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Some Aspects of the Reception of Enrico Fermi in the Soviet Union

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Abstract: The untimely death of Enrico Fermi in 1954 cut him short in the middle of his activity and at the height of his fame, not only in the West: if he was known worldwide for his results, there are however some interesting and neglected aspects of the reception of his figure as a scientist beyond the Iron Curtain. A great promoter of the knowledge of the life and work of Fermi in the Soviet Union was, predictably, his student who emigrated there in 1950, Bruno Pontecorvo, who personally edited the Russian translation of Fermi's *Collected Papers*. Far from being a mere homage, that was also an opportunity for methodological reflections; an aspect that curiously recurs in some parallels between Fermi and Yakov B. Zel'dovich, as underscored by the latter's colleagues and collaborators.

Keywords: Fermi, Pontecorvo, Zel'dovich, Collected Papers, Translations in Science.

1. Prolegomena

Chicago, November 28, 1954: Enrico Fermi passes away at the age of 53, at the height not just of his fame but still of his activity as well. The news echoes at every longitude, soon reaching the distant Soviet Union, where his student Bruno Pontecorvo emigrated four years earlier, causing great uproar. This is the triggering event of what we will address in the present paper, which is an attempt to open a further window on Pontecorvo's activities in Russia: the attention around his figure still seems to be centered, mostly, around questionable "spy stories" and/or some chronological but substantially a-historic presentation of his contributions to physics (e.g., Close 2015), while the actual genesis of such results, his interactions with great local scientists, the circulation of ideas in that context and so on remain largely unexplored. In the previous congress, we already tried to offer a couple of glimpses of this kind, respectively dedicated to a part of the prehistory of the notion of neutrino oscillations (Carini 2021), and to the Dubna *milieu*, with some fascinating resonances and analogies between Pontecorvo and Nikolay N. Bogoliubov and his work on superconductivity (Carini *et al.* 2021). This little self-quotation is only meant to say that what we are going to illustrate here has to be inserted within this wider framework, even if its level is less strictly "technical" than the other two papers. The subject, in appearance, is very

simple: we will be talking about Pontecorvo's involvement (obvious and natural, in some ways) in editorial operations related to the work and life of his illustrious master. As we hope to show, however, this episode lends itself to considerations decidedly less trivial and which deserve attention, not only in the case in question, but also more in general because of some aspects that are rarely perceived or emphasized in the history of recent physics. In fact, "reception", as can be seen in the title, is a rather unusual term in such contexts: we speak at most of the reception of a theory, when it is perhaps not supported yet by experimental results, but what sense could it make to speak of the reception of a physicist, as if we were dealing with a writer, a philosopher, an artist? What we wish to underline, actually, does not have any particularly "subversive" intention: to make the point clear from the outset, let us say that Fermi, as we will have the opportunity to specify, had, especially in his last years but not only, a sort of aura around himself and his way of practicing physics; an aura that, *de facto*, transcended the single technical results associated with his name, and at the same time was not limited to the more or less reliable or sensationalistic accounts of his achievements as the "new Columbus" or "new Prometheus". If the diffusion of his strictly scientific results beyond geographical and political boundaries is something that, to a large extent, can be taken for granted, the interesting aspect to be underlined here is how there were traits of that "expanded version" of his persona which resonated in distant lands and contexts, even decades after his death. In any case, to close this short preamble, we can point out that, after all, there already exists a collection of studies dedicated to the reception of Einstein's figure in the Soviet Union (Vucinich 2001).

This being said, here are a few essential background facts, some of which we have already mentioned: they are well known, but for convenience we will recall them, emphasizing some points differently from usual. Born in 1913, the young Pontecorvo joined in 1931 the group of the *ragazzi di via Panisperna*, where he was affectionately called "the puppy", and soon he got involved in their research on neutrons. Fermi's approach to physics, of course, impressed him in a decisive way: Pontecorvo too, without a doubt, could have expressed himself as Emilio Segrè did one day in Stockholm, referring to Fermi the lines with which Dante addressed Virgil, that is to his *auctor*, i.e. (mindful of etymology, we could say) the one who made him grow: "Tu se' lo mio maestro e il mio autore; / Tu se' solo colui da cui io tolsi / Lo bello stilo che mi ha fatto onore" (Segrè 1959).[1] In 1936 Pontecorvo went to Paris, where he met the second decisive figure who became for him a model and a teacher, the politically outspoken Frédéric Joliot-Curie, about whom he would say that he "possessed in the highest degree what the Italians call *spregiudicatezza* – the ability to recognize as possible even the most strange and [seemingly] impossible facts" (Biquard 1966, p. 132). It was in this context that, due to Joliot-Curie's example but also to the atmosphere created by news of the Spanish Civil War, Pontecorvo got interested – truly in the original sense of "getting involved" – in political ideas (something that, up to that point, he had perceived as utterly alien to his scientific commitment, along the lines of

[1] *Inferno*, I, 85-87; in Longfellow's classic version: "Thou art my master, and my author thou, / Thou art alone the one from whom I took / The beautiful style that has done honor to me".

