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# *The Gleb Wataghin's Archive at the University of Turin*
## *Sources for a history of Italian-Brazilian cooperation in physics in the 20th century*

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ABSTRACT: This paper aims to present and contextualize a selected set of documents from Gleb Wataghin's archive at the Historical Archive of the University of Turin, useful for studying his participation in the Brazilian-Italian scientific cooperation in the 20th century. Wataghin was a Russian-Italian physicist who graduated from the University of Turin, where he also became a professor. In the 1930s, he was invited to contribute to the organization of the Department of Physics of the Faculty of Philosophy, Sciences, and Letters of the University of São Paulo, in Brazil. As observed in the documents from this archive, Wataghin's Brazilian experience was fundamental for the building of Brazilian-Italian cooperation in physics, in times of positive diplomatic relations between the two countries. Beyond that, these documents are also relevant to study other aspects of Wataghin's life, as well as his networks of cooperation with other countries.

KEYWORDS: Gleb Wataghin - Historical Archive of the University of Turin - Brazilian-Italian scientific cooperation

## 1. *Introduction*

Gleb Vassilievich Wataghin (1899-1986) was a Russian-Italian theoretical physicist, also versed in experimental research[1]. He is recognized in Brazilian history of physics for his work in the organization of the Physics Department of one of the first universities of Brazil, the University of São Paulo (USP), for the education of the first generations of Brazilian physicists, and for the shaping of an international environment of research within a short time[2]. Wataghin's

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Abbreviations: ASUT, *G. Wataghin* = Archivio Storico dell'Università di Torino, Fondo *Gleb Wataghin*; ASUT, Fasc. Pers. *Gleb Wataghin* = Archivio Storico dell'Università di Torino, Fascicolo Personale di Gleb Wataghin; AOD = Occhialini-Dilworth Archive; AAO = Augusto Occhialini Archive; AHIFUSP = Historical Archive of the Institute of Physics of the University of São Paulo; HDB = Hemeroteca Digital Brasileira; IUPAP = International Union of Pure and Applied Physics; CNP = Brazilian Research National Council; CBPF = Brazilian Center for Research in Physics; USP = University of São Paulo; FFCL = Faculty of Philosophy, Sciences, and Letters; OCIAA = Office of the Coordinator of Inter-American Affairs; IFGW = "Gleb Wataghin" Institute of Physics; Unicamp = University of Campinas; PCB = Brazilian Communist Party.

[1] ENRICO PREDAZZI, *Gleb Wataghin*, in C.S. ROERO (ed.), *La Facoltà di Scienze Matematiche Fisiche Naturali di Torino*, Torino, Dep. Sub. Sto. Pat., 1999, pp. 283-294; LUCIANA VIEIRA SOUZA DA SILVA, *Ciência, universidade e diplomacia científica: a trajetória brasileira de Gleb Vassilievich Wataghin(1934-1971)*, PhD Dissertation, Univ. de São Paulo, Faculdade de Educação, supervised by Bruno Bontempi Junior, 2020.

[2] MARTHA CECILIA BUSTAMANTE, ANTONIO AUGUSTO PASSOS VIDEIRA, *Gleb Wataghin en la universidad de São Paulo: un momento culminante de la ciência brasileña*, «Quipu», 3, vol. 10, 1993, pp. 263-284; CÁSSIO LEITE VIEIRA, ANTONIO AUGUSTO PASSOS VIDEIRA, *História e historiografia da física no Brasil*, «Fênix: Revista de História e Estudos Culturais», 3, vol., 4, a. 4, 2007, pp. 1-27; HERÁCLIO DUARTE TAVARES, *Estilo de pensamento em física nuclear e de partículas no Brasil (1934–1975): César Lattes entre raios cósmicos e aceleradores*, PhD Dissertation, Universidade Federal do Rio de Janeiro, supervised by Antonio Augusto Passos Videira, 2017; SILVA, *Ciência, universidade e diplomacia científica...*, 2020 cit.; HERÁCLIO DUARTE TAVARES, ALEXANDRE BAGDONAS, ANTONIO A. P. VIDEIRA, *Transnationalism as Scientific Identity: Gleb Wataghin and Brazilian Physics, 1934-1949*, «Historical Studies in the Natural Sciences», 3, vol. 50, 2020, pp. 248-301.

multiple abilities can be identified after researching the historical archives of the institutions where he worked or those connected with his itinerary. Letters, papers, reports, notes, books, newspapers, and interviews: from a diversity of sources, Wataghin's professional and personal paths can be understood as part of the development of 20th-century physics from a transnational and diplomatic perspective.

This paper aims to present and contextualize the documents from Gleb Wataghin's archival fund preserved at the Historical Archive of the University of Turin. To this end, it is divided into two parts. Firstly, I present a picture of Wataghin's trajectory in Brazil[3] from the perspective of the creation of an international network of collaboration in physics, aiming to understand him as a non-official science diplomacy actor, someone who organized his scientific work through international collaboration with attention to the changes in the broader framework of Brazilian international relations[4]. As well as other case studies in the history of science diplomacy and the transnational history of science[5], Wataghin is here understood as a proactive actor in the reinforcement of scientific and institutional ties through the opportunities that come from the foreign policies field. In the second part of this paper, more descriptive, I present the sources useful for studying his work in Brazil (1934-1949) as well as the maintenance of his ties with Brazilian physics when he was a researcher, professor, and director of the Institute of Physics of the University of Turin (1949-1971). This paper is not an inventory or a complete research instrument. Rather than that, it represents a partial perspective of a researcher who found in this fund the possibility to study Wataghin's relations with Brazilian physics from a transnational and science diplomacy perspective[6].

### 1.1 *Gleb Wataghin's trajectory: Russia, Italy, Brazil, and all this once again*

Wataghin was born in Birsula, Ukraine, in the Russian Empire, to a noble, intellectualized, and wealthy Russian family[7]. He attended the Kiev Imperial Secondary School and also studied

[3] In this part, I analyzed historical sources from Italian and Brazilian archives. AOD, in the Physics Library of the University of Milan; AAO, in the Historical Archive of the Physics and Astronomy Department of the University of Florence; ASUT, *G. Wataghin*, in Turin; AHIFUSP, in São Paulo (also available at http://acervo.if.usp.br/); and HDB, online (https://bndigital.bn.gov.br/hemeroteca-digital/).

