

Eugenio Fubini Ghiron

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An outstanding pupil of the future Nobel Prize for physics Enrico Fermi, he was discharged from teaching at the Polytechnic University of Turin in 1938 because of the racial laws. Having found refuge in the United States following his father, he decided not to return to Italy at the end of the war and was granted US citizenship. He established himself in the field of electric engineering as one of the leading American experts of weaponry in this sector, collaborating for a long time with the private sector and the federal government. For the latter, he advanced to the position of assistant secretary of Defense for research and technology in the Kennedy and Johnson administrations.

His studies between Turin and Rome

The second child of mathematician Guido Fubini and Anna (Annetta) Ghiron, Eugenio Fubini Ghiron was born in Turin, into a family of the Jewish middle class, on 19 April 1913. The scientific contacts of his father, who had Henri Poincaré as a student and prided himself on his relationship with Albert Einstein, persuaded Eugenio that, for a young man like himself – of precocious and sharp intelligence, and strongly competitive – physics would be the ideal field of study since it was an emerging discipline¹. Therefore, in 1929, at only seventeen years of age, he enrolled in the Polytechnic University of Turin; but, after attending the first two years, he transferred to the University of Rome². His father, aware of the progressive transformation of the Royal Institute of Physics of the latter university into a modern research center, pushed him to complete his education in the capital, where Eugenio specialized not in the theoretical but in the experimental

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¹ David Fubini, *Let Me Explain. Eugene G. Fubini's Life in Defense of America*, Santa Fe (NM), Sunstone Press, 2009, pp. 39-40.

² Edoardo Amaldi, *Il caso della fisica* (1990), in Id., *20th Century Physics: Essays and Recollections*, edited by Giovanni Battimelli and Giovanni Paoloni, Singapore, World Scientific Publishing 1998, p. 164.

aspects of physics³.

His beginning in the group of via Panisperna, from the name of the street where the Institute of Physics was located, was not among the greatest. Franco Rasetti, who, at the time, held the chair of spectroscopy, remembers Fubini's initial incompetence in setting up the various equipment: one day, when Fubini and Bruno Pontecorvo had dirtied not only themselves but the whole laboratory with glue during the mounting of a spectroscope, Edoardo Amaldi reprimanded them, complaining about the fact that they worked «come maiali»⁴ [like pigs]. Nevertheless, Fubini's talents eventually emerged, and Eugenio graduated with Enrico Fermi from the University of Rome in 1933, having been only twenty years old⁵.

His academic beginning

In 1934, in a letter to Bruno Rossi, who the year before had obtained the chair in experimental physics – the first ever established in Italy – and was searching for candidates for the newly founded Institute of Physics at the University of Padua, Fermi recommended Fubini as one of the most promising young researchers he knew, if not indeed the best⁶. Nevertheless, his transfer to Padua did not materialize because Eugenio decided to change his field of study. Fubini considered Fermi «the smartest person I've ever known»⁷. However, after obtaining his degree, the most likely uneven comparison with his brilliant teacher convinced him that he did not have the skills to excel in the field of physics. Failing to accept the idea of being unable to reach excellence and longing to step out of Fermi's shadow, Fubini turned to applied engineering⁸.

³ Erasmo Recami, *Ettore Majorana. La personalità umana e scientifica*, «Emmeciquadro», 26, 2006, p. 78.

⁴ As quoted in Simone Turchetti, *Il caso Pontecorvo. Fisica nucleare, politica e servizi di sicurezza nella guerra fredda*, Milan, Sironi, 2007, p. 33.

⁵ E. Amaldi, *Il caso della fisica*, cit., p. 164.

⁶ Letter from Enrico Fermi to Bruno Rossi, 8 July 1934, as quoted in *Archive of Correspondence to Experimental Physicist Bruno Rossi* <<https://www.jnorman.com>> (accessed 19 July 2020).

⁷ As quoted in Harold Brown and Bert Fowler, *Eugene Ghiron Fubini*, «Physics Today», 50, 12, 1997, p. 91.

⁸ D. Fubini, *Let Me Explain*, cit., pp. 48-50.