Fermi's example and mindset). It may be significant, in order to have a taste of those times, to recall the following words by Albert Camus, born in the same year as Pontecorvo (Camus 1957):

> Ces hommes, nés au début de la Première Guerre mondiale, qui ont eu vingt ans au moment où s'installaient à la fois le pouvoir hitlérien et les premiers procès révolutionnaires, qui ont été confrontés ensuite, pour parfaire leur éducation, à la guerre d'Espagne, à la Seconde Guerre mondiale, à l'univers concentrationnaire, à l'Europe de la torture et des prisons...

Let us emphasize in particular that "pour parfaire leur éducation", to complete and perfect their education, which to a certain extent applies well to the case we are talking about. Later, after the Nazi occupation of Paris in 1940, Pontecorvo went to the US, and after that, by then launched in his career, he moved to Canada and to England, before making the drastic decision that saw him cross the Iron Curtain in the summer of 1950. Given his expertise in the nuclear field, a second "case Fuchs" was feared, resulting in the hubbub of the media; playing with the name of the two physicists, Carlo Emilio Gadda even adapted for the occasion La Fontaine's story of the fox and the crow (Carini *et al.* 2021).

In Chicago, Fermi, for his part, was enjoying an enormous prestige; many young people who would later distinguish themselves in their field, and many others as well, even literary figures such as George Steiner and Philip Roth, knew about him and went on a sort of pilgrimage to listen to his lectures and seminars. In short, he was certainly not on the road to decline and unproductivity, as some cheap *cliché* about the life of physicists would have it. Segrè (1995, p. 56) compared Fermi to a steamroller that advances with regularity even when the slope starts to become hard: and this fits well with a phrase of Valentine Telegdi, who in turn gravitated around the Chicago environment: "It is easy to be a child prodigy, but much harder to be an adult prodigy" (Cabibbo *et al.* 2006, p. 67) – as Fermi appeared at that point. As a matter of fact, setting aside low-level mythologizations or comparisons with laymen, perhaps we cannot say that Fermi had the young Heisenberg's meteoric rise – but, besides not being so far behind and possessing other qualities, he continued to grow (not only in terms of fame) and in some ways improve with the regularity evoked by Segrè's image, or, if we want, like the proverbial good wine. In that impressive atmosphere, the high and arguably exaggerated praises of Jay Orear (another "observer participator" of the Chicago years), who considered Fermi "the master scientist" at the level of human history (Orear 2004), should not sound too surprising. Apart from this kind of devotion and little shrines, it is now easier to understand why, when Fermi died in the middle of all that, his collaborators and students did their best to pay homage to his memory and his legacy.

2. The *Collected Papers* and their fortune

Fermi's *Collected Papers*, to whose edition various people contributed (E. Amaldi, H.L. Anderson, E. Persico, F. Rasetti, C.S. Smith, A. Wattenberg, although sometimes the bibliographical indications explicitly mention only Segrè, the editor-in-chief), were published in two volumes between 1962 and 1965 by University of Chicago Press in collaboration with the Accademia dei Lincei (Fermi 1962-1965), and are a direct and evident manifestation of the kind of commitment on the side of his friends and collaborators that we have just underlined. In Fermi's archives in Chicago there is some correspondence which reveals that, already between December 1954 (i.e. less than a month after Fermi's death) and April 1955, they were starting to discuss the project. Apart from the timing, such an operation, nowadays, could even seem obvious; but, although not entirely devoid of precedents, it constituted an important novelty, destined to become, first of all at the editorial level, a milestone, even if not always imitated.