[4] The history of science diplomacy is an interesting theoretical approach to understanding the involvement of scientists not trained in international relations with the diplomatic apparatus. On this subject, see MARIA RENTETZI, *Living with Radiation or Why we Need a Diplomatic Turn in History of Science*, «Kjemi», 6, 2017, pp. 21-24; PIERRE-BRUNO RUFFINI, *Science and Diplomacy. A New Dimension of International Relations*, Cham, Springer, 2017; ID., *Diplomatie scientifique. De quelques notions de base et questions-clés*, «Philosophia Scientiæ», 3, vol. 23, 2019, pp. 67-80; MATTHEW ADAMSON, ROBERTO LALLI, *Global perspectives on science diplomacy: Exploring the diplomacy-knowledge nexus in contemporary histories of science*, «Centaurus», 1, vol. 63, 2021, pp. 1-16; SIMONE TURCHETTI, MATTHEW ADAMSON, GIULIA RISPOLI, DOUBRAVKA OLŠÁKOVÁ, SAM ROBINSON, *Introduction: Just Needham to Nixon? On Writing the History of 'Science Diplomacy*, «Historical Studies in the Natural Sciences», 4, vol. 50, 2020, pp. 323-39.

[5] See for example OLIVAL FREIRE JR., INDIANARA SILVA, *Scientific Exchanges between the United States and Brazil in the Twentieth Century. Cultural Diplomacy and Transnational Movements*, in J. KRIGE (ed.), *How Knowledge Moves: Writing the Transnational History of Science and Technology*, Chicago, The University of Chicago Press, 2019, pp. 281-307; MICHAEL J. BARANY, *The Officer's Three Names. The Formal, Familiar, and Bureaucratic in the Transnational History of Scientific Fellowships*, *Ibid*., pp. 254-280; ADRIANA MINOR, *Manuel Sandoval Vallarta. The Rise and Fall of a Transnational Actor at the Crossroad of World War II Science Mobilization*, *ibid*., pp. 227-253.

[6] The documents presented in this paper were consulted in March of 2019 when I was undertaking archival research for my PhD: SILVA, *Ciência, universidade e diplomacia científica…*, 2020 cit., pp. 43-46.

[7] PREDAZZI, *Gleb Wataghin*, 1999 cit., p. 283.

for one year at the University of Kiev (1918-1919)[8]. Following the 1917 Bolsheviki Revolution and the civil war, Wataghin had to leave the region with his family in late 1919[9]. In 1920, he was enrolled at the University of Turin. In 1922, he received his physics degree and, in 1924, his mathematics degree[10].

Wataghin began his physics professional trajectory in 1925, at the *Reale Accademia e Scuola di Applicazione Artiglieria e Genio* in Turin, where he taught mathematical analysis and experimental physics until 1933. He also taught at the Turin *Politecnico* and between 1929 and 1934 he was in charge of rational mechanics and superior physics at the University of Turin[11]. At the beginning of his career, he had the opportunity to establish contact with important names of the physics of his time in Europe, such as Wolfgang Pauli (1900-1958), Niels Bohr (1885-1962), Werner Heisenberg (1901-1976), Paul Dirac (1902-1984), Enrico Fermi (1901-1954), Oskar Klein (1894-1977), and others[12]. This international circulation was fundamental for the building of a transnational network of cooperation that he would keep growing throughout his life[13].

In 1934, Wataghin was invited to integrate an Italian mission of professors, responsible for participating in the organization of the newly founded Faculty of Philosophy, Sciences, and Letters (FFCL) of the USP, in Brazil[14]. This university was built by the São Paulo State government to shape the future elite generations. Because of the political disputes between the *Paulistas* and the federal government headed by Getúlio Vargas, as well as other Brazilian intellectual circles, the USP founders decided to hire the first professors of the FFCL, the *alma mater* of the university, in Europe[15]. After diplomatic disputes for the chairs of that institution – in a soft power logic of conquering foreign legitimacy from scientific and educational activities – the FFCL disciplines were divided by nationality. The main nations represented were: France, responsible for the humanities; Germany, for the natural sciences; and Italy, for the exact sciences[16].

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[8] MARINA MOSEYKINA, *Ученый-физик Глеб Васильевич Ватагин: русский эмигрант, гражданин Италии*, in *Русские в Италии. Итальянцы в России,* Спб, Изд-во СпбГАСУ, 2012, pp. 79-90.
[9] GLEB WATAGHIN, *Gleb Wataghin (depoimento, 1975)*, Rio de Janeiro, CPDOC, 2010.
[10] SILVA, *Ciência, universidade …*, 2020 cit., p. 107; PREDAZZI, *Gleb Wataghin*, 1999 cit., p. 283.
[11] *Ibid.*.
[12] WATAGHIN, *Gleb Wataghin …*, 2010 cit., p. 1.
[13] SILVA, *Ciência, universidade …*, 2020 cit., pp. 107-140; TAVARES, BAGDONAS, VIDEIRA, *Transnationalism …*, 2020 cit., p. 259; TAVARES, *Estilo de pensamento …*, 2017 cit., p. 51.
[14] LUCIA WATAGHIN, *Fundação da Faculdade de Filosofia, Ciências e Letras da Universidade de São Paulo: a Contribuição dos Professores Italianos*, «Revista do Instituto de Estudos Brasileros», 34, 1992, pp. 151-73.
[15] IRENE CARDOSO, *A Universidade da Comunhão Paulista: O projeto de criação da Universidade de São Paulo*, São Paulo, Editora Autores Associados, Cortez Editora, 1982.
[16] PATRICK PETITJEAN, *As Missões Universitárias Francesas na Criação da Universidade de São Paulo (1934-1940),* in A.I. HAMBURGER, M.A.M. DANTES, M. PATY, P. PETITJEAN (eds.), *A ciência nas relações Brasil-França (1850-1950)*, São Paulo, Edusp/Fapesp, 1996, pp. 89-120; ANDRÉ FELIPE CÂNDIDO DA SILVA, *A Diplomacia Das Cátedras: A Política Cultural Externa Alemã e o Ensino Superior Paulista – Os Casos da USP e da Escola Paulista de Medicina (1934-1942)*, «História», 1, vol. 32, 2013, pp. 401-431; CARDOSO, *A Universidade...*, 1982 cit., p. 182; BRUNO BONTEMPI JUNIOR, *A cadeira de história e filosofia da educação da USP entre os anos 40 e 60: um estudo das relações entre a vida acadêmica e a grande imprensa*, PhD Dissertation, Pontifícia Universidade Católica de São Paulo, supervised by Mirian Jorge Warde, 2001; CARLOTA BOTO, *A intelectualidade paulista, o Manifesto dos Pioneiros e a Universidade de São Paulo em sua primeira "missão" (1932-1934)*, in C.E. CURY, C.E. VIEIRA, R.H.S. SIMÕES (eds.), *História da Educação: global, nacional e regional*, Vitória, Edufes, 2019, pp. 39-74.

