



Grasping the cosmos

An art and science project to explore yesterday's and today's universe

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In Arcetri, between 2022 and 2024, a multidisciplinary project with a broad spectrum of content was held. Its main goals were the dissemination of complex scientific topics, the result of the great research work carried out by the institutes on the Florentine hill, and the enhancement of Villa Galileo, following its transformation into one of the sites of the Museum System of the University of Florence (SMA). Promoted by the Galileo Galilei Institute for Theoretical Physics (GGI) and the SMA, *GRASPING THE COSMOS* pursued these goals with the production of a varied, free and accessible cultural offering resulting from an experimental exchange between frontier research, history of science and contemporary artistic practices. Curated by Valeria D'Ambrosio, an art historian and contemporary art curator working in the valorisation of cultural and historical-scientific heritage, and by physicist and science communicator Pietro Centorrino, *GRASPING THE COSMOS* was meant, in the Florentine cultural panorama, as an attempt to prove the importance of a contemporary collaboration between art and science, which is linked to the present with a future-oriented perspective, in a city rich in a historical tradition in this field. A project inspired by the great knowledge revolutions of the past to make them relevant to the pressing issues of our time, is a project which, seated on the shoulders of giants, believes in the value of an updated exchange between humanities and science for the construction of a widespread civic sense seeing social and environmental justice as an essential element in people's education and emotional experience.

The resources made available by GGI-INFN, SMA, INAF and INO and the funds obtained through an intensive fund-raising activity in Italy and abroad were combined to create a programme in four different phases interconnected in terms of the research and production methods employed. The first pilot event that kicked off the programme of free openings at Villa Galileo was *SHE-SCIENCE. La scienza al femminile* (*Il Colle di Galileo*, Vol. 12, 2, 2023, pp. 61-68), a programme of meetings and workshop activities held in October 2022 to accompany the Milla Baldo Ceolin Prize, promoted by the GGI and awarded annually to the best Italian female students of theoretical physics. The project aimed to explore the contribution of women in science, taking a look at the history of women's science, as well as cutting-edge contemporary research in which many female scientists around the world are increasingly playing a leading role. *SHE-SCIENCE* involved scientists and artists in a multidisciplinary narrative aimed at encour-



Photo 1. Guided tour of the exhibition *An Entangled Time Machine* by Tina Salvadori Paz (2023). Ph credits: Giulia Lenzi.

aging the involvement of young female researchers in the STEAM disciplines. Moving from a place of historical importance for an almost exclusive use by the Arcetri research institutes, to a house-museum with a *mission* to open up an important publicly-owned cultural heritage to the local, national and international communities, Villa Il Gioiello immediately proved to be the ideal place to host this kind of event: restored but unfurnished, the Galilean residence appeared as a versatile space, suitable for hosting dynamic programs aimed at non-specialist audiences belonging to different age groups and varying socio-cultural categories.

The following phase (March-May 2023) involved the realisation of the first edition of *Il senso delle stelle*, an artist-in-residence project within the GGI Winter School “Theoretical Aspects of Astroparticle Physics, Cosmology and Gravitation”. PhD course is held every year at the end of March and aims to provide a detailed knowledge of the basic theoretical concepts and main tools for working in the field of Astroparticle Physics, Cosmology and Gravitation. The artist chosen was Federica Di Carlo, whose practice ranges from astrophysics to particle physics with collaborations with international scientists and research centres. The artist’s interaction with the students and teachers at the school was lively and participatory, providing food for thought for both the artist and the physicists, who were offered new ways of interpreting the subjects of their research. At the end of the residency, Di Carlo presented a *site-specific* solo exhibition for Villa Galileo entitled *Tendo a esistere*, inspired by the continuous and incessant movement



Photo 2. Artist Maëva Ferreira Da Costa during the performance *Signal* (2023). Ph credits: Giulia Lenzi.

of information travelling within and beyond Earth's atmosphere through light and cosmic radiation. Focusing on celestial messengers and their remote sources, the exhibition was accompanied by a month-long public programme with workshops, talks and dissemination activities in which scientists from various disciplines discussed the Galilean scientific method to coincide with the celebrations of the 400th anniversary since the publication of *Il Saggiatore*, as well as in-depth conferences on muons, neutrinos, photons and gravitational waves.