He returned to Turin at the Polytechnic University where both his father and his brother Gino were already teaching, the former as full professor of mathematical analysis and an instructor of advanced analysis, the latter as an assistant to the chair in wood, iron and reinforced concrete constructions. Here Eugenio worked first as an assistant lecturer of radio reception and then, from 1935, as a lecturer of radio engineering for the specialization in electric communications at the Istituto elettrotecnico nazionale Galileo Ferraris, which had been established the previous year⁹. His research focused mainly on high-frequency electromagnetic waves and nonlinear acoustics¹⁰. In particular, his most relevant contribution was the solving of Earnshaw's equation on the transmission of sound waves in non-dissipative fluids¹¹. The intensification of Fubini's scientific production in the second half of the 1930s resulted not only from both his maturation as a researcher and his desire to strengthen his academic position. It was also pushed forward by the need of building himself an international reputation in the event that he would be forced to leave Italy and would have to find a job abroad, presumably in the United States¹².

This outcome seemed inevitable to his uncle Marco Ghiron, his mother's older brother, the head of a firm that imported coal to Italy. Marco had been sensing the growing anti-Semitism of the fascist regime and, at least from 1936, had begun to deposit part of the profit of the commercial transactions of his business in an account at a Philadelphia bank in the United States and to transfer other funds abroad. He never missed the opportunity either to urge his nephews,

⁹ *Annuario del Regio Politecnico di Torino. Anno accademico 1937-1938-XVI*, Turin, Società Editrice Torinese, 1938, p. 10, 76, 80. See also Annalisa Capristo, *L'espulsione degli ebrei dalle accademie italiane*, Turin, Zamorani, 2002, pp. 258-259.

¹⁰ Eugenio Fubini Ghiron, *Anomalie nella propagazione di onde acustiche di grande ampiezza*, «Alta frequenza», 4, 10, 1935, pp. 530-581; Id. and Arnolfo Pernier, *Circuiti elettrici contenenti raddrizzatori*, «Alta frequenza», 5, 2, 1936, pp. 104-116; Id. and Ettore Viti, *Relè elettronico a doppio scatto*, «Alta frequenza», 6, 1, 1937, pp. 3-17; Id., *Pressione di radiazione acustica e onde di grande ampiezza*, «Alta frequenza», 6, 10, 1937, pp. 640-655; Id., *Acustica non lineare delle onde di ampiezza finita*, Milano, Industrie Grafiche Italiane Stucchi, 1938; Id., *Filtro elettromeccanico a frequenza variabile*, «Alta frequenza», 7, 2, 1938, pp. 138-144; Id. and Paolo Pontecorvo, *Miglioramenti nella esecuzione delle misure di frequenza*, «Alta frequenza», 8, 10, 1938, pp. 731-741.

¹¹ Robert T. Beyer, *Sounds of Our Times. Two Hundred Years of Acoustics*, New York, Springer, 1999, p. 248.

¹² D. Fubini, *Let Me Explain*, cit., p. 61.

Eugenio and the latter's brother Gino, as well as his brother-in-law Guido to get ready to flee¹³.

The escape to the United States

Eugenio's cousin, Anna Foa, was an inveterate antifascist, like her brother Vittorio, a member of Giustizia e Libertà, who in 1935 had been sentenced to fifteen years of imprisonment for opposition to the regime. Anna, for example, refused to donate her wedding band to her motherland to finance the colonial campaign against Ethiopia and gathered funds for the International brigades during the civil war in Spain¹⁴. In Anna Foa's recollection, with the exception of the writer Pitigrilli, whose real name was Dino Segre, the undercover informant of the OVRA who had reported Vittorio and clearly intended to elicit further information, Eugenio was the only one to reach out to her family after Vittorio's arrest¹⁵. Yet Eugenio could not certainly be called an antifascist: he duly performed military service between 1933 and 1935, participating in the defense of the Brenner pass in 1934 to thwart the first Nazi attempt at the Anschluss. He then accepted being called back to duty in the army from November of 1935 to May of 1936 to carry out research on radio communications in Rome in the laboratories of the Istituto militare delle trasmissioni during the very Ethiopian war that his cousin Anna was trying to boycott¹⁶. Previously, by his own admission, when he was still a student, he had enrolled in the *Gruppi universitari fascisti*¹⁷. He did not even think of himself as a Jew, namely he did not attach any importance to his ethnic belonging and did not practice his faith, even though he would later state his

¹³ Ibid., pp. 57-59.