The USP Italian mission was supervised by the Italian Ministry of Foreign Affairs. At that time, the fascist regime (1922-1943) developed different strategies to spread Italian culture abroad, through massive investments in cultural propaganda[17]. In this sense, the Italian mission in Brazil was very appreciated by that government, although not all the selected professors were fascists[18]. All the opposite, some of them were anti-fascists or non-fascists who saw the Italian mission as an opportunity to escape fascist Italy. That was Wataghin's case. When the Brazilian engineer, professor, and first director of the FFCL-USP, Theodoro Ramos (1895-1935), went to Europe to hire foreign missions, he sought indications at the Academy of Sciences. According to Wataghin, his name was suggested by Fermi. Initially, he did not accept the indication, because he did not know Brazil and did not want to isolate himself. However, he changed his mind, in his words,

> Because I only received the Italian passport at that time. It was fascism; I could not stay there. They also made me understand that it would be difficult for me to get a place as a full professor in Italy. That it would be better to accept a proposal, which was a generous proposal – I received a salary, at that time, of three *contos de réis*, three thousand *réis*, which was a good salary. So I went there[19].

Wataghin remained in Brazil from 1934 to 1949 and was responsible for the organization of the Department of Physics of the FFCL-USP. When he arrived in the country, he was engaged in theoretical topics, such as quantum field theory. Over time, he also began an experimental program on cosmic rays physics. His students in São Paulo were fundamental for the development of his research, such as Marcello Damy de Souza Dantas, Paulus Aulus Pompeia, and Oscar Sala. Dantas and Pompeia came from engineering courses, so their manual abilities were decisive for equipment building and conducting research[20]. With time, Wataghin's former students became professors and participants in his international network of cooperation[21].

Wataghin came to Brazil as an Italian professor. Not only for his Italian citizenship, received by him in 1929[22] but also for the diplomatic character of the Italian mission[23]. During his time in Brazil, he had to send annual reports to his government, to prove that he was doing cultural propaganda through his physics lessons. For example, he used to inform the Italian books he was using in his classes, as well as that he organized his courses according to the Italian institutes of higher education. However, observing other documents produced by Wataghin at that time, it is possible to understand that he was not so devoted to the diffusion of Italian culture

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[17] MARCO MUGNAINI, *L'America Latina e Mussolini: Brasile e Argentina nella politica estera dell'Italia (1919-1943)*, Milan, Franco Angeli, 2008; JOÃO FÁBIO BERTONHA, *O fascismo e os imigrantes italianos no Brasil,* Porto Alegre, EDIPUCRS, 2001.

[18] BERTONHA, *O fascismo…*, 2001 cit.; SILVA, *Ciência, universidade e diplomacia científica …*, 2020 cit., p. 108.

[19] Original in Portuguese: "porque eu só naquela época recebi o passaporte italiano. Estava o fascismo; eu não podia ficar lá. E também me fizeram compreender que era difícil que eu pudesse conseguir um lugar de professor catedrático na Itália. Que era melhor aceitar uma proposta, que era uma proposta generosa – eu recebia um vencimento, naquela época, de três contos de réis, três mil réis, o que era um bom vencimento. Assim fui lá": WATAGHIN, *Gleb Wataghin …*, 2010 cit., p. 11.

[20] BUSTAMANTE, VIDEIRA, *Gleb Wataghin…*, 1993 cit., p. 270; TAVARES, BAGDONAS, VIDEIRA, *Transnationalism…*, 2020 cit., p. 266; TAVARES, *Estilo de pensamento…*, 2017 cit., p. 17.

[21] SILVA, *Ciência, universidade e diplomacia científica…*, 2020 cit., pp. 263-297.

[22] PREDAZZI, *Gleb Wataghin*, 1999 cit., p. 283.

[23] LUCIANA VIEIRA SOUZA DA SILVA, *A Missão Italiana da Faculdade de Filosofia, Ciências e Letras da Universidade de São Paulo: ciência, educação e fascismo (1934-1942)*, Master Dissertation, Universidade de São Paulo, Escola de Artes, Ciências e Humanidades, supervised by Rogério Monteiro de Siqueira, 2015, pp. 33-111.

in Brazil. He also adopted German, French, and US material in his classes, but he knew exactly what he had to declare to Italian diplomacy to keep his position in Brazil – far from fascism[24].

From the moment he arrived in Brazil, Wataghin established connections with the local and the international scientific community to begin the construction of his workplace. Although he never became a diplomat in the strict sense, as he gained experience and opened up spaces for international collaborations in Brazil, he became more aware of how diplomatic policies and good relations between countries could support him in his scientific endeavors. His work in Brazil began with a diagnostic of the local situation of the scientific community and science education, as well as the efforts to organize his workplace. In his discourses as a university professor, the idea that a good physicist should be trained in both theory and laboratory experimentation was common. As FFCL-USP was not yet equipped with laboratories and did not have its own buildings, one of his first activities in São Paulo was the effort for the organization of a physics laboratory[25].

Wataghin believed that the higher education curriculum of physics should present only "a few notions, but presented in such a way as to enlighten the young person's mind about the essence of the explanation of physical phenomena". These "few notions", however, should be worked on in depth. To this end, Wataghin began from the idea that physics would be an "experimental science and therefore requires, first and foremost, the appropriate experimental means, both for research and for teaching purposes, with modern resources"[26].

