

Ultraviolet Astronomy: views from the community.

A report from the NUVA* on-line questionnaire.

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Introduction

The Network for Ultraviolet Astrophysics (NUVA) is a pan-european network set-up to identify the needs of the astronomical community in the UV domain and eventually propose actions to structure it around new projects. It has first been established within the Opticon FP6 program (financed by the European Union), but is now continuing within a broader range. After publishing a first report “Fundamental Questions in Astrophysics: Guidelines for future UV Observatories, 2006, A.I. Gomez de Castro and W. Wamsteker, Eds, Astrophysics and Space Science, 303, Ns 1-4), a new volume was prepared, focused on the UV projects being generated by the astronomical community world-wide, as a result of the first NUVA conference held at El Escorial (Spain) in May 2007 (A. I. Gomez de Castro and N. Brosch, Eds, 2009, Astrophysics and Space Science, 320, Ns 1-3).

The NUVA Network is now continuing its task in planning a roadmap exercise. Because of the diversity of interests it was felt necessary, as part of this exercise, to propose an on-line questionnaire to understand the priorities of the community. This has been proposed in the fall 2008, and its outcome is now analysed here.

The UV community

The questionnaire has received 199 answers by end of April 2009. All ages are represented rather evenly (see Fig. 1), and contrary to common thoughts, there is a genuine interest in UV science even in the young generation. Most users have a prime interest in multi-wavelength coverage, the primary background being optical astronomy. Most of them are not involved in instrument developments.

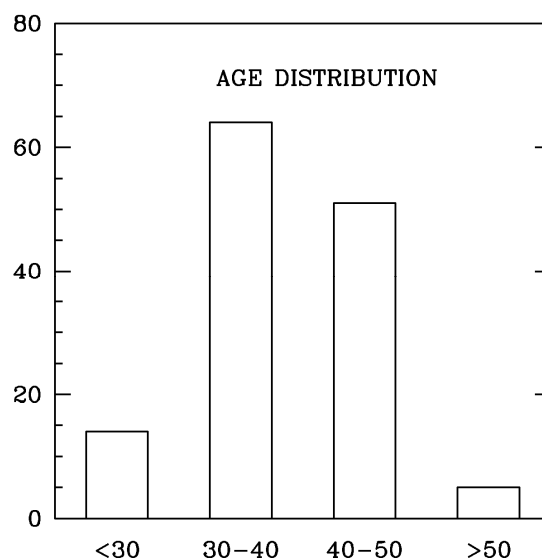


Fig. 1: Age distribution of astronomers having answered the questionnaire

* Details on the Network for UV Astronomy can be found at <http://www.ucm.es/info/nuva>

The research areas are quite diverse, starting with stellar physics (as in the IUE times), but with a growing community in extragalactic astronomy and interstellar/intergalactic medium. The questionnaire was not detailed enough to allow a distinction between sub-categories, like for instance, exoplanet research or protoplanetary disks, so that very specific needs may not be represented.

By countries, the largest interest is found in Italy, Spain and Russia, followed by other countries like France, Germany or the UK (see Fig. 2). An important contribution came from the U.S.A., though it certainly under-represents the interests in such a large community. International organisations like ESO or ESA are well represented also, and four answers were even received from the United Nations.

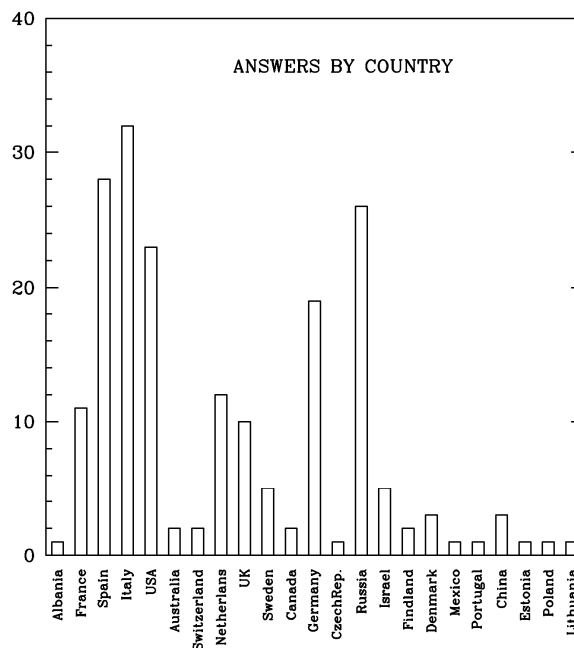


Fig. 2: Distribution of answers by countries

Recent use of UV data (less than 2 years) is mostly based on archival data rather than fresh observations, a fact probably due to the lack of easy accessible observing facilities.