¹⁴ Anna Foa Yona, *Leaving Fascist Italy*, in June Namias (ed.), *First Generation. In the Words of Twentieth-Century American Immigrants*, Boston, Beacon, 1978, p. 111; Alexander Stille, *Benevolence and Betrayal: Five Italian Jewish Families under Fascism*, New York, Summit Books, 1991, p. 137.

¹⁵ Anna Foa, *Memorie di Anna Foa*, in Davide Jona and Anna Foa, *Noi due*, Ital. trans. by Luciana Benigno Ramella, Bologna, il Mulino, 1997, p. 179; Vittorio Foa, *Il cavallo e la torre. Riflessioni su una vita*, Turin, Einaudi, 1992, pp. 43-44.

¹⁶ D. Fubini, *Let Me Explain*, cit., p. 52; Eugenio Fubini Ghiron, *Curriculum Vitae*, 20 October 1938, in BLO, MS, SPSL, 243/3, f. «Fubini Ghiron, Eugenio». The author would like to thank Patrizia Guarnieri for providing a copy of the file.

¹⁷ US Senate, Committee on Armed Services, 88th Congress, 1st Session, *Nominations (Flax, Fubini, McDonald, Pratt)*, Washington, DC, US Government Printing Office, 1963, p. 17.

religion to be «Jewish Reformed» in the questionnaire that he sent to the Society for the Protection of Science and Learning to apply for a job abroad¹⁸.

Neither he nor his father filled out the census form on the racial identity of the members of the scientific academies and societies that they had received from the association of which they were both fellows, the *Circolo matematico di Palermo*¹⁹. It could be easily suggested that they failed to return the form on account of the family's frantic preparations to leave Italy after the racial laws had also affected them rather than as a polemical gesture against the anti-Semitic politics of the regime, which, on 5 September 1938, had arranged the expulsion of the Jewish members from these institutions starting from the following month. His father, brother, and Eugenio himself had all been banned from their teaching assignments at the Polytechnic University of Turin²⁰. Initially, however, since his dismissal would become effective only on 15 October, Eugenio could enjoy the opportunity to continue to access the laboratory of the Polytechnic University to carry on his studies on microwaves. He accelerated his research as he thought that its results would represent a springboard for a position in the United Kingdom or in the United States and, thus, the instrument that would not only enable him to expatriate but also ensure him the means of making a living abroad. He was indeed persuaded that, regardless of the funds that Marco Ghiron had been able to transfer abroad, the only money on which he could rely was «that which was still remaining in your head», namely his own scientific knowledge²¹.

¹⁸ D. Fubini, *Let Me Explain*, cit., p. 57; Eugenio Fubini Ghiron, *General Information*, 24 October 1938, in BLO, MS, SPSL, 243/3, f. «Fubini Ghiron, Eugenio».

¹⁹ A. Capristo, *L'espulsione degli ebrei dalle accademie italiane*, cit., p. 111.

²⁰ *Annuario del Regio Politecnico di Torino. Anno accademico 1938-1939-XVII*, Torino, Società Editrice Torinese, 1939, p. 8; Historic Archive of the Polytechnic University of Turin, f. «Eugenio Fubini Ghiron»; Eugenio Fubini Ghiron, *Confidential Information*, 24 October 1938, in BLO, MS, SPSL, 243/3, f. «Fubini Ghiron, Eugenio».

²¹ As quoted in D. Fubini, *Let Me Explain*, cit., p. 64. Eugenio was so concerned with enhancing his own résumé that, in the list of publications provided to the Society for the Protection of Science and Learning, he also claimed the authorship of the article *Un teorema di unicità per l'equazione $\partial^2 u / \partial x^2 + \partial^2 u / \partial y^2 + \partial^2 u / \partial t^2 = 0$* (E. Fubini Ghiron, *Curriculum Vitae*, cit.), which had been instead written by his father (cfr. Guido Fubini, *Opere scelte*, edited by Unione matematica italiana, Rome, Edizioni Cremonese, 1962, vol. III, pp. 214-217).