Wataghin argued that the application of physics was of paramount importance, which justified government investment in laboratories: "if we think today of the profound revolution produced in civilization by the progress of physics (e.g. the applications of electrical energy in the 19th and 20th centuries), we will have to recognize that the tendency to favor research in this field is more than justified"[27]. In addition, he pointed out that large companies had "created costly physics laboratories staffed exclusively by scientific researchers, sometimes with very little connection to the industry itself", such as the Bell-Telephone Company, RCA and Siemens and AEG[28]. Finally, he recommended that

> in Brazil, too, at least one large physics laboratory should be created, in which as many young people as possible should receive instruction.
>
> Such an institute could serve to create young Brazilian physicists who will certainly find a vast field in which to apply their activity as scientists for the good of the country[29].

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[24] Silva, *Ciência, universidade e diplomacia científica…*, 2020 cit., p. 140.

[25] *Ibidem*, p. 75.

[26] Universidade De São Paulo, *Anuário da Faculdade de Filosofia, Ciências e Letras da Universidade de São Paulo (1934-1935)*, São Paulo, Empreza Grafica da "Revista dos Tribunaes", 1937, p. 45, original in Portuguese: «poucas noções, porém expostas de modo que esclareçam a mente do jovem sobre a essência da explicação dos fenômenos físicos (…) ciência experimental e por isso requer, antes de tudo, os meios experimentais adequados, tanto para investigações como para fins didáticos, com recursos modernos».

[27] *Ibidem*, p. 45, original in Portuguese: «se pensarmos hoje na profunda revolução produzida na civilização pelos progressos da física (p. ex. as aplicações da energia elétrica nos séculos XIX e XX), teremos de reconhecer que a tendência de favorecer as investigações nesse campo é mais que justificada».

[28] *Ibidem*, p. 46, original in Portuguese: «criaram custosos laboratórios de física com pessoal ocupado exclusivamente em investigações científicas, às vêzes bem pouco ligadas à própria indústria».

[29] *Ibidem*, p. 46, original in Portuguese: «também no Brasil deveria ser criado pelo menos um grande laboratório de física, no qual o maior número possível de jovens deveria receber instrução. Tal instituto poderá servir para criar jovens físicos brasileiros que encontrarão certamente um vasto campo para aplicar a sua atividade de cientistas para o bem do país».

Wataghin organized his first laboratory in São Paulo between 1936 and 1937. At this period, he began the research on cosmic radiation with equipment built by him and his students, such as Marcello Damy and Paulus Aulus Pompeia[30]. As Damy pointed out in an interview,

> The laboratory, set up in an attic of the main building of the Polytechnic School, had a blackboard, a cupboard, the lid of which was level with the window frame, and six chairs for the students. Wataghin had a table, chair, and two cupboards to store the apparatus; we, his assistants, used part of the counter and the laboratory stools. Next to the counter, a bench was set up on which the physics laboratory technician, Francisco Bentivoglio Guidolin, built an apparatus for the cosmic rays research that was beginning to be carried out. When Wataghin was teaching, we weren't allowed to talk or even Bentivoglio to work. When we worked, we did so amid the noise of hammers, saws, etc. We remained in this environment for two or three years until, in 1938, we managed to rent the building of an old boarding house on Tiradentes Avenue. There was the place where the department began to develop[31].

At the same time he was organizing the first laboratory of the department, Wataghin was looking for support for the beginning of his scientific and educational workplace outside the USP, through cooperation with other institutions. In 1935, one year after he arrived in Brazil, he joined the Brazilian Academy of Sciences, in Rio de Janeiro, and presented a conference on cosmic rays[32] and another entitled "Nuclear physics and properties of elementary particles"[33]. These communications were made even before he presented the first research results of his work in São Paulo. At that time, the cooperation between Wataghin and the Brazilian Academy was just beginning, and he was awarded a diploma as a corresponding member, "in recognition of the relevant services he has been rendering to our country, through the diffusion, from his cathedra in São Paulo, of the most advanced achievements in Modern Physics"[34]. This tribute can be seen as a legitimization, on the part of the Brazilian institution, of Wataghin's participation in its board of supporters. The following year, Wataghin and the mathematician Luigi Fantappiè (1901-1956), his Italian mission colleague at the USP, took part in a series of conferences celebrating the institution's twentieth anniversary. On that occasion, Wataghin spoke about "The new theory of light and neutrinos"[35].

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[30] SILVA, *Ciência, universidade …*, 2020 cit., p. 75.

[31] MARCELLO DAMY, *Marcello Damy: revolução no ensino da Física*, «Estudos Avançados», 22, vol. 8, pp. 79-95, 1994, pp. 82-83, Original in Portuguese: «O laboratório montado em um sótão do prédio principal da Escola Politécnica contava com um quadro negro, um armário, cuja tampa estava no nível do batente das janelas, e seis cadeiras para os alunos. Wataghin tinha mesa, cadeira e dois armários para guardar os aparelhos; nós, seus assistentes, usávamos parte do balcão e as banquetas do laboratório. Ao lado do balcão foi montada uma bancada na qual o técnico do laboratório de Física, Francisco Bentivoglio Guidolin, construía aparelhos para as pesquisas de raios cósmicos que começavam a ser realizadas. Quando Wataghin dava aulas, não podíamos falar e sequer o Bentivoglio trabalhar. Quando trabalhávamos, o fazíamos no meio de barulho de martelo, serra etc. Nesse ambiente permanecemos durante dois ou três anos, até que, em 1938, conseguiu-se alugar o prédio de uma antiga pensão, na avenida Tiradentes. Nele, é que o departamento começou realmente a se desenvolver».

[32] HDB, *Correio da Manhã*, Academia Brasileira de Sciencias, Rio de Janeiro, May 25th, 1935, p. 12; *Diário da Noite*, Academia Brasileira de Sciencias, Rio de Janeiro, May 25th, 1935 p. 2.

[33] HDB, *Correio da Manhã*, Reune-se hoje a Academia Brasileira de Sciencias, Rio de Janeiro, May 27th, 1935, p. 7.

[34] HDB, *Correio da Manhã*, Duas interessantes conferencias, Rio de Janeiro, May 30th, 1935, p. 5, Original in Portuguese: «em reconhecimento dos relevantes serviços que vem prestando ao nosso paiz, através da diffusão feita, de sua cathedra em São Paulo, das mais avançadas conquistas da Physica Moderna».