The format is simple and compact: it is not just a matter of gathering and arranging chronologically the scientific articles, which, left to themselves decades later, might not be the easiest, most profitable or enjoyable reading (on the other hand, these are volumes that are often used as reference works), but of enriching them with comments on the circumstances in which they were written, the expectations that were accompanying them, the way the questions were set out, or simple curiosities and anecdotes. Segrè, who would later say (Segrè 1993, p. 268) that he felt an "obligation" which led him to take responsibility for that operation (not unlike Maxwell had done for Cavendish's papers or Marie Curie for her husband's), also wrote the general introduction in an attempt to give an overall view of the scientist and his work. This was obviously first-hand material, as we have said, coming from collaborators or even long-time friends (fact which, of course, can also have negative implications from the point of view of the historian, unless this same material is treated as a valuable source to be subjected to critical scrutiny). It was a model that set the standard: just to give a significant example, when a little more than twenty years later Heisenberg (born in the same year as Fermi) passed away, the editors of his *Gesammelte Werke* (Heisenberg 1984) were explicitly inspired by Fermi's *Collected Papers*, as Helmut Rechenberg repeatedly declared,[2] even if the dissimilar circumstances and the time elapsed in the meanwhile meant that the commentary work was of a different nature. Other comparable and later examples that we can mention are the *Selected Papers* of Tsung-Dao Lee (1986), just to mention another of Fermi's students, or the *Collected Works* of Wigner (1993). What is perhaps more significant, however, is to note the differences with other *Collected Papers* published in the same years as Fermi's: those of Landau (which appeared when he was still alive, albeit after the tragic accident) or Kapitza (who was also still alive), except for the meritorious operation of translating the papers from Russian, are not different from the model that had been followed forty years earlier for those of Gibbs, for instance, simply gathering together the various writings (Kapitza 1964) (Landau 1965). What Fermi's *Collected Papers* had in addition did not go unnoticed: significant in this regard seems to be a review of Robert Wilson,

[2] We wish to thank Luisa Bonolis for this information.

appeared after the release of the first volume, in which he wrote: "The book is considerably more than just a convenient collection of papers which after all exist separately in the literature" (Wilson 1963, p. 143). He also emphasized, in reference to the comments that accompany Fermi's papers, how much he got "fascinated by these remarks" (Wilson 1963, p. 144).

Now, what we are interested in is the Russian edition of the *Collected Papers*, published between 1971 and 1972, in the editing of which Pontecorvo was involved, as expected; not only that, but he was the general editor, with some help as "editor-compiler" from another physicist, V.N. Pokrovsky (Fermi 1971-1972). It should be noted, in fact, that this is a Russian edition: while Landau and Kapitza were honored by initiatives in some respects much less edited, that were realized directly in English and not in their homeland, for Fermi we even have, instead, a translated version. Pontecorvo himself wrote an introductory note on Fermi's life and work, "or rather" – as he put it – "to better say, his work, since it was also his life" (Pontecorvo 1993, p. 3). The material of this note also found expression in a small work of 1971 (Pontecorvo 1971) and, significantly expanded, in another book published in 1972 (Pontecorvo 1972) and translated into Italian by Edizioni Studio Tesi in 1993 (it came out shortly after Pontecorvo's own death) with the title *Enrico Fermi: Ricordi di allievi e amici* (Pontecorvo 1993). Moreover, in editing the *Collected Papers* he added, after the various papers by Fermi, some lines of comment, in addition to those already present in the English version. The way in which Wilson greeted the appearance of the *Collected Papers* in the Western world is mirrored by the way in which, in a review, Gurevich and Smorodinsky (1974) welcomed the Russian edition of the two volumes. Reading this review helps us to better understand the decision to make a translation, despite the fact that it was already an "international" work, so to speak. First of all, it must be kept in mind that the articles collected in the *Collected Papers* had been left in the original languages: Italian, German, English; translating everything and homogenizing it in a single language was not so weird. A translation into Russian sanctioned, even in that cultural context, the rank of "classic" attributed to Fermi, as is clear from the words of Gurevich and Smorodinsky: a classic next to figures such as Poincaré, Einstein, Bohr – and classics, of course, get translated. Not only that, but its educational-pedagogical usefulness is explicitly underlined, not just for young scientists; and, obviously, English was not the main language of education in that part of the world. The novelty of the format is then recognized and praised, as is the work done by Pontecorvo. It is interesting to note how Gurevich and Smorodinsky also comment on the salient traits of the theoretical-experimental versatility and productivity manifested by Fermi's life-work, which certainly did not get extinguished after a blaze: they even compare him to a sort of King Midas who turns what he touches into gold. All aspects that we will find again soon.[3]

[3] It remains to be investigated how a scientific figure in several respects not interested in politics, such as Enrico Fermi, could be perceived in a highly politicized society like the Soviet one: simply as a representative of "scientific objectivity", despite the *milieux* he had lived in, or as a (perhaps even desirable) model of non-interference between spheres of activity?