The invitation that Guido Fubini received from Princeton University, thanks to Einstein's intercession, to teach at the Institute for Advanced Study opened the doors to the United States for the Fubinis. As early as September, the family relocated to Paris, via Switzerland. In order not to arouse any suspicions, the trip by car from Turin to a small Swiss town close to the border was disguised as a one-day excursion to the eyes of the Italian border patrol. To make this account convincing, the family members travelled without luggage and were dressed in informal attire but with jewelry sewn into the overcoat of Eugenio's mother. After entering Switzerland, they headed towards Sion and from here, they took a train to Paris. They were forced to spend a few months in the French capital, staying at Hotel Albany, while they were completing the necessary paperwork for obtaining a visa for the United States²². They did not have valid Italian passports for the United States; therefore, they had to resort to an *affidavit of identity*, a type of self-certification of their identities corroborated by other documents, to enter the country at which Eugenio could disembark as a dependent of his father²³. The Fubinis were able to set sail from the port of Le Havre to New York, onboard the ship *Ile de France*, as late as 8 March 1939. They arrived there on 15 March and then settled in Princeton²⁴. In the meantime, Eugenio had probed the possibility of a position at the Cavendish Laboratory in the physics department at the University of Cambridge in the United Kingdom, but this aspiration had fallen through, perhaps because the offer he received had been only the opportunity to conduct research without getting paid²⁵.

The difficulties of exile

Upon arrival in the United States, the Fubinis found a country that was still in the throes of the economic depression. «Gente in cerca di giobbi molti e giobbi

²² D. Fubini, *Let Me Explain*, cit., pp. 63-69.

²³ US Senate, Committee on Armed Services, 88th Congress, 1st Session, *Nominations*, cit., p. 21.

²⁴ Ellis Island Foundation, *Passenger Search, ad nomen* <<https://www.libertyellisfoundation.org/>> (accessed upon registration 19 July 2020).

²⁵ Letter from Eugenio Fubini Ghiron to the Society for the Protection of Science and Learning, 24 October 1938; letter from Esther Simpson to Eugenio Fubini Ghiron, 25 October 1938, in BLO, MS, SPSL, 243/3, f. «Fubini Ghiron, Eugenio».

pochi» [many people in search of jobs and few jobs], as Rasetti, who also moved across the Atlantic, would comment, using the Italian American slang transformation of the English term *job* ironically, to describe the situation of many Italian-Jewish scientists, who had left Italy in the spring of 1940²⁶. The Fubinis had a little more than 40,000 dollars available, a sum that Marco Ghiron had previously transferred to US banks²⁷. In spite of this small wealth, the prospects were not particularly bright for four people. Eugenio feared the depletion of the funds in a span of time no longer than eight months²⁸. Guido, who had received the invitation from Princeton, was supposed to be the breadwinner for the family. However, despite being only sixty-one years old, he was also in poor health, which hindered his working abilities. Besides, the position was not a tenured but a fixed-term one. Eugenio realized, therefore, that the obligation to provide to the family would soon be in his hands. He did not consider academic positions, not only because of the expected low pay but also on the grounds that he did not want to find himself having to rely once again on Fermi, also an exile in the United States, even though he had listed Fermi to the Society for the Protection of Science and Learning, along with Giancarlo Vallauri, the president of the Polytechnic University of Turin, as colleagues who could provide reference letters, while he still had high hopes for a job at the Cavendish Laboratory²⁹. Having kept his distance from Fermi, Eugenio did not participate in the research that led to the making of the American atomic bomb, unlike other escaped Italian-Jewish physicists in the United States such as Emilio Segrè³⁰. At least at first, he instead concentrated on applied engineering in the private sector. His aspiration was to join a research group at the Columbia Broadcasting System (CBS), which had launched the

²⁶ As quoted in Alessandra Gissi, *L'emigrazione dei «maestri». Gli scienziati italiani negli Stati Uniti tra le due guerre*, in Angiolina Arru, Daniela Luigia Caglioti and Franco Ramella (edited by), *Donne e uomini migranti. Storie e geografie tra breve e lunga distanza*, Rome, Donzelli, 2008, p. 157.

