio. Additional help was given by Dr. J. Pons and Dr. J. A. Miralles from U. of Alicante.

The main purpose of this meeting has been strengthening the scientific collaboration among the participants of the Iberian and rest of European branches of the European nuclear astrophysics network. It has helped in the presentation of research lines in the most interesting and relevant subjects being developed nowadays in nuclear astrophysics. Talks were allotted according to thematic blocks and structured in long 50+10 min (invited) review talks and short 20+10 min (regular) talks. There were also discussion sessions.

Oral presentations were given on the following list of scientific topics:

1- Magnetic fields in compact stars.
2- Nuclear structure and in-medium effects in nuclear interaction.
3- Equation of state: from nuclear matter to quarks.
4- Importance of crust in the physics of neutron stars.
5- Computational Simulations of collapsing dense objects.
6- Observational phenomenology.

Scientific support was given to main speakers for travel and accommodation costs and just for accommodation costs to regular speakers. Partial support for meals was also provided.

Additional financiation was obtained from a national program grant from the Spanish ministry of Science and from the local Institute of Fundamental Physics and Mathematics at University of Salamanca.

Sponsors:

2) Description of the scientific content of and discussion at the event (up to 4 pages)

The event took place in the Faculty of Science (Salón de Grados) at University of Salamanca, Spain, from September 22 to 23, 2011. Most of the participants were in the not-senior stages of their scientific career and this was one of the main sources for the dynamization of the meeting. Regarding international origin of participants around 12 (54%) were not at Spanish institutions. There were a list of main topics including

1 -Magnetic fields in compact stars.

There were two talks on this subject by Dr. J. Pons and D. Viganò.

2 -Nuclear structure and in-medium effects in nuclear interaction.

There were four talks by Dr. Constança Providência, Dr. I. Vidaña, Dr. X. Roca-Maza and D. Logoteta.

3- Equation of state: from nuclear matter to quarks.

There was one plenaty talk by Dr. I. Bombaci and one regular talk regarding EOS by Dr. A. Fantina

4- Importance of crust in the dynamics of neutron stars.

There were three talks by J. Hughto , Dr. Klaas Vantournhout and Dr. F. Gril

5- Computational Simulations of collapsing dense objects.

There was one review plenaty talk regarding this subject by Dr. J. M. Ibáñez

6- Observational phenomenology.

In this section Dr. N. Rea was giving us a short review of magnetars.

Additionally there were a couple of regular talks on collateral topics regarding Cold atoms (by Dr. B. Juliá) and High field laser physics (Dr. L. Roso) to reach new possible members in this interdisciplinary area. In this sense Cold atoms may constitute a very useful tool to obtain more information on nuclear interaction in dense matter since in these systems one may fine-tune the scattering length of the interaction. On the other hand, modern facilities and the Petawatt lasers can deliver beams able to produce $B=10^6$ G fields and this could be useful to study atmospheres in neutron stars.

There was one poster (by R. Casali) on the symmetry energy in Neutron star matter with high magnetic fields.

Most relevant contributions to this meeting were selected to appear in a volume of the indexed Journal of Conference series, from the Institute of Physics (IoP). We consider it is important to produce a publication for a community as highly heterogeneous as this in order to be visible. The volume is currently in the processing stage. Future publication has already been agreed and it is likely to appear by June 2012.

In the discussion sessions there were scientific oriented issues regarding the possibility of the convenience of having a unified EOS for describing the interior of compact objects. In this sense there was a common point of view that more effort should be done on this particular side.

Some other discussions were related to the future of the network COMPSTAR and the possible continuation of it, since all members agree they have benefited from its existence. Especially schools and international meetings are good opportunities to meet and discuss on common research lines and new advances on them from either theoretical, computational and observational points of view.