The instrumentation needs

The community uses or requires more spectroscopy than imaging (by about a factor of 2), but it is to be noted that efficient imaging facilities in the UV were only recently made available (with the implementation of the Advanced Camera for Surveys on the Hubble Space Telescope in 2002). A small fraction of the community uses both imaging and spectroscopy.

The primary range of interest is the far (110-200nm) UV range, closely followed by the near-UV one (200-320nm). There is a substantial fraction (one third) of the community interested to go down to the Lyman limit (91.2nm) but only a small one wanting to go further down to the extreme UV (see Fig. 3).

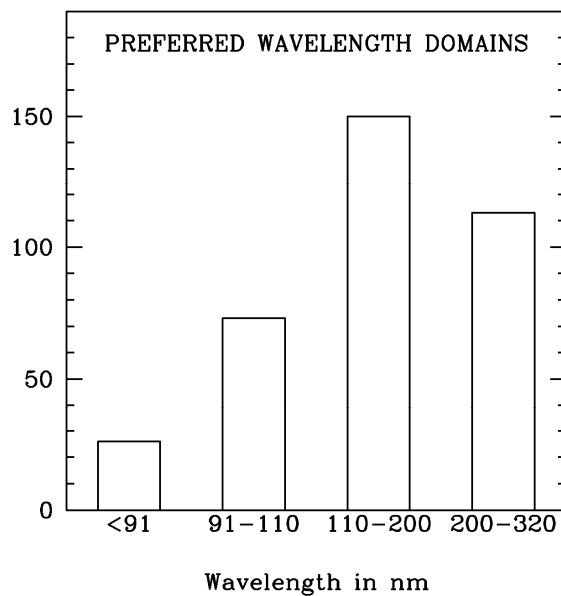


Fig. 3: Spectral range of interest

In imaging, the Field of View (FOV) requested ranges from 5 to 60 arcmin essentially. The wishes for time resolution go from 1 to 300 seconds or more, with a few requests for very high time resolution (0.1 sec or much less). There is some interest in polarimetric mode (25% of the answers).

In spectroscopy, the requests in spectral resolution can be broadly distributed into three categories: 1000-3000, 10000, or 50000. Only few users ask much more (or much less...) than that. Time resolution is not a major constraint here, although a few users ask for a few seconds or less. In terms of FOV, most users would be satisfied with a field between 1 and 5 arcmin, but some requests exist for much larger fields (up to 60 arcmin), presumably for surveys. Like for imaging, a quarter of the population is expressing an interest in spectropolarimetry.

About half the community is requesting a long-slit mode, while about a quarter is interested in new techniques like Multi-Object or Integral Field spectroscopy.

Telescope size.

The questionnaire proposed only a limited choice of possible telescope diameters: 2, 6 or 20m. An equal number of users would be satisfied with a 2m telescope (79 answers) and with a 6m telescope (75 answers). Surprisingly few (13 only) are requesting a 20m one, possibly due to fears in its feasibility. Some answers did not express a preference at all.

Some specific comments are made about the following points:

- The need for a high dynamic range
- The need to be immune to bright objects in the field
- The interest in high orbits for long observations

Conclusion

As expected, a broad range of interests has been expressed, pointing towards a general, observatory-type mission. It is however not clear if the diversity of requests can be satisfied with a small set of instruments only. The one challenge that remains is to close-up the technological break around 110nm, which forces to artificially separate many science cases, like for instance low redshift separated from high redshift galaxies, or the OVI resonance lines separated from the NV or CIV hot plasma tracers, etc...

A major breakthrough expected in UV technology is a new generation of detectors, CCD alike, with high quantum efficiencies, high dynamical range and immune to bright sources, to substitute the present generation of MCP's.

This questionnaire shows an active and young community, with a broad range of scientific interests, requesting new UV instrumentation. The existence of such a community is the best guarantee for a good use of the next generation facilities. As a word of caution however, there is a risk to lose those competences if too long a gap appears between the end of Hubble's life and the next generation of instruments like ATLAS-T. The current scarcity of UV instruments should thus be addressed rapidly by the community; in the mean time, a refurbished HST and smaller, dedicated UV missions like Tauvex, Astrosat, WSO... will help to keep it alive.