[35] HDB, *Correio da Manhã,* Na Academia Brasileira de Sciencias, Rio de Janeiro, June 23rd, 1936, p. 7.

Wataghin's participation in the Brazilian Academy of Sciences' events was important not only for the presentation of his works but also for the strengthening of cooperation with a local institution. From that moment on, it became a transit point for the international network of collaboration he was building on Brazilian soil. Tullio Levi Civita's (1873-1941) travel to the country permits to illustrate this strategy. On a visit to Brazil in 1937, the Italian mathematician went to the Brazilian Academy of Sciences accompanied by Wataghin to present a paper on "the recent stages of scientific thought". After spending some time in Rio de Janeiro, he traveled to São Paulo with his wife[36]. Wataghin also helped to bring other foreign scientists to the Brazilian Academy, such as George Gamow (1904-1968), from the University of Washington, in early 1939. The visit was promoted by the National Faculty of Philosophy and Wataghin collaborated intensively, from the travel preparation to the reception in Rio de Janeiro and the organization of a series of lectures at the Physics Department of FFCL-USP[37]. In 1940, one of Wataghin's students, Mario Schenberg, got a grant from the Guggenheim Foundation to work in Gamow's laboratory in the United States[38].

Wataghin's efforts to improve the training of his students were based on the idea of the importance of infrastructure and adequate personnel. As he was the only professor in the Department until 1937, he began looking for someone to help him. This is how the Italian physicist Giuseppe Occhialini (1907-1993) arrived in Brazil. According to Gariboldi[39], Wataghin's invitation to Occhialini was motivated by a request from his father, the physicist Augusto Occhialini[40]. The idea was to distance Occhialini from Italy because of his anti-fascist activism[41]. In a notebook, probably written in the 1980s, he recalls when he decided to leave Italy:

> (...) I had come to Brasil to be free from the constriction my family, my father university professor was imposing on me – I had that now you might call a terroristic [sic] activity, very amateurist [sic] I was feeling the police net coming near so when Wat. offered me a job I accepted heartily – Then in Brasil I discovered that I had less freedom than in Italy (...)[42].

Wataghin called on the Brazilian authorities to hire Occhialini and spent efforts to bring that to reality. In a letter to the Italian colleague, he informed that the salary would be 1,800 thousand-*réis* per month, paid by the Brazilian government, plus a possible supplement, which could reach 1,000 thousand-*réis* per month, as well as 3,000 lire paid by the Italian government and an annual trip to Europe. Wataghin explained that they could even build Wilson chambers to study cosmic rays in Brazil[43]. Once he arrived, Occhialini would have at his disposal a

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[36] HDB, *Correio da Manhã,* Na Academia Brasileira de Sciencias*,* Rio de Janeiro, Sep. 28th, 1937, p. 7; Original in Portuguese: «as recentes etapas do pensamento matemático»:
[37] SILVA, *Ciência, universidade e diplomacia científica…*, 2020 cit., p. 116.
[38] MARIO SCHENBERG, *Formação da mentalidade científica*, «Estudos Avançados», 12, vol. 5, 1991, pp. 123-151; TAVARES, BAGDONAS, VIDEIRA, *Transnationalism…*, 2020 cit., p. 269.
[39] GARIBOLDI, *Giuseppe 'Beppo' Occhialini…,* 2007 cit., p. 69.
[40] Augusto Raffaele Occhialini (1878-1951), Giuseppe Occhialini's father, was a physics professor in Sassari, Siena, and Genova. He developed research on spectroscopy, radioactivity, and electrotechnics. He was responsible for suggesting that Giuseppe write a thesis on cosmic rays at the University of Florence in 1929. See ALBERTO BONETTI, MASSIMO MAZZONI (eds.), *L'Università degli Studi di Firenze nel centenario della nascita di Giuseppe Occhialini (1907-1993)*. Florença, Firenze University Press, 2007.
[41] GARIBOLDI, *Giuseppe 'Beppo' Occhialini…,* 2007 cit. ., p. 69.
[42] AOD,. Series 7m, file 1345. Occhialini's notebook. N.d.
[43] AAO, Doc. 245. Letter from Gleb Wataghin to Giuseppe Occhialini, March 13th, 1937.

laboratory organized by Wataghin with the materials already bought, such as electrometers, galvanometers, oscillographs, as well as a small Wilson chamber, counters, pumps of different types, a mechanical workshop, and electrical materials. Before leaving for Brazil, Occhialini had to wait for a summons from the Italian Ministry of Foreign Affairs. After presenting himself in Rome, he could finally schedule his trip. An official proposal would be sent by the General Consul to Minister Piero Parini, director of Italians Abroad. As well as Wataghin, Occhialini would be "appointed as a substitute teacher at the Italian Middle Institute in São Paulo"[44]. Occhialini finally left for Brazil in July 1937[45], when he signed his contract[46]. Initially hired as a scientific assistant, in 1941 Occhialini was also appointed professor of General and Experimental Physics, accumulating his previous position[47].

Throughout Occhialini's stay in Brazil, his father was kept informed of his work and progress in cosmic rays research[48]. In one of his letters to his father, he commented on Italians he had met during the ship's voyage, who said they were "Italians, but Brazil without São Paulo would be nothing: we made it and that's why we want to be *Paulistas*", which gave him the impression that the entire Italian aristocracy was to be found in São Paulo[49]. In his contacts with his father, he also asked him to send books, instruments, and personal equipment, such as special outfits to carry out research in caves[50]. Occhialini's accounts help us to understand the research environment he found in São Paulo with Wataghin's work. In a letter to his father, he stated that the Physics Department's laboratory was better stocked than his previous one in Florence[51]. After a period of work, he came to regard himself as a kind of experimental consultant for the laboratory[52].

