

giovanni bignami **view from the top**

It's time to catch that falling star

It is 400 years since Galileo first looked at celestial objects through a telescope. His devastating news was that, after all, 'celestial' they were not—rather, they were mundane and imperfect like our surroundings. The Moon had mountains, the Sun had spots, Venus phases, Saturn 'ears' and Jupiter revolving satellites.

Such is the revolution we celebrate in 2009, in the wake of last month's release of Astronet's 20-year plan for astronomy in Europe (*see news, page 5*). We do so, conscious that in the past decade a revolution of similar import has been brought upon us by the grandchildren of Galileo's spyglass, on Earth and in space.

We now know that Giordano Bruno, Italian philosopher, Galileo contemporary and martyr of the Inquisition, was right: there is an "infinity of worlds" out there. In just over a decade, 330 (and counting) new extra-solar planets have been discovered. Not only do we have proof of their existence, we have seen a few of them, and a new Earth is probably just round the corner.

European observers have consistently been at the forefront of this new astronomical revolution, from their discovery of the very first extra-solar planet onwards, and they want to remain there. But, like all Europeans, they know they face hard times in gathering the meagre contribution each EU citizen gives to astronomy: about 5 euros a year.

Astronomers are scientists: they don't complain, they get organised. In times of paucity, a strategic plan is not only desirable, it is the only way to go in a union of 27 countries, large and small, burdened (and enriched) by 20-odd centuries of history and 20-odd languages. So now, thanks to Mike Bode and his crowd, we have an excellent strategic plan. It results from a couple of years of work 'by the people, for the people': that is, it was constructed bottom-up by many tens of astronomers who, in turn, consulted a much wider community.

Such a plan was badly needed on both scientific and political grounds. Although the science may simply appear to be that of understanding our Universe, it can be organised according to many different priorities; from the ground or from space, with instruments large or small, working at different wavelengths, and so on. The science roadmap was traced starting from such fundamental questions as the origin of galaxies, stars and planets or that of life itself and its presence elsewhere.

Not surprisingly, most questions, and many of the answers, were coherent with, and complementary to,

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those in a similar exercise, Cosmic Vision 2015-2025, carried out by the European Space Agency a couple of years ago on astronomy from space. The scientific community feels reassured by such convergence, especially given the truly independent origin of the two reports.

Astronomers agree that we need, for example, a big optical instrument on the ground, ESO's Extremely Large Telescope, as much as we need a similar instrument for X-ray astronomy in space, ESA's International X-ray Observatory. We also agree that we should study our Universe beyond the good old photons that we have exploited for millennia. Neutrinos and gravitational waves will give a new insight into objects and phenomena out there, from the Big Bang to neutron stars.

Politically, what stands out from the Astronet report is the need to harmonise public funds, since we can't yet (but let's not give up...) count on significant private funding for European astronomy. Funding, at the moment, is 99 per cent local, by which I mean at the national level, and 1 per cent federal, that is at the EU level. This should change. The union should be proud of supporting one of the pinnacles of its intellectual achievements, which, moreover, as in the case of space, produces fundamental technological advances. Ways must be found to remedy this state of affairs, which is demeaning for the union.

For example, the great radio-astronomy project SKA, high on the Astronet wish list, consists basically of thousands of identical antennas, arranged in a clever array. Of course, the first prototypes of both antennae and receivers should be devised and developed using national research funds. But subsequent production, of great interest to a variety of European industries, should definitely be supported by the union, as is the satellite production in the Galileo project, after ESA developed the prototypes.

In general, much infrastructure work is needed in modern astronomy, covering topics from electronics to computer science to precision mechanics to advance coating and many more. While we guarantee the science, we ask our union to move in, maybe going up from 5 to 6 euros per year per European. They all love to look up to the sky, and they know that if there is a will there is a way.

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