Turning didactic concepts into working knowledge

The Hindu MASSIMO RAMELLA: I think that to use, develop and maintain the Virtual Observatory is an importrant choice for astronomy in India. Photo: Vipin Chandran

Massimo Ramella, *internationally renowned expert in astronomy, is the team leader of the outreach and education package of the European project of the Virtual Observatory (EuroVO). In an exclusive interview to* **G. Krishnakumar** *in Kochi,* Dr. Ramella *shares his views on various aspects ranging from virtual observatory to the popularisation programmes related to it among the young students.*

Could you elaborate on your contributions to astronomy and the Virtual Observatory in particular?

My career in astronomy has been mostly devoted to the study of the large-scale structure of the universe and of systems of galaxies. Today we know a lot more but when I started these topics were quite hot.

For example, in the Eighties the existence of poor systems of galaxies (i.e. groups including only few galaxies like our Local Group with the Milky Way and Andromeda) was questioned.

I have been lucky to be in the right place with the right group when the most exciting results started to appear (I worked with John Huchra and Margaret Geller at the Center for Astrophysics of Cambridge, Massachusetts, from 1987 to 1993 and then kept visiting them until recently).

After that, I worked in Europe collaborating with major programmes as new telescopes and instruments were becoming available. Since 2005 a large fraction of my time is devoted to outreach and education and I am the head of the public outreach education office of the Astronomical Observatory of Trieste.

My collaboration with the virtual observatory (VO) began in 2007 and still continues. Within the VO, my responsibility has been to lead the group of people that has developed a programme for education based on modified version of the professional VO.

Are there any additional benefits in using the Virtual Observatory?

The VO in general is very useful since it allows astronomers to forget about problems like formats of the files, exchange of results between different software tools, communication protocols with international databases, manipulation of huge data tables etc.

But for the school, the VO is simply outstanding. It puts in their hands some of the best achievements of astronomers. It also allows to replicate on a smaller scale the ‘real' work of an astronomer since our tools have a professional look-and-feel.

Teachers can use the VO to make small measurements that are very important to distinguish our products from those that simply allow to admire images without any active involvement.

Is the virtual observatory all about working with observatory data alone or are there any implications to theoretical astronomy?

The VO is really important for retrieving data from all electronic archives scattered around the world and to display them, cross-correlating with tables of big online catalogues or of published scientific papers. However, there are aspects that are rather relevant to theory.

In particular there are tools that have been modified in order to explore theoretical models producing huge simulations.

Although the main functionalities are similar to those used with real data, the effort to include big simulations among possible sources has been rather large. Of course theory benefits from an efficient and simple exploration of numerical results.

Which are the popularisation programmes of the virtual observatory among school children that you have initiated in your country?

In fact, the transfer of some benefits from the professional world to schools and enthusiasts has been my main role within the VO. Our educational tools have been developed in three years with several cycles of interactions with both students and teachers both in high school and at the university. A description of our mission and of our products is available here: http://wwwas.oats.inaf.it/aidawp5.

In fact, the simple translation of our tools in some of the main languages in Europe has been a great effort that has brought many schools to contact us in order to develop programmes together. The tools and products that we use have really two main goals — to bring the sky to kids who often cannot see it in our light-polluted cities and to show kids that it is possible to make simple measures from what you see in the sky and obtain answers to questions that may seem impossible when they are first read.

An example, we measure the angular size of a nebula (extremely easy with our tools) that was first observed by Chinese astronomers in 1054. We search in the big online catalogues a measurement of the expansion velocity of the nebula and from this information we derive the distance between us and the nebula.

How do you analyse the future and prospects of the virtual observatory related research in India?

I think that to use, develop, and maintain the VO is an important choice for astronomy in India.

Such a commitment is evident also from the fact that the week of October 17-21, a large community of astronomers and software engineers will meet at the IUCAA, Pune. I think that to make the best use of very expensive data that are often, or even mostly, underused is a very good strategy.

Furthermore, the VO helps distributed research in astronomy which, especially in a huge country like India is not a minor benefit.

You are here to train a group of researchers from across the country on doing science with the virtual observatory. How do you view the scope and importance of the programme?

I think that the best way to quickly learn something is to have someone to guide you while you work “with your hands on.”

It happens that some concepts are known by students from textbooks, like celestial coordinates, but when you bring them to the telescope and ask to point in a given direction these textbook concepts do not help. Our VO uses cases that can transform didactic concepts into working knowledge.

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