²⁷ US Senate, Committee on Armed Services, 88th Congress, 1st Session, *Nominations*, cit., p. 19. The previously-mentioned sum of 400,000 dollars (p. 18), which was obviously exorbitant for the time, is probably the result of a typo that also occurs in D. Fubini, *Let Me Explain*, cit., p. 60.

²⁸ E. Fubini Ghiron, *Confidential Information*, cit.

²⁹ D. Fubini, *Let Me Explain*, cit., pp. 71-72; E. Fubini Ghiron, *General Information*, cit.

³⁰ Giovanni Battimelli, *I fisici italiani di fronte all'atomica*, in Emilia Fiandra and Leopoldo Nuti (edited by), *L'atomica. Scienza, cultura, politica*, Milan, Franco Angeli, 2014, p. 65.

program destined for the development of television. However, as a foreigner who still spoke English «with some difficulty»³¹, obtaining a position in the key sector in the main radio network of the United States was not at all an easy task. After repeated attempts, Fubini was compelled to accept a compromise: in April of 1939 he was hired as a sound technician at CBS for the evening musical broadcast – a job by far below his qualifications and, as such, underpaid – but he had the authorization to participate informally and for free in the more cutting-edge research of the company, with the opportunity to propose and conduct some of his own. After a few months of commuting from Princeton to stay close to his father, Eugenio moved to New York in September to reside in the same city where he worked³².

If his father enjoyed «una casetta fra le piante, in una zona di boschi e di villini» [a small house between plants, in an area of woods and cottages] in Princeton³³, Eugenio ended up living in a room at the International House of New York, a non-profit organization that made cheap accommodation available for students and young researchers³⁴. However, against the backdrop of the hard times, Fubini considered himself «lucky» for his job at CBS³⁵.

He did not forget about his relatives who were still living in Italy either. In particular, with his own family, he became a sponsor for the financial support of his cousin Anna, her husband Davide Jona, and their two daughters, if the need arose, to allow them their relocation to the United States in May of 1940 in compliance with the Federal legislation that barred prospective immigrants without means of sustenance so that the newcomers would not end up weighing on public assistance. He also loaned a small sum of money to Anna in time of

³¹ E. Fubini Ghiron, *General Information*, cit.

³² D. Fubini, *Let Me Explain*, cit., pp. 72-75.

³³ Letter from Guido Fubini Ghiron to Tullio Levi Civita, 21 August 1939, as quoted in Pietro Nastasi, *Leggi razziali e presenze ebraiche nella comunità scientifica italiana*, in Antonio Di Meo (edited by), *Cultura ebraica e cultura scientifica in Italia*, Rome, Editori Riuniti, 1994, p. 136.

³⁴ D. Fubini, *Let Me Explain*, cit., p. 75.

³⁵ As quoted in Lucia Orlando, *Physics in the 1930s: Jewish Physicists' Contribution to the Realization of the «New Tasks» of Physics in Italy*, «Historical Studies in the Physical and Biological Sciences», 29, 1, 1998, p. 173.

need³⁶.

His American success

Fubini did not give up his academic aspirations. In 1939 he published anonymously an article on radiofrequency-powered amplifiers in *Alta frequenza* [High frequency], the journal of the Italian Electrotechnical Association. It cannot be ruled out that he submitted his contribution before the enactment of the racial laws and Fubini's flight to the United States. However, a subsequent letter, dating to 1941, on pressure gradient microphones, sent for consideration to the same periodical and once again published without his signature, demonstrated that he intended to continue the collaboration with the journal even after going into exile³⁷.

The following year Fubini was able to reinsert himself in the academic world. Between 1942 and 1945 he obtained a research position in Cambridge, Massachusetts, at Harvard University, where he participated in the development of radar systems and devices for shielding radio transmissions from interferences. Within the context of the Second World War, such projects were conceived for military field applications. By the virtue of his skills, although he was not a United States citizen and could technically be considered an enemy alien³⁸, Fubini became a scientific consultant to the US air force and navy, with which he collaborated in order to detect German radar systems and to jam them thanks to electronic disturbance systems during the Anglo-American invasion operations of

³⁶ A. Foa, *Memorie di Anna Foa*, cit., pp. 198, 214.

