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Orazio Specchia and physics in Catania between the two World Wars

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Summary. — In this paper we briefly discuss the figure and scientific contributions of Orazio Specchia, an Italian physicist mainly operating in Bologna, Catania and Pavia, in the period between the two World Wars. In particular, we will examine his efforts in the modernization of teaching and research activity in physics at the University of Catania during his professorship (1933–1942).

1. – Orazio Specchia in Bologna: between Righi and Majorana

Orazio Specchia (fig. 1(right)) was born in Sternatia (Lecce, Italy) on 11 September 1890. After high school, he studied Mathematics at the University of Pisa. In 1911 he moved to study Physics at the University of Bologna, where he attended the lessons of Augusto Righi, remaining fascinated by him. In Bologna he was a colleague of Sebastiano Timpanaro and Bruno Biancoli. The outbreak of World War I, however, did not allow Specchia to continue his studies. Enlisted as a volunteer, he showed great heroism by participating in various military actions on different fronts and he was decorated with several medals [1].

At the end of the war, Specchia resumed his studies at the Institute of Physics of the University of Bologna. He conducted all the research activities related to his thesis (the study of the *Wiedemann effect* on Ni-Cr alloys) under the supervision of Righi. At the beginning of June 1920, just one month before graduation, Righi suddenly died, and Quirino Majorana was appointed director of the Insitute of Physics.

In 1914, Specchia, Biancoli and Timpararo had the idea of publishing a new magazine, *L'Arduo*. After stopping due to the outbreak of World War II, they resumed publications and reinvigorated the discussed topics. The magazine published important articles on science, literature, philosophy, pedagogy and politics.

A special number (published in July 1920) of *L'Arduo* was dedicated to the memory and scientific legacy of Augusto Righi. Specchia, that was the last physicist graduating under Righi's supervision, described his teacher as follows: "*He treated a subject of Physics not as if he was teaching something useful, but as if he was talking about a beautiful thing worth knowing [...]. He exhorted us to read the original memories of*

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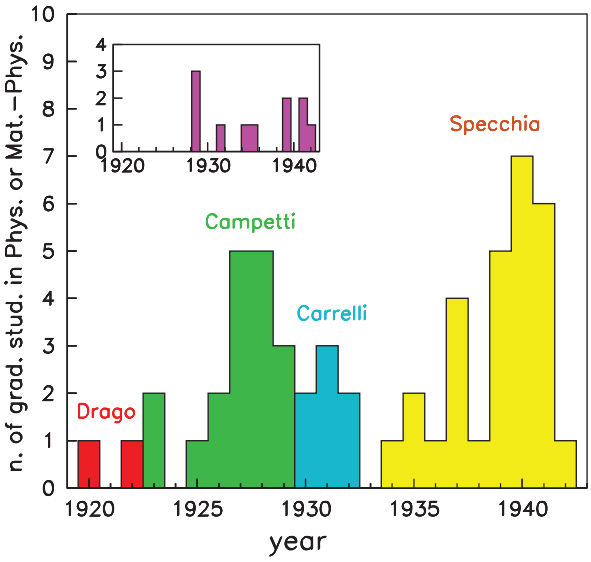

Fig. 1. – (Left panel) Number of students graduated in Physics or in Mathematics and Physics (but with the discussion of a thesis in Physics) at the University of Catania in the period between the two World Wars. The different Directorates of the Institute of Physics are indicated in different colours (Ernesto Drago was *tenured* director). In the insert we show the evolution with time of the number of women graduating in Physics or in Mathematics and Physics at the University of Catania in the same period. (Right panel) A rare photography of Orazio Specchia (1890–1961), taken at the time of his appointment as Extraordinary Professor of Experimental Physics at the University of Catania (Source: Archivio Centrale dello Stato, Roma).

scientists with love, with the aim to unveil, through the rigidity of the formulas and schematic deductions, the beauty of the efforts of a man who seeks the truth. And he, like all the greats, possessed this beauty [...]" [2].

With the advent of the Fascist regime, the liberal and socialist ideas discussed in the magazine began to be viewed with suspicion by the authorities, despite the early inclusion of Specchia to the Fascist party (1923). This dangerous situation, together with the economic problems of the editors, led to stop publications in 1923.

Under the direction of Quirino Majorana in Bologna, Specchia was appointed assistant of experimental physics (1921) and adjunct professor of medical physics (1925). Starting from 1926he published several articles on experimental physics (especially magnetism and physical optics); subsequently, he worked on molecular spectroscopy, especially on the Raman effect. An important article, following Righi's studies, was focused on circular dichroism in thin sheets of magnetized iron; this work was awarded the *Sella Prize* of the *Accademia dei Lincei*.

