Simbol-X: The hard X-ray Universe in focus

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Sponsorship

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FOREWORD

The *Simbol-X: the hard X-ray universe in focus* international workshop took place last may in Bologna, at the CNR Conference Centre. This was the second international Simbol-X workshop, after the one organized in 2004 in Paris. The outcome can be considered more than successfull, having gathered more than 150 scientists for a three-day discussion on the scientific impacts of the forthcoming Simbol-X mission.

The scientific programme was articulated into the following nine sessions, each one containing both solicited and contributed talks:

1. Mission and general
2. Supernova remnants: acceleration, shocks and nucleosynthesis
3. Cosmic X-ray diffuse background obscured accretion and super-massive black holes census
4. The galactic centre
5. Neutron stars
6. Black holes accretion/ejection phenomena
7. Acceleration mechanisms in jets and radiogalaxy lobes and hot spots
8. Non thermal emission and shocks in clusters
9. It takes two to hard X (additional science)

The above programme was also complemented by a robust poster session, with more than 50 poster contributions.

X-ray imaging observations, performed first by Einstein and ROSAT in the soft X-ray band below $\sim$ 3 keV and then by ASCA, BeppoSAX, XMM-Newton and Chandra, up to 8-10 keV detected tens of thousands of X-ray sources and resoved nearly 100% of the CXB below a few keV and up to 50% at 6–8 keV. These observations increased by orders of magnitude the discovery space for compact objects of all masses and for thermal plasma sources. However, they still leave open the fundamental issues, such as what is making most of the energy output of the CXB in its peak spectral region, i.e. around 30 keV. Above 10 keV the most sensitive observations have been performed so far by collimated instruments (e.g.: Beppo-SAX/PDS), or coded masks instrument (e.g.: INTEGRAL/IBIS, and Swift/BAT). Only a few hundred sources are known in the whole sky in the 10-100 keV band, a situation recalling the pre-Einstein era during the '70s. A new window in X-ray astronomy above 10 keV must be opened, producing an increase of the discovery space similar to that obtained with the first X-ray imaging missions. This will be achieved by Simbol-X.

Simbol-X is a new technology, hard X-ray astronomy mission, completing its Phase-A study in 2007. The mission is carried out jointly by France and Italy with participation of German laboratories, for a launch date at the end of 2013. Simbol-X is dedicated to hard X-ray imaging and spectroscopy in the 1-100 keV X-ray band, coupled, for the first time, to microCrab sensitivity.

Taking advantage of emerging technology in mirror manufacturing and spacecraft formation flying, Simbol-X will push grazing incidence imaging to ~80–100 keV, providing an extremely large improvement (up to about three orders of magnitude) in sensitivity and angular resolution, compared to all instruments that have so far operated above 10 keV. This technological breakthrough will open a new window in astrophysics and cosmology, enabling detailed studies on a very wide range of sources, such as galactic and extragalactic compact sources, supernova remnants (SNR), young stellar objects, clusters of galaxies, and the cosmic X-ray diffuse background (CXB). The very large discovery space that Simbol-X will uncover is particularly important for the advancement of the following two crucial areas in astrophysics and cosmology, which define the core scientific objectives of the mission:

- Black holes physics and census, and
- Particle acceleration mechanisms.

Based upond these perspectives, the *Simbol-X: the hard X-ray universe in focus* international workshop brought together the international community, for detailed reviews and discussions on the scientific breakthroughs that Simbol-X will enable on its core objectives and the additional scientific topics as indicated in the programme outlined above.

We acknowledge the fondamental collaboration of all Scientific and Local Organizing Committee members for their contribution to the organization of this workshop at all levels. We would also like to thank all participants who have allowed such a successful and fruitful workshop, and all the the authors that have dedicated their time and effort in the preparation of the present Proceedings volume.

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