

## An Italian project for scientific dissemination: "What Next? Giovani che raccontano il futuro"

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The citizens of the future were extended a unique invitation to witness High Energy Physics firsthand. A group of 130 individuals, aged between 16 and 30, eagerly embarked on a journey to explore 17 INFN sites and engage in conversations with our esteemed scientists across Italy. As they delved into our laboratories, collaborations, and day-to-day operations, a talented director meticulously captured their awe-inspiring experiences and unanticipated discoveries within this previously unknown realm.

The resulting documentary encapsulates the profound emotions that both the visitors and researchers experienced throughout these captivating events. This poignant film is currently being showcased across various Italian cities, granting citizens the opportunity to immerse themselves in the world of high-energy physics. Through the lens of these young, visionary individuals—the citizens of the future—they can embark on a journey that unravels the mysteries behind the scenes of high-energy physics, not just in Italy but also across the globe.

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## 1. The *Physics Involving People* call

The project presented in this document is a dissemination project winner of an internal call of the Italian Institute of Nuclear Physics (Istituto Nazionale di Fisica Nucleare - INFN) to launch innovative public engagement initiatives. Here, a brief introduction will be given about the original call and our winning proposal.

In 2020, the Third Mission Coordination Committee of the INFN [1] started a series of internal calls for public engagement initiatives to involve the general public in physics research to learn about objectives, methods, tools, and benefits. This is done with the intention of the institute to keep pace with the times [2]. Each year new topics will be submitted to the researchers to define the areas of intervention.

The call required a full project prospect with a detailed description of the identified target among the general public, the expenses and the budget, and the expected outcome of such a project. *What Next* won the call within the theme *High energy physics in the post-LHC world: new physics and the post-Higgs landscape*.

The chosen contest was the post-LHC owing to the participation of the endorser to the Future Circular Collider (FCC) Collaboration. In particular, the Ferrara group, with Gianluigi Cibinetto as leader, was the main proponent and followed the organization.

This project was able to involve 17 INFN sites around Italy with scientists participating in the same FCC collaboration: C.N.A.F. – INFN Center for Research and Development on Information and Communication Technologies, Sezione di Bari, Sezione di Bologna, Sezione di Cagliari, Sezione di Catania, Sezione di Ferrara, Sezione di Firenze, G.G.I. – Galileo Galilei Institute, Sezione di Lecce, Sezione di Padova, Sezione di Pavia, Sezione di Pisa, Sezione di Roma 1, Sezione di Torino, L.A.S.A. – Laboratorio Acceleratori e Superconduttività Applicata, L.N.F. – Laboratori Nazionali di Frascati, L.N.L. – Laboratori Nazionali di Legnaro, and L.E.N.A. – Lab. Energia Nucleare Applicata.

During the project's planning, the focus was on the aspects that could have distinguished it from all the other interesting initiatives of the INFN. We were able to summarize the originality in three main points, as follows. As the first point, it was important to involve young people in visiting our laboratories firsthand, but without using the well-known school channels, and try, instead, to reach them personally to have curious persons join. Then, a desire was to use more in-step-with-the-times tools both to promote and to run the initiative, like the standard social (YouTube, Facebook, Instagram, or Twitter), but also try to use more recent social media channels such as TikTok. In addition, people with careers unrelated to physics have been involved to have a fresh point of view during the whole period in the organization. Finally, beyond the direct participation of young people, the goal was to create a final product that could be of interest to everybody and could be used in dedicated events or during other dissemination projects to involve all citizens.

## 2. The Project

The project required different phases of organization and realization. In the next paragraph, the experience of running *What Next* will be described focusing first on the bigger picture of the organization and then focusing on the realization itself.

## 2.1 The organization

The project organization was divided into three main parts to facilitate and separate different processes.

The organization started with the *subscription* and the *contents*. It was important to understand how to engage and reach young people, but it was not possible to neglect the preparation of the content. It has been decided to involve citizens from 16 to 30 years old to have the possibility to listen to the opinions of high school and university students and maybe some early workers. To subscribe to the project they were required to submit a one-minute video. They were not asked to speak about specific subjects but generically to present themselves and to explain why they were curious about the project. In parallel, the preparation of the contents would proceed by dividing the subject into five macro-areas (see Fig. 1): *theory, accelerators and superconductors, detector and electronics, data analysis and computing, and social and environmental aspects*.



**Figure 1:** Introductory slide to the project. Particle physics at the accelerator split into the five macro-areas.

The second phase was bringing the young participants to *visit our laboratory* for a day or more and letting them get in touch with the typical working day of a high-energy physics scientist. Different INFN sites would have the possibility to show different aspects of particle physics at accelerators, from theory to accelerators, detectors, electronics, and data analysis. During the visits, a movie director would follow the reaction and the emotion and the visitors could film or take pictures of anything they wanted.