³⁷ [Eugenio Fubini Ghiron], *Considerazioni sul calcolo degli amplificatori di potenza a radiofrequenza*, «Alta frequenza», 8, 3, 1939, pp. 147-191; [Id.], *Sulle proprietà dei microfoni a gradiente di pressione*, «Alta frequenza», 10, 1, 1941, p. 99. Only after democracy was restored to Italy at the end of the Second World War, the journal acknowledged Fubini's authorship of his contributions by using a rather ambiguous phrasing, a complicit circumlocution that did not mention explicitly the anti-Semitic measures of the fascist regime: «Cessate le ragioni contingenti che vietavano di pubblicare il nome dell'antico ed apprezzato collaboratore, "Alta frequenza" adempie con piacere il debito di darne notizia» [Since the contingent reasons that forbade publishing the name of the long-standing and appreciated contributor have ceased, "High frequency" fulfills with pleasure the duty to give notice of it] (La Redazione, *Note di redazione*, «Alta frequenza», 14, 1-2, 1945, p. 4).

³⁸ Shira Klein, *Italian Jews from Emancipation to Fascism*, New York, Cambridge University Press, 2018, p. 134.

Italy and southern France³⁹. In preparation for the latter – which, unlike the former, never took place – Fubini spent six months in Corsica. Then he was transferred to Great Britain following the 8th Air Force⁴⁰.

At the end of the Second World War, his mother, who was widowed in 1943, alternated stays of a few months in Turin and New York almost every year⁴¹. Instead, Fubini decided to live permanently in the country that had welcomed him in 1939. In 1945 he married Jane Elizabeth Machmer, whom he had met four years earlier and with whom he would have six children⁴². In the same year, on 2 May, he obtained US citizenship, Americanizing his own first name to Eugene and changing his second last name, that of his maternal family, to a middle name, as used by some Americans⁴³. After his collaboration with the air force had come to a close, he was hired as an engineer by the recently established Airborne Instruments Laboratory (AIL), a firm in Mineola – on Long Island in the State of New York – that very soon became a company leader in the development of technologies for radar. Fubini continued to deal with microwaves and equipment to shield radio transmissions from interferences, publishing the findings of his research in the renowned journal of the Institute of Radio Engineers⁴⁴. He then made his way up in the hierarchy of the company until he held the position of co-director of the division of engineering research in 1955⁴⁵. In this capacity, he also tried to promote a reduction of the gap between the theoretical aspects of the discipline and the practical problems that the professionals would confront⁴⁶.

³⁹ Eric Pace, *Eugene Fubini, 84; Helped Jam Nazi Radar*, «New York Times», 6 August 1997, p. D21.

⁴⁰ US Senate, Committee on Armed Services, 88th Congress, 1st Session, *Nominations*, cit., p. 14.

⁴¹ D. Fubini, *Let Me Explain*, cit., pp. 128-129; Anna Foa, *La famiglia F.*, Rome-Bari, Laterza, 2018, p. 60.

⁴² E. Amaldi, *Il caso della fisica*, cit., p. 164.

⁴³ *Fubini Case – Decision no. 201*, in United Nations, *Reports of International Arbitral Awards*, New York, United Nations, 2016, vol. XIV, p. 421.

⁴⁴ *Dr. Fubini To Address L.I. – PGMTT*, «The Pulse of Long Island», 8, 5, 1960, p. 9; Eugene G. Fubini and Peter J. Sutro, *A Wide-Band Transformer from an Unbalanced to a Balanced Line*, «Proceedings of the IRE», 35, 10, 1947, pp. 1153-1155; Eugene G. Fubini and Donald C. Johnson, *Signal-to-Noise Radio in AM Receivers*, «Proceedings of the IRE», 36, 12, 1948, pp. 1461-1166.

⁴⁵ H. Brown and B. Fowler, *Eugene Ghiron Fubini*, cit., p. 91.

⁴⁶ Eugene G. Fubini, *A Plea for Simplification*, «IRE Transactions on Microwave Theory and Techniques», 6, 4, 1958, pp. 341-342.