As a consideration of the amount of talks given, there was a proportion of 68% of registered participants who presented oral talks. The general list of registered participants was:

C. Albertus (U. Salamanca, Spain)

I. Bombaci (U. Pisa, Italy)

Rudiney Casali (U. Coimbra, Portugal)

Silvia Chiacchiera (U. Coimbra, Portugal)

Anthea Fantina (U. Libre Bruxelles, Belgium)

Márcio Ferreira (U. Coimbra, Portugal)

Miguel Gullón (U. Alicante, Spain)

Fabrizio Grill (U. Coimbra, Portugal)

Joe Hughto (Indiana University, USA/ U. Alicante, Spain)

J. M. Ibáñez (U. Valencia, Spain)

B. Juliá Díaz (U. Barcelona/ICFO)

D. Logoteta (U. Coimbra, Portugal)

V. Moreno (U. Complutense de Madrid, Spain)

M. A. Pérez-García (U. Salamanca, Spain)

J. Pons (U. Alicante, Spain)

C. Providencia (U. Coimbra, Portugal)

Nanda Rea (ICE-CSIC, IEEC, Barcelona, Spain)

Xavier Roca-Maza (INFN, Milano, Italy)

Luis Roso (U. Salamanca, Spain)

Klaas Vantournhout (GSI Darmstadt, Germany)

I. Vidaña (U. Coimbra, Portugal)

Daniele Viganò (U. Alicante, Spain)

3) Assessment of the results and impact of the event on the future direction of the field (up to 2 pages)

The global result of this event is successful since the main purpose was fulfilled; that was namely to gather in order to strengthen scientific bonds and discuss on new developments and future innovation in the field. As for the future several consideration were discussed in this meeting. One was to be able to financially support a new edition of the European Network on The physics of Compact stars since it has been a very fruitful framework for collaboration and scientific training of future students in the field.

Another point concerns the future of this series of meetings for the field. We think that they are useful for us as a community since they allow to group and gather people from the Iberian peninsula and abroad to meet

in a somewhat difficult non-centralized area. Next year there is a proposal to held the III edition at University of Barcelona with a tentative Local Organizing committee including Dr. A. Polls, Dr. X. Viñas and Dr. M Centelles.

In the context of new collaborations in the near future there have been several attempts to revitalize the idea of having a benchmark for the EOS in dense matter and the possibility of applying for a common doctoral program at the European level, similar to existing ones.

4) Final programme of the meeting

The final form of the program is given below. I poster session was continuous at the coffee breaks during the meeting.

Thursday 22/09/2011

9:00-09:30h **Registration and welcome**

Session I: Chairman: M. Ángeles Pérez

09:30-11:00h Plenary Talk: J. María Ibáñez, **Numerical Relativistic (Magneto) Hydrodynamics in Dynamical Spacetimes**

Pause : 11:00-11:30h

Session II: Chairman: José Pons

11:30-12:00h Nanda Rea, **Observational news from magnetars**

12:00-12:30h Daniele Viganò, **Force-free twisted magnetosphere of Neutron Stars**

12:30-13:00h Jose Pons, **Magnetars vs. High-B Field Pulsars: Is there a Real Dichotomy?**

Comida-Lunch: 13:00h-15:30h

Session III: Chairman: C. Providência

15:30-16:00h Joe Hughto, **Structure and Shear Modulus of the Neutron Star Crust**

16:00-16:30h Anthea Fantina, **Unified equation of state for neutron stars and supernova**

cores using the nuclear energy density functional theory

Pause : 16:30-17:00h

Session IV: Chairman: I. Vidaña

17:00-17:30h Klaas Vantournhout, **A new technique to cook nuclear pasta**

17:30-18:00h F. Grill, **Vortex-Lattice Interaction in Pulsar Glitches**

18:00-19:00h **Round Table: Future of Iberian COMPSTAR**

Social Dinner: 21h

Friday 23/09/2011

Sesión V: Chairman : J. María Ibáñez

09:30-10:30h Plenary Talk: I. Bombaci, **Nucleation of quark matter in newborn neutron stars**

10:30-11:00h Constança Providência, **Effect of symmetry energy on properties of asymmetric matter**

Pause : 11:00h-11:30h

Session VI: Chairman: A. Fantina

11:30-12:00h I. Vidaña**, Symmetry energy within the BHF approach**

12:00-12:30h X. Roca Maza, **The pygmy dipole strength, the neutron radius of 208Pb and the symmetry energy**

12:30-13:00h Domenico Logoteta, **Estimation of the effect of three-body forces on the maximum mass of neutron stars**

Comida-Lunch: 13:00h-15:30h

Session VII: Chairman: C. Albertus

15:30-16:00h Bruno Juliá, **Aspects of ultra-cold atom physics**

16:00-16:30h Luis Roso, **Intense infrared lasers and laboratory astrophysics**

Pause : 16:30h-17:00h

Session VIII: 17:00-18:00h **Discussion session and conclusions**