In 1942, when Brazil broke diplomatic relations with the Axis countries, Occhialini was among the Italian professors whose employment contracts were interrupted. In 1944, Wataghin managed to hire him again, albeit temporarily, to teach an extension course on X-rays. This course was attended by one only student, César Lattes[53]. After this contact they forged closer relations and later worked together in Bristol, England[54]. After the Italian armistice, Brazilian

[44] AOD. Series 2m, file 20, Letter from Gleb Wataghin to Giuseppe Occhialini, April 28th, 1937, original in Italian: «(…) nominato come supplente nell'Istituto Medio Italiano di S. Paolo (…)».
[45] AAO. Doc. 5. Letter from Augusto Occhialini to Giorgio Abetti, July 31st, 1937.
[46] AOD. Series 2m, file 20. Letter from Gleb Wataghin to Giuseppe Occhialini, April 28th, 1937.
[47] SILVA, *Ciência, universidade e diplomacia …*, 2020 cit., p. 110; *A Missão Italiana…*, 2015 cit.., p. 89.
[48] AAO. Doc. 248. Letter from Gleb Wataghin to Augusto Occhialini, [1937].
[49] AAO. Doc. 359. Letter from Giuseppe Occhialini to Augusto Occhialini, [June, 1937], original in Italian: «(…) italiani ma il Brasile senza S. Paulo sarebbe niente: l'abbiamo fatto noi ed è per questo che vogliamo essere Paulisti».
[50] AAO. Doc. 361. Letter from Giuseppe Occhialini to Augusto Occhialini, August 21st, 1937, AAO. Doc. 367, Letter from Giuseppe Occhialini to Augusto Occhialini, [September, 1937].
[51] AAO. Doc. 364. Letter from Giuseppe Occhialini to Augusto Occhialini, August 27th, 1937.
[52] AAO. Doc. 366. Letter from Giuseppe Occhialini to Augusto Occhialini, August 31st, 1937.
[53] César Lattes graduated in physics from FFCL in 1943. In 1946, he went to the University of Bristol to work alongside with Cecil Powell, at the H. H. Wills Laboratory, under Giuseppe Occhialini's invitation, who had been at the laboratory since 1945. In 1948, Lattes went to Berkeley to work at Ernest Lawrence's Radiation Laboratory, in Eugene Gardner's group, where he had at his disposal a particle accelerator (synchrocyclotron) that enabled his great achievement of producing and identifying artificially produced pi mesons. See ANA MARIA RIBEIRO DE ANDRADE, *Físicos, Mésons e Política: a dinâmica da ciência na sociedade*, São Paulo, Rio de Janeiro, Hucitec, Museu de Astronomia e Ciências Afins, 1999; TAVARES, *Estilo de pensamento…*, 2017 cit.; HERÁCLIO TAVARES, IVÃ GURGEL, ANTONIO AUGUSTO PASSOS VIDEIRA, *César Lattes e as técnicas de produção e detecção de mésons: a prática científica como objeto histórico*, «Revista Brasileira De Ensino De Física», 42, 2020, pp. e20200330.
[54] TAVARES, *Estilo de pensamento…*, 2017 cit.

authorities invited Occhialini to resume his professorship at the FFCL[55], but his plans were different. While still in Brazil, he made himself available to the British government to work as a volunteer with the Allies, which would have been accepted by the British embassy in Brazil[56], but it doesn't seem to have materialized, due to his Italian nationality. In September 1945, Occhialini began working in Cecil Powell's laboratory in Bristol[57].

Occhialini was not the only Italian to be helped by Wataghin. In the interwar period and at the beginning of the Second World War, the Russian-Italian physicist played a key role in helping Italian scientists who needed to immigrate to escape fascism and the persecution caused by the racial laws of 1938[58]. That was, for example, Sergio Sonnino's case, a young mathematician of Jewish origin who came to Brazil in 1939 after a contact between Wataghin and Levi-Civita. In Brazil, Wataghin helped Sonnino publish one of his papers in the Annals of the Brazilian Academy of Sciences. Sonnino began to work in Rio de Janeiro with the Italian mathematician Acchile Bassi, for whom he developed a course in analytical geometry at the University of Brasil. Through his contacts at the Brazilian Academy of Sciences, Wataghin also helped the physicist Georgio Todesco, from the University of Bologna. He wanted to immigrate and find work in teaching or industry. In an emotional letter sent to Adalberto Menezes de Oliveira, then-president of the Brazilian Academy of Sciences, Wataghin stressed that Todesco needed to find a job, because "knowing that he is the father of six children and is in a difficult situation, I would like to allow him to work in industry, as he is an excellent radio technician (professor at the Bologna School of Radiocommunications)"[59].

At the same time Wataghin took profit of his connections with Italian science to help his colleagues to escape the fascist regime, he was attentive to diplomatic agreements signed between Brazil and United States. As a result of the so-called Good Neighbor Policy, in 1941 a scientific-diplomatic mission headed by physicist Arthur Compton (1892-1962) went to Brazil with Rockefeller Foundation funding and support from the Office of the Coordinator of Inter-American Affairs (OCIAA). Wataghin participated in the organization of the mission in Brazil, accompanied Compton's entourage on field activities to study cosmic rays in São Paulo, invited the group to give lectures at USP, and organized a Symposium on Cosmic Rays in Rio de Janeiro, which was attended by members of Compton's mission, physicists from São Paulo and Rio de Janeiro, politicians and militaries[60].

During his time in Brazil, Wataghin published a series of articles with his students, some of which had an international impact. According to Videira and Vieira, the first important research

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[55] ASUT, *G. Wataghin*, Copia Corrispondenza, Letter from G. Wataghin to Giuseppe Occhialini, April 14th, 1961.
[56] AAO. Doc. 253. Letter from Fabio Ziffer to Augusto Occhialini, August 24th, 1945.
[57] LEONARDO GARIBOLDI, PASQUALE TUCCI, *Giuseppe Paolo Stanislao Occhialini (1907-1993). A Short Biography*, in P. REDONDI, G. SIRONI, P. TUCCI, G. VEGNI (eds.), *The scientific legacy of Beppo Occhialini*, Berlim/Heidelberg, Springer, 2006, pp. XI-XXXVII; TAVARES, *Estilo de pensamento …*, 2017 cit.; ASUT, *G. Wataghin*, Copia Corrispondenza. Letter from G. Wataghin to Giuseppe Occhialini, April 14th, 1961.
[58] LUCIANA VIEIRA SOUZA DA SILVA, BRUNO BONTEMPI JUNIOR, *From Europe to Brazil: Gleb Wataghin and the scientists' mutual cooperation in times of intolerance and war*, «Lettera Matematica International», 6, 2018, pp. 203-210.
[59] AHIFUSP, Doc. 2.26, box 2, file 5. Letter from [Gleb Wataghin] to Adalberto Menezes de Oliveira, October 31st, 1939, original in Portuguese: «mas somente, sabendo que é pai de seis filhos e se acha numa situação difícil, dar-lhe uma oportunidade de colocar-se na industria sendo ele um excelente radiot[é]cnico (prof. na Escola de Radiocomunicações de Bolonha)».
[60] OLIVAL FREIRE JR., INDIANARA SILVA, *Diplomacia e ciência no contexto da Segunda Guerra Mundial: a viagem de Arthur Compton ao Brasil em 1941*, «Revista Brasileira de História», 67, vol. 34, 2014, pp. 181-201.

