Abstract

This paper describes the *Hunt for Black Holes* project, a new workshop addressed to groups of about 30 secondary school students.

The *Hunt for Black Holes* is a new concept workshop addressed to groups of about 30 secondary school students, who have just finished their penultimate school year. Its main goal is to introduce the students to scientific research and industry in the field of space technology and applications. The formal goal of the students was to make a proposal for a high energy space telescope to hunt for black holes, taking into account both the scientific rationale, the industrial technologies and the actual assigned budget.

The workshop lasted eight days, a total of about 50 hours. From the very beginning the students were divided into six competing groups. Each day they attended laboratories and lessons given by scientific researchers and aerospace industry representatives, and gathered information about both black holes and space missions.

Each group had to formalise its choices on the last day by making a proposal for a high energy space telescope to study black holes. The groups had to specify the scientific goal of their missions (which aspect of black holes they wished to investigate), the energy ranges they wished to explore, the mirrors, the detectors, the spacecraft (solar panels and electronics all-included) and the launcher. They had 30 credits to buy the components and pay for the launch itself. The groups had to prepare a presentation and submit the project to a scientific panel. Just five minutes before the presentations were due to begin, the groups were told that the budget had been reduced to 23 credits because of a sudden change in the strategic decision of the space agency. They were given an extra 10 minutes to take this new piece of information into account. This was a very interesting moment in the workshop: the groups naturally joined forces, making every effort to maintain the scientific relevance of their missions.

At the end a panel of scientists chose the space telescope (or telescopes) that were worthy to fly into space. We monitored the results of the workshop afterwards by using self-evaluation questionnaires filled out by every student. According to the students, they developed skills in interaction knowledge, sharing knowledge and team-building, discussion and problem solving.
They also felt they had acquired a deeper knowledge of the Universe and the space technologies for observation and scientific research and a greater ability to focus on the main aspects of an astronomical space mission.

We strongly believe that this approach, which uses a combination of a role-play approach, hands-on strategy and some more formal education constitutes a format that can easily repeated in most European countries to fight the disaffection of secondary school students from science curricula at the university level.

The *Hunt for Black Holes* was organised at the end of the scholastic year 2006-07 by the Public Outreach & Education office (EPO) of the Astronomical Observatory of Brera (Milan) and the ASF Milano, the Milan Section of the Space Astrophysics and Cosmic Physics Institute. It was hold in collaboration with Thales Alenia Space (Milano, Italy) and Media Lario Technologies (Lecco, Italy) and coordinated by the onlus association Odisseospace. The workshop was financed by ASI (Italian Space Agency) and the National Agency for Education (ex IRRE). ESA (European Space Agency) supported the workshop as well.