

## AHEAD2020 - WP4- Public Outreach Open Day Activities - First Year Report

The Public Outreach package (WP4) has as a goal to publicise the scientific results in High Energy Astrophysics and Gravitational waves to the general public and primarily students. This is accomplished via a series of instruments which include running two regularly updated web-pages, in both Astrophysics and Gravitational waves, production of scientific videos, posters and organisation of schools and open day events. This work package is based on the joint efforts of seven research Institutes and Universities. These cover the major European countries (Germany, United Kingdom, France, Italy, Spain). Our work relies on the legacy of our previous successful AHEAD project.

During the first year of the project, we encountered some unforeseen difficulties because of the CoVID pandemic situation. These affected only partially our work plan. The production of new material proceeds normally with no interruption. These include a web-game (INAF-OAR), an X-ray astronomy video (IFCA) and a planetarium dome video (NOA). The web-page continued its operations posting news items and informing the public twice a week. However, the open days and schools faced disruptions. Some of the activities mentioned in the proposal included a) teaching of the African under-privileged community in Leicester b) Astronomy summer camps in Athens and Leicester c) open days in Rome, Athens and Toulouse. Few of these activities took place. For example, we succeeded Open Air meetings at the visitor centre of the National Observatory of Athens in September keeping safe distances and wearing masks. Many of these nights have been devoted exclusively to X-ray Astronomy. However, some other activities have been hosted in the web. These include:

- 1) **NOA:** Teaching Astronomy for children 11-13 year old. This was a 2 hour activity per week lasting for 6 weeks. One week was exclusively devoted to high Energy Astrophysics (5/6/2020). This activity took place in March-April-June 2020 and it has been repeated again in December 2020 January 2021. A special X-ray astronomy lecture has been developed (L. Koutoulidis) which has been translated in English and is available via the AHEAD2020 web-page; <http://ahead.astro.noa.gr/index.php/2020/06/18/educational-presentations-for-kids/>. The first online X-ray Astronomy session for adults took place on the 12th of December. This will be a regular event and it is scheduled next time for the 13th of March. Finally, NOA organized a two day Astronomy summer school for final year high school students (24-25 August 2020).
- 2) **EGO:** The EGO node has started a programme of remote live visits of its facilities in Cascina (PISA) and of the Virgo detector. The programme started at the end of October 2020 and collected (up to February 2021) 2000 remote visitors on zoom and around 3000 visualizations on Facebook and youtube. It is possible to book a visit by email ([info@ego-gw.it](mailto:info@ego-gw.it)) or on [ego-gw.it](http://ego-gw.it). A remote visit was also offered by EGO in the occasion of the European Researchers 'Night on November 27<sup>th</sup> 2020 <https://www.ego-gw.it/blog/2020/11/20/european-researchers-night-2020-at-ego-virgo-en>

EGO is developing also a virtual tour of its site and the Virgo interferometer, which will have also additional educational features about gravitational wave science and the different technological challenges of the detector. It will be ready at the end of April, 2021.

- 3) **IFCA:** IFCA delivers public outreach talk about High Energy Astronomy (black holes, Athena) in Spanish.

A kahoot activity for kids has also been organized around X-ray Universe and Black holes to commemorate the European Researchers Night 2020. The activity run online and also as an offline assignment and reached around 60 scholars (in Spanish).

An outreach talk about Black Holes and X-ray astronomy for the Science Week 2020

IFCA also participated in a workshop about Astronomy for the mentoring of young people with high capacities.

- 4) **INAF-OAR** INAF - OAR staff took part at the European Researchers' Night in November 2020. The event was in web streaming mode. Two public activities were streamed from OAR: The first was a talk show. Researchers with different astronomical expertise present their job and the scientific discoveries about their astrophysics field. The activity involved high energy and gravitational waves astrophysics. The event was focused on gender balance in astronomy. ( 10.000 views)

The second was an online laboratory for kids about Energy. During this activity one astronomer explained how different phenomena in the universe involve different levels of energy. The kids asked questions and observed several lab experiments, suggesting what to do to the researchers involved. (40 participants)

- 5) **IRAP:** IRAP devised a source-crowding game exploiting the resources from the ESA's XMM-Newton X-ray mission. The game has been already translated in a number of languages (French, Spanish, Italian, Greek). The game can also be accessed via the AHEAD2020 public outreach web-page

A number of public outreach talks on X-ray and gamma-ray Astronomy have been organized.