After the 1940s Fubini did not publish major scientific works⁴⁷, probably because his growing interest in military applications dissuaded him from disclosing the results of his studies. Not coincidentally, in a letter sent to the *Washington Post* in 1980, speaking of the debate on Stealth aircrafts, the so-called invisible airplanes undetectable by radar, Fubini would caution against discussing the details of this particular technology in public⁴⁸. However, he continued his research with success, as shown by the thirteen patents that he obtained, alone or in collaboration, in the field of microwaves and electromagnetism between 1952 and 1964⁴⁹.

The main client of the AIL was the Department of Defense. Hence, Fubini maintained close ties with the United States military system and in 1962 accepted to return to work for the federal government in the Office of Defense Research and Engineering of the Pentagon, where he attended to weaponry development programs, a job that entailed managing a yearly budget of about seven billion dollars. He also carried out political tasks in the Department of Defense. In particular, President John Fitzgerald Kennedy appointed him as assistant secretary of Defense, in charge of research and technology, on 15 June 1963 and the Senate later confirmed his nomination on 28 June⁵⁰.

In the ultra-liberal Foa family, who should have been grateful to him for the help he had given them, he became the «cugino “cattivo”, quello che lavorava nel governo americano» [the “bad” cousin, the one who worked in the American government]⁵¹. Nonetheless, within the top echelons of the Pentagon he was known as «no man», namely as the official who, resorting to his power to veto

⁴⁷ Fubini edited and partly re-elaborated a text on the applications of mathematics for engineers that his father had begun to write with his colleague Giuseppe Albenga, president of the Polytechnic University of Turin from 1929 to 1932, and whose elaboration had been interrupted by Guido's flight to the United States (Guido Fubini and Giuseppe Albenga, *La matematica dell'ingegnere e le sue applicazioni*, edited by Eugenio Fubini Ghiron, 2 vols., Bologna, Zanichelli, 1949-1954).

⁴⁸ Eugene V. Fubini, *Stealth and Counter-Stealth*, «Washington Post», 22 October 1980, p. A22.

⁴⁹ Bob O. Evans, *Eugene V. Fubini, 1913-1997*, in National Academy of Engineering, *Memorial Tributes*, Washington, DC, National Academies Press, 2002, vol. X, pp. 83-84. The patents Fubini obtained can be identified by consulting Hollis, the online catalog of Harvard University, <<https://hollis.harvard.edu>> (accessed 19 July 2020).

⁵⁰ *Italian Immigrant Gets High Post at the Pentagon*, «New York Times», 16 June 1963, p. 68; US Senate, Committee on Armed Services, 88th Congress, 1st Session, *Nominations*, cit., p. 23.

⁵¹ A. Foa, *La famiglia F.*, cit., p. 60.

research projects, repeatedly availed himself of this authority in the conviction that the development of technology in the field of weaponry had at that point reached a level beyond which it was no longer necessary to go in order to guarantee national security⁵². For example, he was reluctant to the further development of strategic bombers, thanks to the existence of ballistic missiles⁵³. Fubini was also a technocrat convinced that scientists and engineers should pay greater attention to the moral and social consequences of their work⁵⁴.

After formally taking office on 3 July 1963, Fubini continued his mandate under Lyndon B. Johnson until the time when, also because of conflicts with military leaders, he resigned on 28 June 1965, though he stayed in that position until 15 July in order to fulfill ordinary matters. He then served as the vice president of the International Business Machine Co. (IBM) with the primary task of getting commissions from the Pentagon⁵⁵. In this capacity, he re-established some relationship with Italy. In particular, upon request of the president of the University of Pisa, Alessandro Faedo, and, most likely, with special regard for the university that had been his father's alma mater, he had IBM donate a 7090 data processor – once cutting-edge but at this point on the verge of becoming obsolete – to this university laying the groundwork for the birth of the Centro nazionale universitario di calcolo elettronico [National university center for electronic computation]⁵⁶.

Fubini left IBM in 1969 to establish his own consulting firm, EG Fubini Consultants, with its headquarters in Arlington, Virginia, a short distance away from the Department of Defense. He remained in charge of his firm for a quarter

⁵² John W. Finney, *Pentagon's «No» Man on Research Is Going Into Private Industry*, «New York Times», 4 July 1965, p. 16.

⁵³ Lee C. Carpenter, *Memoirs of a Cold Warrior. The Struggle for Nuclear Parity*, New York, Algora, 2009, pp. 43-44.

