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The Hidden Force

Women in Physics and in History

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The Hidden Force arises in the performing art scene from the interaction of a group of women researchers in Physics, History and Theatre, with the aim to celebrate women's contribution to Science and to make it known within the general public. The play offers a view of twentieth century's Physics through the eyes of four only partly credited protagonists: Marietta Blau, Chien-Shiung Wu, Milla Baldo Ceolin and Vera Cooper Rubin. Their stories reveal a common fabric of strong intellectual and human value, talent and determination, which led them to achieve fundamental results towards a deeper understanding of nature: these covered innovative methods to reveal the essence of nuclear processes, experiments on their hidden symmetries, the elusive nature of neutrinos and the observation of distant galaxies. Their lives were intertwined with radical social and historical changes in an international context characterized by great upheaval, but also by the birth of modern Physics and of institutions like CERN.

Too few people are concerned with handing down and making known a female genealogy. This work presents four iconic women who have loved Science, four like the forces of Nature: the force of Gravity, Electromagnetic, Weak and Strong. But there is another hidden force that any spectator will perceive, and it is the force of women, generating a drive towards Science as a place of respect, progress and civil coexistence.

The Hidden Force was conceived, written and promoted by a group of women physicists from the Turin Division of the National Institute of Nuclear Physics, Anna Ceresole, Nora De Marco and Nadia Pastrone, and from the Physics Department of the University of Turin, Simonetta Marcello, together with Women's historian Emiliana Losma, expert in new technologies Rita Spada, author and playwright Gabriella Bordin, author, actress and activist Elena Ruzza, in collaboration with soprano Fé Avouglan.

Duration: 1 h 10 min

CONCEPT and CURATION Anna Ceresole, Nora De Marco and Nadia Pastrone (INFN Turin)

Simonetta Marcello (Physics Dept, U. Turin and INFN Turin), Emiliana Losma (www.emilianalosma.it), Rita Spada (AICT)

DRAMA Elena Ruzza and Gabriella Bordin

DIRECTION Gabriella Bordin

ON STAGE Elena Ruzza actress, Fé Avouglan soprano, Diego Mingolla pianist, Ale Bavo electronic music performer

PLAYWRIGHTS: Gabriella Bordin, Elena Ruzza and the Scientific Team.

ORIGINAL MUSIC Ale Bavo

SCENOGRAPHY Adriana Zamboni

SCENIC ELEMENTS Silvano Gallian

VOICE RECORDING Matteo Cantamessa

VIDEO Giuseppe Verdino

TECHNICAL AND LIGHT SUPERVISION Eleonora Sabatini

PHOTOGRAPHY Anna Parisi

PRODUCTION INFN Turin Division, Physics Dept. Turin University, Terra Terra Association, Almateatro and Teatro Baretto, Turin

Due to the pandemics, the play was first staged in streaming, at the Teatro della Tosse in Genoa in October 2020 as part of the Science Festival. Then it debuted in Turin in December 2020 at the Baretto Theater in deferred streaming on Facebook.

In 2021, starting with the show at the Arcetri Astrophysical Observatory on 21 September, promoted by the Galileo Galilei Institute for Theoretical Physics, the show resumed live in various institutional occasions: in Turin and its surroundings, including the Planetarium and the Teatro Gobetti, in Padua, in Rome, Milan, Trento and at the Puccini theater in Torre del Lago Puccini - Viareggio. Several new editions are already planned around Italy.

Vera Cooper Rubin (Philadelphia, 23 July 1928 - Princeton, 25 December 2016) - American astronomer who made fundamental observations on the orbits of stars around the center of their galaxy and on the distribution of galaxies in the Universe, establishing their organization in clusters. She was responsible for the discovery of the anomaly of the motion of stars in galaxies, an experimental evidence in support of the theory of dark matter formulated by Fritz Zwicky in the 1930s.

Marietta Blau (Vienna, April 29, 1894 - Vienna, January 27, 1970) - Austrian nuclear physics was a pioneer in the detection and study of the processes between elementary particles by means of photographic emulsions, establishing a method that was the basis of Nuclear Physics in the 1900s. She explored the properties of cosmic rays and high-energy particles, discovering the phenomenon of disintegrating stars in the nuclear spallation.

Chien-Shiung Wu (Shanghai, May 31, 1912 - New York, February 16, 1997) - Chinese nuclear physics, moved to the United States before the Second World War, and became a reference in the study of beta decay and nuclear physics. She designed and carried out a famous experiment that demonstrated the violation of parity symmetry in processes dominated by weak interactions, opening new scenarios in Physics and the way to the Nobel Prize for Lee and Yang.

Milla Baldo Ceolin (Legnago, Verona, 12 August 1924 - Padua, 25 November 2011) - Italian particle physics, cultured and multifaceted, the first woman to obtain the professorship at the University of Padua in 1963, where she graduated in 1952. Her research on weak interactions ranged from the study of K mesons in cosmic rays, to neutrinos and their oscillations, to the stability of matter. She experienced the transition from the "small science" of the study of particles using nuclear emulsions to the "big science" of large accelerators.

The Curator of Memory

In the short time of this play of prose and music, the Curator of Memory accompanies us on this journey through time and space not only to tell the stories of four scientists of the twentieth century, but also to remind us that many women have contributed to Science and Society with their passion and their ingenuity. There are more than we have been told in the narrative of the history of humanity. Many are united by ties of blood, friendship and love, or by intellectual and professional affinities. A female genealogy that wishes to be claimed and to act in the present.

Director's Notes

The documentary page almost never has the power to convey the depths of a human being. For this purpose, the playwright or the poet are more suitable than the historian or the psychologist. [Primo Levi].

In order to recount the lives of these four women scientists, so intense on a scientific and human level and so immersed in the history of the twentieth century, it was necessary to strike a balance between the documentary and the poetic page. This was achieved through the music and the lyrics, which accompany the word in a continuous dialogue, through the writing of some scientific concepts in poetic form and also with the "vortexes", musical moments of words and sounds that create a high and solemn acoustic environment. Thus the story expands and envelops the whole scene. Text is words, but it is also music, song and movement. Text is the essential scenography: five luminous bars that assume different meanings according to how they are acted by the two performers. At the end of the play they are composed in the form of a star, a powerful scenic element, defined by the artist Gilberto Zorio as an "ancestral figure...agitated by the flow of forces". The star recalls the four women-stars, women of knowledge. And the four forces of Physics, with one more force: the hidden force of women.

Stage music

Casta diva, Norma, Vincenzo BELLINI;

Stars, Les Misérables, Claude-Michel SCHÖNBERG;

Kaddish, Maurice RAVEL;

Dan Yuan Ren Chang Jiu (May we be blessed with longevity), LIANG Hong Zhi;

If I were a Bell, Guys and Dolls, Frank LOESSER;

Apri le luci e mira (Caesar's aria), Cato in Utica, Antonio VIVALDI.

Wave, Cassiopeia, Storm, Luminous, Alessandro BAVO.



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