Such collected material would be then used for the final product to put together a *short documentary* for the involvement of all the other citizens in the same particle accelerator and basic research environment, without the need to visit every single INFN laboratory.

## 2.2 The realization

From the organization to the realization some changes were needed, and additional ideas for the project were added, but the overall structure remained the same. Here, the three phases introduced in the previous paragraph are presented singularly and thoroughly.

The very beginning was the preparation of the website and the start of the advertising. The goal was to decide on a launch date and be ready at that moment for the promotion with all the information necessary for interested people to participate.

As previously mentioned, to keep the product fresh and captivating, it has been asked to an external company to prepare the website: Deepstudio [3]. They helped to prepare a product professional and easy to navigate, following the needs of the users. It was prepared with the introduction of the general idea of the project, the presentation of the INFN, particle physics at the accelerators, the presentation of the macro-areas, the location of the several INFN sites participating in the project, and the form to participate.

To thoroughly follow the organization, a *creative group* has been creatively composed by the author, Ilaria Balossino, researcher, Alessio Attardi, video producer and director, Patrizia Azzi, researcher, Gianluigi Cibinetto, researcher and INFN responsible for the project, Nina J. Kors, screen player and art director, and Marco Scodreggio, researcher. Within this group, all the content and aspect of the organization has been discussed before finalization.

To promote the project in this initial phase, but also later on during the following phases, all the social media channels have been opened [4, 5], a partnership with a YouTube channel called *Un quarto d'ora con il prof* [6] started, and it was essential the collaboration of the INFN Multimedia Office of Bologna [7]. Different contents have been prepared: some short videos to act as teasers, a trailer for the YouTube channel, some YouTube lives, and several posts.

From the physics point of view, a working group dedicated to each macro-area has been created among all the scientists who happily join this project all over Italy. The idea was to prepare a starting presentation to be shared at the beginning of each visit to give a general idea of all the subjects. While visiting and experiencing the life of a researcher inside the laboratories, each INFN site could show specific experiments.

The website was launched on the European Researcher Night in September 2020 and, consequently, the possibility to subscribe to the initiative was closed by April '21.

The subscription reached 130 participants. They were asked to choose an INFN site themselves and they were equally balanced around Italy. This allowed us to accept all participants who presented all the required documents. While being balanced between female and male, the age of all the participants was a bit unbalanced towards the lower limit. Being asked to express a preference about which of the five macro-areas were most of interest, the answers were equally spread.

The second phase of the project involved visits to the INFN laboratories. Due to the pandemic restrictions, the visit started in September '21. Trying to have the video producer in most of the cities and not overlap dates, the last visit happened in December '21. Each INFN site was free to show whatever the researchers were allowed and comfortable with, considering that the visiting groups were, at maximum, 20 people, but most of the time, less than 10.

It has been decided to keep two things almost the same among all the visits: the start and the end. At the start, the presentation of all the macro-areas allowed to give the same overview to all the guests, while, at the end, a moment of discussion was created to allow the guests to ask any question to the researchers. In this part, the guests were asked to express their feelings about the day in a phrase on the Post-it. The result of the Post-it was very intense and a good feedback for the organizers.

As already mentioned, during the visits the video producer (or someone for him in case of impossibility to participate) was present trying to collect as many expressions and comments out of the guests. On some occasions, a few interviews have been set up for one or two guests to have their thoughts on tape.

The result was a lot of wonderful material to analyze and choose from. The final part of the project, which took most of the year 2022, was the production of the documentary. Many meetings happened among the video producer and the screen player and also among them and the researchers. During these months, the 20-minute docu-film has been produced, the subtitles created, the poster has been designed by hand by Nina J. Kors shown in Fig. 2, and the title decided: *Fuori dalla caverna*. It literally means "out of the cavern" and it was chosen to underline how the whole work has been done to open the doors of the INFN laboratories and get the particle physics at accelerators outside in the world. In jargon, sometimes the experimental halls are called the caverns.

The project officially finished for INFN in October '22 when the docu-film was shown for the first time in Ferrara. The evening was organized with the projection of the film followed by some interventions of scientists, one for each macro-area, moderated by a journalist, following the line of work to have professionals to be captivating.

Before releasing the docu-film online to be available to anyone, it has been decided to wait at least a year to have the product new to be used in different outreach and dissemination initiatives. It has been presented, in fact, in several cities around Italy. It will be released online on January 2024 with the help of the INFN communication office [8].

### 3. Outcome

This project followed the INFN's requests to have a product for engaging the general public with particle physics at accelerators. Several scientists from many INFN sites around Italy participated with great enthusiasm as well as our young guests did. The final product *Fuori dalla caverna* is a 20-minute docu-film in Italian with English subtitles to meet the scientist of today, learn about their work, their physics, and understand how many possibilities are available for the future in such an environment.

### References

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Figure 2: Fuori dalla caverna poster designed by Nina J. Kors and Alessio Attardi