⁵⁴ Henry R. Lieberman, *Scientists Are Urged to Back Inventions*, «New York Times», 26 March 1967, p. 1.

⁵⁵ Department of Defense, *Key Officials, 1947-2012*, Washington, DC, Office of the Secretary of Defense, 2003, p. 66 <<https://history.defense.gov>> (accessed 19 July 2020); *IBM. Adds Two Vice Presidents*, «New York Times», 30 June 1966, p. 53; D. Fubini, *Let Me Explain*, cit., p. 212.

⁵⁶ Massimo Bozzo, *La grande storia del computer. Dall'abaco all'intelligenza artificiale*, Bari, Dedalo, 1996, p. 144.

of a century and continued to collaborate with both the federal government and the private sector, joining the boards of directors of two of the Pentagon's supply companies for electronic devices: Texas Instruments, headquartered in Dallas, in 1970 and Gould of Cleveland, Ohio⁵⁷. At times, he intervened publicly in matters regarding armaments and technology in general⁵⁸. For the weekly magazine *US News and World Report* he was «a top authority on weapon technology»⁵⁹. William J. Perry, the undersecretary of Defense in the Carter administration from 1977 to 1981, recalled that «Fubini would stop by my Pentagon office every Saturday morning to offer support and advice»⁶⁰. Under Democrat Jimmy Carter, besides presiding over the Defense Science Board, an advisory body of the Pentagon comprising civilian experts, Fubini also performed the role of «unofficial adviser» and «talent scout» for Perry's immediate superior, the secretary of Defense Harold Brown. With the latter he formed a real friendship, which was perhaps bolstered by their common scientific education since both of them had graduated in physics⁶¹.

Fubini left the helm of his namesake company as late as 1993, after the passing of his wife. Retiring to private life, he moved from Vienna, Virginia, where he had resided to manage EG Fubini Consultants, to Brookline, Massachusetts, where he died of a heart attack on 5 August 1997⁶². In his honor, in 1996, Perry, who had meanwhile become secretary of Defense in the Clinton administration,

⁵⁷ *Executive Changes*, «New York Times», 28 February 1970, p. 57; *Laurie Fubini, Robert Jacobs Plan Wedding*, «New York Times», 1 September 1974, p. 44.

⁵⁸ See, for example, Eugene G. Fubini, *Discussion*, «American Economic Review», 56, 1-2, 1966, pp. 514-518; Id., *Electronically Expanding the Citizen's World*, «IEEE Spectrum», 6, 7, 1969, pp. 30- 33; Id., *The Burdens of Technology*, «New York Times», 12 January 1970, p. 87; Id., *Stealth and Counter-Stealth*, cit. See also the conversation with Michael Krepon, *Weapons Potentially Inhumane: The Case of Cluster Bombs*, «Foreign Affairs», 52, 3, 1974, pp. 607-608.

⁵⁹ *Is the US Armed for the Wrong War? Interview with a Top Authority on Weapon Technology*, «US News and World Report», 16 August 1965, p. 60.

⁶⁰ William J. Perry, *My Journey at the Nuclear Brink*, Stanford, CA, Stanford University Press, 2015, p. 29.

⁶¹ Harold Brown con Joyce Winslow, *Star Spangled Security. Applying Lessons Learned over Six Decades Safeguarding America*, Washington, DC, Brookings Institution, 2012, pp. 48, 64; Edward C. Keefer, *Harold Brown. Offsetting the Soviet Military Challenge, 1977-1981*, Washington, DC, Historical Office, Office of the Secretary of Defense, 2017, pp. 109, 623.

⁶² Louie Estrada, *Eugene G. Fubini Dies at 84*, «Washington Post», 6 August 1997 <<https://www.washingtonpost.com>> (accessed 19 July 2020).

established the Eugene G. Fubini Award to recognize a civilian who had made significant contributions to the activities of the Pentagon. The first to be bestowed this distinction was Fubini himself⁶³.

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⁶³ Don Herskovitz, *Eugene Fubini Dies at 84*, «Journal of Electronic Defense», 20, 10, 1997 <<https://www.thefreelibrary.com>> (accessed 19 July 2020).

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