2 March 2020 : "Our galaxy" - 1 hour talk to a class of 9 & 10 year olds (Natalie Webb)

24 March 2020 : Skype a scientist, 1 hour with 10 year old students (Gabriele Betancourt)

31 March 2020 : Press release on intermediate mass black holes, e.g.

<https://hubblesite.org/contents/news-releases/2020/news-2020-19>

<https://esahubble.org/news/heic2005/>

1 April 2020 : Interview live on the BBC's World Service radio on intermediate mass black holes (Natalie Webb)

July 2020 : Interviews with journalist to produce an article on XMM-Newton for Mook Mars (via telephone, Natalie Webb)

8 August 2020 : 1 hour talk to the public on The extinction that will bring about the Universe, the Fleurance Astronomy festival (Peter von Ballmoos) <https://www.festival-astronomie.com/>

9 August 2020 : 1 hour talk to the public on Balloons for Astronomy, the Fleurance Astronomy festival (Peter von Ballmoos) <https://www.festival-astronomie.com/>

15 September 2020 : One day with a journalist to instruct him on high energy astrophysics at IRAP (Natalie Webb)

20 September 2020 : One hour national radio show, 'France Culture' on gravitational wave events (Natalie Webb)

2 October 2020 : Public conference on black holes at the "Forum des Savoirs" and live streamed through facebook (Natalie Webb)

9 October 2020 : Skype a scientist, 1 hour with 8-10 year old students (Gabriele Betancourt)

20 October 2020 : 1 hour discussion on high energy astrophysics with a group of first year University Toulouse III students at IRAP (Natalie Webb)

20 October 2020 : Skype a scientist, 1 hour with 7-14 year old students (Gabriele Betancourt)

21 October 2020 : 1 hour discussion on high energy astrophysics with a group of first year University Toulouse III students at IRAP (Natalie Webb)

22 October 2020 : 1 hour discussion on high energy astrophysics with a group of first year University Toulouse III students at IRAP (Natalie Webb)

23 October 2020 : 1 hour discussion on high energy astrophysics with a group of first year University Toulouse III students at IRAP (Natalie Webb)

13 November 2020 : 1 hour discussion on high energy astrophysics with a group of first year University students from Brittany (via zoom, Natalie Webb)

10 December 2020 : Press release for CLAXSON and the XMM-Newton catalogue (Natalie Webb) <https://www.cosmos.esa.int/web/xmm-newton/news-archive-2020>  
<https://www.irap.omp.eu/en/2020/12/21-years-of-xmm-newton-celebrated-with-a-new-catalogue-and-an-ambitious-citizen-science-project/>

4-8 January 2021 : Various high energy activities with 14 year old student at IRAP (Natalie Webb, Gabriele Betancourt)

21 January 2021 : 1 hour talk on Compact Objects to a class of 14 & 15 year olds at IRAP (Natalie Webb)

9 February 2021 : 1 hour talk on 'X-raying the sky - finding black holes and other extreme objects' + discussion (zoom and facebook - total of 600 participants, Natalie Webb)

9 February 2021 : 1 hour talk on Antimatter to a class of 14 & 15 year olds at IRAP (Peter von Ballmoos)

11 February 2021 : 1 hour talk on Compact Objects to a class of 14 & 15 year olds at IRAP (Natalie Webb)

11-19 February 2021 : Women in high energy astrophysics on twitter and facebook (Gabriele Betancourt, Natalie Webb) <https://twitter.com/AthenaXIFU>  
<https://www.facebook.com/AthenaXIFU>

11 February 2021 : Participation in video on women in high energy astrophysics (Natalie Webb) <https://www.youtube.com/watch?v=qFA8MKYe3UI>

25 February 2021 : Skype a scientist, 2\*30 minutes with 14-18 year old students (Gabriele Betancourt)

26 February 2021 : Skype a scientist, 30 minutes with 9 year old students (Gabriele Betancourt)