The second phase (September-December 2023) arose from an unprecedented international collaboration with the 10th edition of *La Science de l'art*, a French art and science biennial. Organised by the Collectif pour la culture en Essonne, for the first time in 20 years, the biennial overcame the French borders and found in Villa Galileo an international venue where European artists and scientists collaborated on hybrid projects at the intersection of art and science. The two selected artists, Maëva Ferreira Da Costa (FRA) and Tina Salvadori Paz (ITA), alternated between France and Italy to realise, in liaison with Arcetri scientists, two exhibitions for Villa Galileo: *Cosmogonic Orchestra* by Ferreira Da Costa, investigated the origin of the cosmos through a dialogue between scientific theories, shamanic cultures, aesthetic manipulations and technological explorations. Drawing inspiration from different scenarios of cosmogenesis, the exhibition presented itself as an orchestra of music-sculptural objects which, activated by the presence of the public, reinterpreted the score of the first sounds of the universe. Salvadori Paz's



Photo 3. Conference in the Auditorium of Villa Galileo during the inauguration of the exhibition *Inner Worlds Outer Spaces* by Daniela De Paulis (2024). Ph credits: Giulia Lenzi.

An Entangled Time Machine exhibition, on the other hand, investigated the nature of time in an attempt to lead us towards a more complete understanding of the temporal dimensions that characterise our existence. With the construction of two “time machines,” conceived as electronic devices capable of addressing different perspectives on time research, from traditional to quantum, Salvadori Paz suggested a different relationship between past, present and future. Both exhibitions were accompanied by a programme to explore the scientific topics that inspired the artists, thanks to the collaboration with scientists from some of Europe’s leading research institutes, such as INFN, INAF, CNR-INO, LENS, Sorbonne Université, Scuola Normale Superiore in Pisa, University of Heidelberg, and Helsinki Aalto University.

Lastly, for the third phase (March-May 2024), *Il senso delle stelle* second edition was organised with a new artist in residency within the GGI training school. The artist selected for this last project was Daniela De Paulis, whose multimedia practice combines video, sound and performance, and focuses on the concept of Space in its broadest sense, through the filter of radio astronomy, neuroscience and cosmology. The outcome of her stay in Arcetri was the production of the solo show *Inner Worlds Outer Spaces*, born out of the exchange with the history of Villa Galileo and the themes of the Winter School. The exhibition investigated the interactions that keep the Universe alive with the aim of transporting us from an



Photo 4. *FLOW* by Federica Di Carlo (2023). Ph credits: Alessio Attardi.

anthropocentric and geocentric perspective to a cosmic one, in which we find assonances between the nature of Space and our existence on Earth. As previously, the exhibition was accompanied by a rich satellite programme with guided tours, workshops, and meetings with experts, which allowed the public to explore the scientific themes that inspired the works on display, such as dark matter, moon-bounce, quantum cryptography and extra-terrestrial intelligence.

GRASPING THE COSMOS was realised as part of the project “*Sulle tracce di Galileo Galilei: sentieri di scienza ad Arcetri (GGPaths)*”, co-funded by the Tuscany Region (Fund for Development and Cohesion) with a call for advanced training projects thanks to the assignment of two two-year research grants. The Arcetri hill has been declared a historical site by the European Physical Society for the presence of institutes of historical and scientific value: the Department of Physics and Astronomy of the University of Florence; the Galileo Galilei Institute for Theoretical Physics (GGI) of the INFN; the National Institute of Optics of the CNR, the Arcetri Astrophysical Observatory of the INAF and Villa Galileo (National Monument since 1920), where Galileo Galilei spent the last eleven years of his life and completed the treatise *Dialogues Concerning Two New Sciences*. An initiative based on an agreement between the research centres for the cultural valorisation of Arcetri as a privileged site for the creation of museum and didactic-scientific routes to be offered to schools, citizens and the scientific community is currently being implemented. GGPaths was part of this initiative, aiming to develop a research project for two young assignees in order to respond to the need to formulate a renewed concept of extended museum, understood as a place of interpretation of the territory and its own communities. The goal, which was



Photo 5. Guided tour of the exhibition *An Entangled Time Machine* by Tina Salvadori Paz (2023). Ph credits: Giulia Lenzi.

fully accomplished, was to conceive and develop new narratives able to address different audiences, and to create an exchange between scientific research and contemporary artistic research, stimulating new ways of thinking and acting. All this through a program of collective and co-creative events, educational activities, informative meetings and the development of shared thematic paths. The result obtained was surprising, proving the extraordinary potential of the Arcetri hill as a laboratory for a new way of narrating science through the dialogue with art.