program was carried out in cooperation with two of his students, Marcello Damy and Paulus Aulus Pompeia, and was well received by both theoretical and experimental physicists. In their work, they

> have pointed to the existence of a component of the particle shower generated by the collision of cosmic rays with atmospheric nuclei. This component (...) has a high penetrating power in matter, and can pass through tens of centimeters of lead, for example. It was a cutting-edge subject at the time, and the results were published abroad and cited by theoretical and experimental physicists in the field of cosmic rays – among them, the German Werner Heisenberg[61].

The list of works published by Wataghin alongside his Brazilian students can be seen below[62]:

- Wataghin, G.; Damy de Souza Santos, M., *Sobre a técnica das medidas referentes a contagem de partículas elementares e a radiação cósmica*, «Boletim da Faculdade de Filosofia, Ciências e Letras da Universidade de São Paulo. Física 1». Separata do Boletim, n. 5, 1938, pp. 39-41.
- Wataghin, G.; Damy de Souza Santos, M.; Pompeia, P. A., *Sui gruppi simultanei di particelle penetranti nella radiazione cosmica*, «La Ricerca Scientifica», Anno X, n. 12, 1939, pp. 1150-1151.
- Wataghin, G.; Damy de Souza Santos, M., *Cosmic-Ray Showers at Great Depths*, «Annaes da Academia Brasileira de Sciencias», v. 11, n. 1, 1939, pp. 1-9.
- Pompeia, P. A.; Damy de Souza Santos, M.; Wataghin, G., *Simultaneous Penetrating Particles in the Cosmic Radiation*, «The Physical Review», v. 57, n. 1, 1939, p. 61.
- Pompeia, P. A.; Damy de Souza Santos, M.; Wataghin, G., *Penetrating Cosmic-Ray Showers*, «Annaes da Academia Brasileira de Sciencias», v. 12, n. 3, 1940, pp. 229-232.
- Damy de Souza Santos, M.; Pompeia, P. A.; Wataghin, G., *Showers of penetrating particles*, «The Physical Review», v. 59, n. 11, 1941, pp. 902-903.
- Pompeia, P. A.; Damy de Souza Santos, M.; Wataghin, G., *Showers of penetrating particles under 30m. of clay*, in *Proceedings of the Symposium on Cosmic Rays*, Rio de Janeiro: Academia Brasileira de Sciencias, 1941, pp. 155-156.
- Lattes, C.; Wataghin, G., *Estatística de Partículas Elementares e Núcleos e sua Relação com o Problema da Explicação da Abundância dos Elementos e seus Isótopos*, «Annaes da Academia Brasileira de Sciencias», v. 17, n. 4, 1945, pp. 269-270.
- Sala, O.; Wataghin, G., *Showers of penetrating particles at altitude of 22,000 feet*, «The Physical Review», v. 70, n. 5-6, 1946, p. 430.

[61] ANTONIO AUGUSTO PASSOS VIDEIRA, CÁSSIO LEITE VIEIRA, *Reflexões sobre historiografia e história da física no Brasil*, São Paulo, Editora Livraria da Física, 2010, p. 21, original in Portuguese: «apontaram para a existência de uma componente do chuveiro de partículas gerado pelo choque de raios cósmicos contra núcleos da atmosfera. Essa componente (...) tem alto poder de penetração na matéria, podendo atravessar dezenas de centímetros de chumbo, por exemplo. Era assunto de ponta na época, e os resultados foram publicados no exterior, sendo citados por físicos teóricos e experimentais da área de raios cósmicos – entre eles, o alemão Werner Heisenberg».

[62] Gleb Wataghin's complete list of publications can be found in CAROLA DOBRIGKEIT, ARMANDO TURTELLI, RITA APARECIDA SPONCHIADO (eds.), *Selected papers Gleb Wataghin*, Campinas, UNICAMP, Instituto de Física Gleb Wataghin, 2000, pp. XI-XXII.

- Sala, O.; Wataghin G., *On showers of penetrating particles*, in *Physical Society Cambridge Conference Report,* 1947, p. 71.
- Saraiva de Toledo, P.; Wataghin, G., *On the Relative Abundance of Nuclei in the Universe*, «The Physical Review», v. 73, n. 1, 1948, p. 79.
- Meyer, H. A.; Schwachheim, G.; Wataghin, A.; Wataghin, G., *On the nature of mesons in penetrating showers*, «The Physical Review», v. 75, n. 5, 1949, pp. 908-909.
- Meyer, H. A.; Schwachheim, G.; Wataghin, A.; Wataghin, G., *On penetrating showers in cosmic radiation*, «The Physical Review», v. 76, n. 5, 1949, pp. 598-601.

As can be noticed in the list above, Wataghin published alongside his students in both Brazilian and foreign journals, such as La Ricerca Scientifica and The Physical Review. In addition to his work as an informal actor for the improvement of science diplomacy, his efforts to encourage members of his department to circulate also resulted in the publication of co-authored papers, which launched young physicists into the international community. According to Vladimir Wataghin, his son,

> The years spent by Gleb Vasilievich Wataghin at the University of São Paulo were, perhaps, the most productive in his long career as a teacher and scientist, two activities which, for him, were inseparable. In his passionate relation with science, research and discovery were inseparable from formation of students, whose intellectual growth was for him, at the same time, a reward for his efforts as a teacher and an incentive to proceed as a researcher[63].