At the end of '20s, Specchia performed a series of interesting experiments on the diffraction of electrons by materials by using the *Davisson-Germer* technique, together with his young collaborators Stefano Petralia and Nicola Dallaporta. Bruno Rossi, student in Bologna in 1926–1927 (where he later graduated in mathematics and physics), in his memories, describes the meeting with Specchia as follows: *"The laboratory was well equipped, and was used by only three students: two boys and one girl. The person in charge of the laboratory, Dr Orazio Specchia, had given us the key, and then had*

disappeared, leaving us free to do whatever we wanted - something for which I still am grateful [...]" [3].

In 1931, Bose and Raha observed a curious effect of light on the susceptibility of paramagnetic materials, soon named as *photomagnetic effect*. Its origin was initially attributed to some unknown *atomic* mechanisms, but several experimentalists raised questions on the possible, more trivial, *thermal* nature of the effect. Specchia then carried out a high-precision experiment on such effect and published a letter to *Nature* clearly pointing out the *thermal* origin of the phenomenon [4].

2. – Professorship in Catania (1932–1942)

In 1932, the sudden death of Michele Cantone led Antonio Carrelli, Director of the Physics Institute in Catania, to move to Naples, taking over the chair of his old teacher. In the same year, there was a competition, held by the University of Ferrara, for a chair of Experimental Physics: the examination board was composed of Quirino Majorana, Alfredo Pochettino, Carlo Somigliana, Luigi Puccianti and Enrico Fermi. The three winners were, respectively, Orazio Specchia, Bruno Rossi and Giorgio Valle. The last two physicists were hired respectively in Padua and Ferrara([1]). At the end of 1932, the Faculty of Sciences of the University of Catania, under the recommendation of Quirino Majorana, called Specchia to the chair of Experimental Physics. His inaugural lesson, entitled *"L'elettrone"*, was held in Catania on 14 January 1933.

Specchia immediately operated a revolution in teaching and research activities, writing a textbook that was mainly based on the fundamental concepts of physics. Furthermore, in 1935 he introduced, for the first time, the *Theoretical Physics* course in the Science faculty, that was mandatory for students majoring in Physics. This course, touching all the relevant subjects of quantum mechanics and relativity, was held by Specchia until 1942 [5].

The only assistant found by Specchia at his arrival in Catania was Francesco Galvano, a student graduated in 1922 under the supervision of Ernesto Drago and Enrico Boggio-Lera. After collaborating for a very short period, at the end of 1933 he moved to the Nautical Institute in Genoa. Concetto Bellia, Physics teacher at the Liceo Cutelli, supported teaching to Medicine and Pharmacy students as an adjunct professor. Enrico Boggio-Lera, another famous adjunct professor at University of Catania, was very old (over 70) and essentially inactive during the direction of Specchia. In 1935, Specchia called, from Bologna, Nicola Dallaporta, who became his assistant and *aiuto di direzione (direction assistant)*. With the help of Dallaporta, Specchia undertook a series of accurate experiments on optics and quantum physics: diffraction of electrons from single crystals, Kerr effect in polar molecules, photomagnetic effect, Raman spectroscopy, production of atomic and molecular beams. In particular, the work *"On the technique of Stern and Gerlach experiment"* describes the apparatus used by Specchia to generate, for the first case in Italy, atomic and molecular beams, and discusses all the improvements made by Specchia to refine the results obtained by Stern and Gerlach [6].

The impact of the research carried out at the Institute of Physics, together with a very accurate teaching activity, soon gave their fruits. Many physicists were trained and

([1]) After few months, Valle was called in Parma, where he was Director of the Institute of Physics until 1947. Then he moved to Bologna (1947), where he directed the Institute of Physics until his tragic death (1954).

graduated under the supervision of Specchia (*e.g.*, Gennaro Dascola, Carmelo Milone, Filippo Affronti, Margherita Addario); many of them were involved in several fields of research after World War II. During his directorate, the number of graduate students in Physics or Mathematics and Physics (but with a main thesis on *physics* subjects) considerably increased with respect to the past, as shown in fig. 1(left). For his academic and military merits, in 1938 Specchia was appointed Commander of the *Corona d'Italia* Order. One of Specchia's last actions as a director was transferring the institute to the new headquarters, inside Palazzo delle Scienze. On 10 February 1941 Specchia and his students moved "*... the most precious scientific material and the library*" to the new, much bigger and better equipped rooms in *Viale del Littorio* (now *Corso Italia*) [7].

3. – The last part of his life: Pavia

In June 1942, Rita Brunetti, director of the Institute of Physics in Pavia, suddenly died. Because of his experience, Specchia was called by the Faculty to succeed her, taking the chair until 1960, when he retired. Specchia was also elected Dean of the Faculty of Sciences from 1948 to 1957. One of Specchia's first actions in Pavia was to dismantle and hide the parts of the accelerator built by Brunetti, for fear of having it seized by the Nazis. After the war, he reassembled the accelerator, that was subsequently used by his students mainly for the investigation of photo-nuclear reactions. During the final period of his life, Specchia completed and re-edited the fortunate series of his textbooks "*Lezioni di fisica sperimentale*", published by *Viscontea*. Just after retiring, he suddenly died on 12 July 1961.

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