

Concluding Address

Franco Giovannelli *

INAF – Istituto di Astrofisica Spaziale e Fisica Cosmica - Sezione di Roma
Area di Ricerca CNR di Roma-2, Via del Fosso del Cavaliere, 100, I 00133 Roma, Italy

Abstract Before to conclude officially this workshop - far from me the idea to attempt some concluding remarks already well done by Vladimir Dogiel, Giulio Auriemma and Janusz Ziołkowski - I would like to comment few highlights coming out from our fruitful week of discussions on *multifrequency astrophysics*, without any pretension of completeness.

Key words: Multifrequency Astrophysics

1 COMMENTS ABOUT SOME HIGHLIGHTS

I would like to comment few highlights coming out from our fruitful week of discussions on *multifrequency astrophysics*, without any pretension of completeness.

- **Cosmic Microwave Background contamination:** As discussed by Giovannelli & Sabau-Graziati in the Opening Remarks talk of this workshop, the analysis of WMAP source catalog has shown that the vast majority of bright foreground extragalactic sources detected in CMB maps are blazars. So, they contaminate the CMB, and consequently a warning is mandatory in analyzing the results of measurements like BOOMERanG as deeply discussed by Sergio Colafrancesco and collaborators. Moreover, all the future CMB measurements of polarization can be affected by the presence of the foreground blazars, which contaminate the measurements even more than the temperature measurements.
- **Gamma Ray Bursts:** The origin of γ -ray bursts still constitutes the main problem of astrophysics today. Although evidences of their extragalactic origin have been brought by the BeppoSAX, HETE, and SWIFT detections and by the association of GRBs with SNe, energetic evaluations and analysis of the BATSE-CGRO catalog cannot exclude their galactic origin, at least for a sub-class. The new measurements of the SWIFT satellite have detected up to date of the workshop about 50 GRBs, 10 of which with the known redshift of the host galaxy. This enhanced the average redshift of GRBs to 2.4, contrary to the pre-SWIFT one which was 1.2. Moreover, the detection of short GRBs open a new problem in understanding their origin, both in distance and in progenitor. It seems that some short GRBs are just giant flares of distant SGRs (Soft Gamma-ray Repeaters).
- **Jets from Cosmic Sources:** The existence of relativistic jets have been experimentally proved both in galactic and extragalactic sources; deeper multifrequency studies on their origin and interactions with the surrounding matter would be desirable. Ultra-relativistic jets could be the vehicle in transmitting energy of γ -ray bursts if they were extragalactic in origin.
- **SGR, AXP and Magnetars:** As I commented in the Concluding Address of the Frascati Workshop 2003, “*these three types of objects are probably correlated. However such correlations are not yet well understood. My feeling is that such objects will deserve surprises for the next Frascati Workshop*”. As discussed by Giovannelli & Sabau-Graziati in the Opening Remarks talk of this workshop, recent measurements of the spin down rates of SGRs and AXPs have been interpreted as evidence of very strong magnetic fields at the collapsed object poles, roughly two orders of magnitude greater than

* E-mail: franco.giovannelli@iasf-roma.inaf.it

those of the ‘normal’ X-ray pulsars. Alternatively, the observations can also support the hypothesis that SGRs and AXPs are neutron stars that have suffered a transition into a denser form of nuclear matter to become, presumably, strange stars or quark stars. Internal heat and slow gravitational contraction long after this transition can power both their quiescent X-ray emission and their star quakes, which produce ‘soft’ gamma ray bursts.

In the magnetar model, SGRs are isolated neutron stars with teragauss exterior magnetic fields and even stronger fields within, making them the most strongly-magnetized objects in the Universe. However, the nature of magnetar is not yet proved.

We could speculate as follows: if magnetic fields of $\sim 10^{15}$ G can be expected in order to explain the behaviour of magnetars, an almost ‘obvious’ consequence can be derived from the diagram magnetic field intensity versus the dimension of the relative cosmic source: for B up to 10^{15} G, the correspondent dimension of the source is of ~ 10 m. This could be the dimension of the acceleration zone in a supercompact star, probably a quark star.

This not yet solved problem is one of the hottest in modern astrophysics.

- **Ongoing Experiments:** Interesting perspectives for the future has been pointed out by several colleagues, who have discussed new experiments like REM, ECLAIRS and GLAST for measuring the prompt GRB emissions, AGILE and MAGIC which could give the possibility of measuring flaring activity in VHE sources as well as the detection of a VHE afterglow from GRBs, the LOBSTER novel telescopes for monitoring the sky with unprecedented sensitivity and angular resolution of ~ 1 arcmin, the GRAPE γ -ray polarimetric experiment, the MEGA project for medium energy γ -ray astronomy, the GAW experiment for very large field of view imaging atmospheric Cherenkov telescope, the WSO satellite for UV astrophysics, and X-Shooter for wide band spectroscopy for the VLT.

2 CONCLUSIONS

During this workshop we have once more remarked that:

- **a) multifrequency astrophysics is mandatory** for a faster and better development of science;
- **b) astrophysics is clearly moving toward higher and higher energies.** HE, VHE and UHE astrophysics are the most powerful tools for sounding the deepest secrets of the Universe.

I completely agree with the *nomination for the conference hit* given by Janusz Ziołkowski to the two spectacular events: the **giant flare of SGR 1806-20** (27.12.2004), which threw a new light not only on magnetars, but possibly also on a certain class of short gamma ray bursts and to **GRB050509b** – possibly the first short gamma ray burst with a measured distance ($z = 0.226$).

Finally, on behalf of the members of the Scientific Organizing Committee, I would like to express many thanks to the participants, and to the members of the Local Organizing Committee.

I could say more words, but I sincerely think that the moment to close this workshop has actually arrived. Thanks a lot to everybody.

The workshop is closed, see you next time!