The aim of the *GGPaths* project in general, and of *GRASPING THE COSMOS* in particular, was to make the general public aware of the historical and scientific importance of the activity which took place and is currently taking place in Arcetri, using hybrid languages that link art and science. All this is done by promoting the historical and scientific heritage represented by the house where Galileo lived the end of his life, opening up this prestigious venue to a wide-ranging audience, maintaining a very high standard of scientific rigour, and entrusting young artists with the difficult task to translate the extraordinary progress of modern physics into a modern and comprehensible language, in collaboration with renowned scientists. Having identified the contents, the project involved a search for the most effective story-telling strategies to make them accessible. Interactive storytelling favoured integration, the combination of art forms and scientific research, and immersive and engaging experience. The organisation of workshops was therefore a fundamental part of the project, offering visitors the opportunity



Photo 6. Artist Daniela De Paulis during the presentation of her work at the GGI (2024). Ph credits: Giulia Lenzi

to interact directly, becoming co-authors, no longer passive spectators, but active protagonists. The planning of a series of scientific-cultural activities aimed at attracting the public and building their loyalty, opening up to the understanding and transmission of scientific knowledge through other languages, capable of touching on more emotional and multi-sensory aspects to involve a non-specialist public on contemporary issues.

By creating images and producing knowledge, art and science have often overlapped in their methods of experimentation and discovery, giving us the necessary basis to shed light on the mysteries of Nature. Technological progress in modern age has led to specialisation and their gradual estrangement, yet our time, with its planetary crises, has sparked a renewed interest in their convergence. Scientific communities have increasingly turned to contemporary artistic languages for social engagement, while artists increasingly find inspiration in scientific discovery as a means to explore new creative solutions and ways of thinking, living and acting which are more consistent with the world we inhabit. At a time when the study of art and science is becoming increasingly urgent, this project has, in its own small way, attempted to fill a critical gap in our understanding of how interdisciplinary practices can respond to the pressing challenges of our time.

Starting from the valorisation of a historical heritage mostly unknown to the people of Florence, *GRASPING THE COSMOS* set out to make a contribution to the growing international engagement of the arts and humanities in more genu-



Photo 6. Guided tour of the exhibition *Tendo a esistere* by Federica Di Carlo (2023). Ph credits: Alessio Attardi.

inely scientific matters in order to reflect on how historical insights can help promote a paradigm shift today. The times we live in force us to re-imagine a new model of ecological thinking that science alone cannot achieve, a model that prioritises the cohabitation of human and non-human entities and mutual prosperity over exclusively anthropocentric narratives of progress. As we all witness the consumption of resources and the extinction of ecosystems and their biodiversity, Spanish philosopher Marina Garcés speaks of a “*conditio posthuma*”, a time when everything is coming to an end, including the future as a time of promise, development and growth. In this context, *GRASPING THE COSMOS* questioned whether human creativity will ever end or whether, supported by science, it can offer alternative pathways that neither exploit nor waste but, on the contrary, awaken society to its capacity for renewal and give people the tools to imagine a possible, sustainable and interconnected future.

Reference links

- GRASPING THE COSMOS: <https://graspingthecosmos.infn.it/>
- GGPpaths: sentieri della scienza in Arcetri: <https://www.ggi.infn.it/ggpaths.html>

- Theoretical Aspects of Astroparticle Physics, Cosmology and Gravitation (2023): <https://www.ggi.infn.it/showevent.pl?id=445>
- Theoretical Aspects of Astroparticle Physics, Cosmology and Gravitation (2024): <https://www.ggi.infn.it/showevent.pl?id=488>
- SMA: Il senso delle stelle 1: <https://www.sma.unifi.it/art-501-il-senso-delle-stelle-a-villa-galileo-eventi-tra-arte-e-scienza.html>
- SMA: La Science de l'Art: <https://www.sma.unifi.it/art-531-la-science-de-l-art-a-villa-galileo-eventi-tra-arte-e-scienza.html>
- CNR: Il senso delle stelle 2: <https://www.cnr.it/en/event/19186/il-senso-delle-stelle-ii-a-villa-galileo-eventi-tra-arte-e-scienza>

Valeria D'Ambrosio is an art historian and contemporary art curator. She has collaborated with the Museum System of the University of Florence from 2018 to 2024 as a curator of projects for the valorisation of the permanent scientific collections through the languages of contemporary art. In addition to institutional appointments and lectures in international academies, she has pursued an independent curatorial activity focused on the relationship between art, science and ecology for over ten years.

Stefania De Curtis is Director of Research in Theoretical Physics at the Florence Section of INFN, conducting research on various aspects of the physics of fundamental interactions and on the phenomenology of manifestations of new physics in high-energy experiments. She contributed to the founding of the Galileo Galilei Institute for Theoretical Physics, which she directed from 2019 to 2024.