It can well be said that, in this way, besides contributing to the diffusion of that editorial model, Pontecorvo did not limit himself to paying tribute to the memory of his master, as one would do with a memoir (which, in any case, he actually wrote on the occasion of the first anniversary of Fermi's death: Pontecorvo 1955), but carefully went over the various phases of his life-work. Bearing in mind that Pontecorvo himself, by unanimous consent of his Soviet colleagues and others, had proved to be excellent in both experimental and theoretical work (and in their conjugation, of course), a rare quality that he shared with his master, it does not seem vain to conjecture that, while meditating on the figure and the overall work of Fermi and on his lessons ("lo bello stilo che mi ha fatto onore", to return to quote from Dante), Pontecorvo took the opportunity to reflect on his own path as a physicist, as well as on his own balance between theoretical and experimental activity. Thus, this episode seems interesting to us, more in general, as an example of a space for reflection that, *within* physics and at the hands of its own practitioners, configures itself not with the aim of industriousness and direct results, so to speak, but with that of reconsidering past possibilities and, at the very least, becoming more aware of the practices – theoretical or experimental – that have been undertaken. There is also a psychological side to all this: John Wheeler (1980, p. 102) loved to recall the speech that Thomas Mann gave on the occasion of Sigmund Freud's eightieth birthday, where, *inter alia*, he underlined the importance of personal models that get internalized and are continuously kept active and alive, in order to constitute a pole of dialogical confrontation. It is not too far-fetched to suggest that, like Einstein and Bohr for Wheeler, the two models who continued to shape Pontecorvo's scientific *persona*, so to speak, were Fermi and Joliot-Curie; after all, he also kept a portrait of Fermi in his study.

Finally, there is a further event that we wish to emphasize regarding the promotion and diffusion of knowledge about the figure of Fermi in the Soviet Union; although it is also linked to Pontecorvo, it actually predates the *Collected Papers*. Following the watershed decision taken by the "puppy", by then no longer a puppy, in 1950, the old group of via Panisperna did not react very well, also due to the unfortunate timing, since they were in fact involved with the United States in a matter of claiming patents for their work of the '30s (Turchetti 2006). There was no lack of harsh comments: it would be enough to recall what can be read in Segrè's autobiography (Segrè 1993) or in *Atoms in the Family* by Laura Fermi (1954). It is precisely the latter book that we would like to mention. As is known, it got published immediately after Enrico's death; within a few years (1959) it was translated and published in Russian. We point out that, in spite of the political and cultural climate, that the pages where, towards the end of the book, rather harsh judgments are expressed about the choice to emigrate to the Soviet Union were translated literally and without resorting to censorship or omissions, as we were able to verify also with native speakers. Perhaps we may take that as a sign of Pontecorvo's honesty and – we may say – even devotion.

After having outlined this aspect of Pontecorvo's activities, from a historical and human point of view as well, we would like to conclude by mentioning a curious case that can be taken as an attestation of the resonance of Fermi's figure in the Soviet Union. The person we are now interested in is the famous, but at the same time not so

well known, Yakov B. Zel'dovich, or rather a volume of reminiscences in his honor, which appeared in English translation in 2004 with the rather flat title of *Reminiscences*, while the original one would sound (more in line with the character) like "Familiar/unfamiliar Zel'dovich" (Sunyaev 2004). If in an impromptu exercise one were to ask someone what Zel'dovich and Fermi had in common, the answers would most likely be limited to rather superficial juxtapositions, such as "both worked on nuclear projects". We can imagine a *connoisseur*, equipped with some little more information, who would venture, if pressed, to underline how both of them were largely self-taught and then deployed this personal "style" in a variety of areas of physics, always going straight to the point without too much mathematical lucubration. In any case, it would not be the most spontaneous of comparisons, one would say. However, one thing that may strike the attentive reader who peruses the aforementioned book of recollections – offered by Zel'dovich's collaborators, students, acquaintances and family members – is how the comparison with Fermi returns repeatedly, from independent and different sources. As suggested by our hypothetical *connoisseur*, such a comparison tends to make leverage on the peculiar style of doing physics of the two great scientists, in particular on their ability to grasp the essential core of a problem and to have developed a concrete physical intuition, so to speak, to which the use (not too subtle, but effective) of mathematical or numerical approximations was subordinated. Not separated from all this, there was also the ability of interweaving or balancing in an efficient way theoretical speculation and its experimental, or better testable, implications. It may seem a rather generic parallelism, once it is admitted we are speaking of two physicists who were so well-distinguished in the areas they worked on, but certainly this desire to evoke the shadow of Fermi, even in the absence of any direct link with Zel'dovich, testifies to how his figure was very much alive, even decades after his death, in the imagination of physicists in the distant lands of Russia; and undoubtedly an important role in all this was played by the mediation of Pontecorvo.

