

Concluding Address

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Abstract Before to conclude officially this workshop - far from me the idea to attempt some concluding remarks already well done by Guennadi Bisnovaty-Kogan and Janusz Ziolkowski - 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.

- **Hubble Constant:** The problem of the determination of the Hubble constant is still open. The most probable value of the Hubble constant suggested by Nino Panagia a few years ago here in Vulcano was $H_0 = 59 \pm 6 \text{ km s}^{-1} \text{ Mpc}^{-1}$. A couple years ago it was discussed that from the 2dF Galaxy Redshift Survey (2dFGRS) the derived total mass density parameter is: $\Omega_m = 0.35 \pm 0.14$, giving a value $\Omega_0 = 1.11 \pm 0.07$, with an Hubble constant $H_0 = 70 \pm 7 \text{ km s}^{-1} \text{ Mpc}^{-1}$. The results obtained for Ω_0 from BOOMERanG and from 2dFGRS are converging to a flat Euclidean Universe. Further adjustments on the values of Ω_0 will be possible when a better determination of the Hubble constant will be available. This year, its best estimate is $H_0 = 62 \pm 6 \text{ km s}^{-1} \text{ Mpc}^{-1}$. The most recent estimate on the other end of the scale, that of WMAP is $71^{+3}_{-2} \text{ km s}^{-1} \text{ Mpc}^{-1}$. So, it seems that the Hubble constant at last is converging to a *real constant value*.
- **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 satellite 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. Improvements in understanding the origin of GRBs are now coming from HETE and INTEGRAL missions, as well as from the forthcoming experiments, such as SWIFT, REM, AGILE and MAGIC. Hopefully we could have news just in occasion of the next Frascati Workshop.

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- **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:** 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.
- **Ongoing Experiments:** Interesting perspectives for the future has been pointed out by several colleagues, who have discussed new experiments like SWIFT and REM for measuring the prompt GRB emissions, AGILE and MAGIC which could, for instance, give the possibility of measuring flaring activity in VHE sources as well as the detection of a VHE afterglow from GRBs.

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 Ziolkowski to **GRB030329 = SN 2003dh**, the “**Rosetta stone**” of gamma ray bursts (Elena Pian) or the “**smoking gun**” evidence of GRBs-SNe connections (Guido Barbiellini).

This event provided the first secure association of GRB with a SN explosion. This is a direct argument in favor of the idea of Arnon Dar and his coworkers when claimed that optical spectrum of SN 1998bw might be used as a template to search for the underlying SNe in the more distant afterglows.

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!