References

Biquard P. (1966). *Frédéric Joliot-Curie*. Greenwich, Conn.: Fawcett.

Cabibbo N., Freund P.G., Gell-Mann M., Goldberger M.L., Nambu Y., Oehme R., Okun L., Winston R. (2006). "Valentine Louis Telegdi". *Physics Today*, 59, pp. 66-67.

Camus A. (1957). *Nobel Banquet Speech* [online]. URL: <https://www.nobelprize.org/prizes/literature/1957/camus/25232-albert-camus-banquet-speech-1957/> [access date: 31/10/2021].

Carini G. (2021). *The Ancestors of Two-Component Neutrino Theories*, in Bevilacqua F., Gambaro I. (eds.), *Proceedings of the 40th SISFA Annual Conference* (September 8-10, 2020). Pisa: Pisa University Press, pp. 141-146.

Carini G., Furlan S., Gaudenzi R. (2021). *Tales from Dubna's Oakwood: Bogoliubov, Pontecorvo, and the JINR Seminars*, in Bevilacqua F., Gambaro I. (eds.), *Proceedings of the 40th SISFA Annual Conference* (September 8-10, 2020). Pisa: Pisa University Press, pp. 155-162.

Close F. (2015). *Half-Life: The Divided Life of Bruno Pontecorvo, Physicist or Spy*. New York: Basic Books.
Fermi E. (1962-5). *Collected Papers*, 2 Volumes. Chicago: University of Chicago Press.
Fermi E. (1971-2). Научные труды, В 2-х т. Moscow: Наука.
Fermi L. (1954). *Atoms in the Family*. Chicago: University of Chicago Press.
Gurevich I.I., Smorodinsky Ya.A. (1974). "Научные труды Энрико Ферми". *Успехи физических наук*, 114 (10), pp. 385-387.
Heisenberg W. (1984). *Gesammelte Werke. Band I*. München, Zürich: Piper.
Kapitza P.L. (1964). *Collected Papers of P.L. Kapitza*, vol. 1. Oxford: Pergamon.
Landau L.D. (1965). *Collected Papers of L.D. Landau*. Oxford: Pergamon.
Lee T.D. (1986). *Selected Papers,* vol 1. Boston: Birkhäuser.
Orear J. (2004). *Enrico Fermi: The Master Scientist*. Ithaca, NY: Cornell University Press.
Pontecorvo B. (1955). "Энрико Ферми (1901-1954) (К годовщине смерти)". *Успехи физических наук*, 57 (11), pp. 349-359.
Pontecorvo B. (1971). Энрико Ферми. Moscow: Знание.
Pontecorvo B. (with Pokrovsky V.N.) (1972). Энрико Ферми в воспоминаниях учеников и друзей. Moscow: Наука.
Pontecorvo B. (with Pokrovsky V.N.) (1993). *Enrico Fermi: Ricordi di allievi e amici*. Roma: Edizioni Studio Tesi.
Segrè E. (1959). *Nobel Lecture* [online]. URL: <https://www.nobelprize.org/uploads/2018/06/segre-lecture.pdf> [access date: 31/10/2021].
Segrè E. (1995/1970). *Enrico Fermi, Physicist*. Chicago: University of Chicago Press.
Segrè E. (1993). *A Mind Always in Motion*. Berkeley: University of California Press.
Sunyaev R.A. (ed.) (2004). *Zeldovich: Reminiscences*. Boca Raton: CRC Press.
Turchetti S. (2006). "'For Slow Neutrons, Slow Pay'. Enrico Fermi's Patent and the U.S. Atomic Energy Program, 1938-1953". *Isis*, 97 (1), pp. 1-27.
Wheeler, J.A. (1980). *Albert Einstein March 14, 1879 - April 18, 1955,* in *NAS Biographical Memoirs*, vol. 51. Washington, DC: National Academy of Sciences.
Wigner E.P. (1993). *The Collected Works of Eugene Paul Wigner. Part A*. Berlin: Springer.
Wilson R.R. (1963). "The Collected Papers of Enrico Fermi, Volume 1, Italy 1921-1938" (review). *Nuclear Science and Engineering*, 16 (1), pp. 143-144.
Vucinich A.S. (ed.) (2001). *Einstein and Soviet Ideology*. Stanford: Stanford University Press.

Archival Sources

Chicago, Enrico Fermi Collection, Box 12, Folder 25.