When Brazil entered the Second World War against Italy in 1942, differently from Occhiliani and the other Italian professors of USP, Wataghin was authorized to stay after insisting on his Russian origins. In fact, from that moment on, he established ties with the Russian community in São Paulo and became the vice-president of the Russian Subcommittee for the Assistance to War Victims (*Subcomitê Russo de Socorro às Vítimas da Guerra*)[64]. After the war, Brazil and France reestablished their previous scientific, university, and technical cooperation in different fields, including physics. Wataghin became an agent of that new bilateral cooperation, being close to the French cultural attachée in Brazil, Gabrielle Mineur. As a result, he received French physicists in São Paulo and traveled to France to work in cosmic rays measurement with Louis Leprince-Ringuet (1901-2000), of the Polytechnic School in Paris[65]. Despite Wataghin's intense research, university, and diplomatic activity in Brazil, in the late 1940s the anti-communist policies in Brazil made him a target of police investigation, because of his leading role in the São Paulo-Russian community[66]. In 1947, when Brazil broke diplomatic relations with the Soviet Union, he was advised to leave the country[67]. In 1949, he returned to Turin following an invitation to direct the Institute of Physics[68].

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[63] VLADIMIR WATAGHIN. *This Volume*, in C. DOBRIGKEIT, A. TURTELLI, R. A. SPONCHIADO (eds.), *Selected papers Gleb Wataghin*, Campinas, UNICAMP, Instituto de Física Gleb Wataghin, 2000, p. IX.
[64] About the Russian communities in São Paulo, see SVETLANA RUSEISHVILI, *Ser russo em São Paulo: os imigrantes russos e a (re)formulação de identidade após a Revolução Bolchevique de 1917*, Universidade de São Paulo, Faculdade de Filosofia, Letras e Ciências Humanas, supervised by Eva Alterman Blay, 2016.
[65] SILVA, *Ciência, universidade e diplomacia científica* …, 2020 cit.
[66] LUCIANA VIEIRA SOUZA DA SILVA, BRUNO BONTEMPI JUNIOR, *Gleb Vassilievich Wataghin: Physics, University and Politics in Brazil (1934–1949)*, «RUDN Journal of Russian History», 4, vol. 19, 2020, pp. 965-978.
[67] MOSEYKINA, *Ученый-физик* …, 2012 cit., p. 82.
[68] WATAGHIN, *Fundação da Faculdade de Filosofia*..., 1992 cit., p. 163; PREDAZZI, *Gleb Wataghin*, 1999 cit., p. 287.

Italian physics was strongly affected by the racial laws of 1938 and the Second World War. During this period, several physicists of Jewish origins left Italy. Due to the hostile political environment in the country, Enrico Persico (1900-1969), who headed the Theoretical Physics Institute of Turin, left the country in 1947 and went to Canada, where he stayed until the 1950s. When he left, Romolo Deaglio (1899-1978) assumed the position and spent efforts for rebuilding the institution, both in material, human, and scientific terms. One of the greatest difficulties faced by Deaglio was running the Chair of Experimental Physics. Although he could have taken it over, he preferred to hire a professor who would promote modern physics at the institution. This is how he called Wataghin back to Turin[69].

Deaglio and Wataghin had known each other for a long time, from the time they worked at the Turin *Politecnico*. Wataghin was very known by the Turin physics community for his ability to be aware of cutting-edge research topics in physics. In the 1920s, when Wataghin finished his initial training at the University of Turin and began his career as a researcher, he was one of the only people working on relativistic quantum mechanics, astrophysics, cosmic rays, and field theory, among others. Moreover, even then he was known for his versatility and ability to work both theoretically and experimentally. The experience he gained in Brazil between 1934 and 1949, where he carried out cosmic ray measurements in different locations in Latin America, was certainly one of the decisive factors for his return to Turin[70].

Just as he did in Brazil, Wataghin was important in building new networks of international collaboration in Turin. In 1949, Paul Dirac visited the institute and gave a seminar on the canonical theory of bounded systems, such as electrodynamics. Wataghin was also responsible for creating a network of collaboration with the Soviet Union, inviting personalities such as Dmitrii I. Ivanenko, Nicolai M. Bogolubov, Isaak M. Khalatnikov, Dmitrii I. Blokhinzev, Artem I. Alikhanian and others[71]. This Italian-Soviet network emerged when Wataghin joined the Italian commission of the International Union of Pure and Applied Physics (IUPAP) in the 1950s. Born in the Russian Empire, Wataghin tried to come back to the Soviet Union when he was still in Brazil, in the 1940s. However, he had to wait until 1959 to finally accomplish his plans by taking part in the IUPAP Conferences organized in Moscow and Kiev[72].

Wataghin and the other heads of the Institute of Physics, Deaglio and Mario Verde (1920-1983), built a new physics school in Turin in the second post-war period. They also equipped the institution with new instruments to keep up with new trends in physics. In 1954, they bought a 30-MeV betatron and later a 100-MeV synchrotron, which operated at the institution for around 40 years. Attention to both experimental and theoretical physics was a mark of Wataghin's work, as he believed that the theories should be verified experimentally[73]. Wataghin and Deaglio were also attentive to other relevant discussions in the scientific field at that time. Together, they advocated the full and equal entry of women into the field of physics, both as

[69] VITTORIO DE ALFARO, *Fisica*, in ROERO (ed.i), *La Facoltà di scienze …*, vol. 1, *Ricerca, insegnamento, collezioni scientifiche*, Torino, Dep. Sub. Sto. Patria, 1999, pp. 207-280.
[70] *Ibidem*, p. 224.
[71] *Ibidem*, pp. 244-245.
[72] Cf. LUCIANA VIEIRA SOUZA DA SILVA, *National Individuals and International Unions: Gleb Wataghin's experience with the IUPAP (1951-1959)*, in R. LALLI, J. NAVARRO (eds.), *Globalizing physics*, Oxford, Oxford University Press 2024, pp. 273-287; SILVA, *Ciência, universidade …*, 2020 cit.. For more information about his cooperation with Soviet physicists, see MOSEYKINA, *Ученый-физик*…, 2012 cit., pp. 82-89.
[73] PREDAZZI, *Gleb Wataghin*, 1999 cit., pp. 287-289.

students and researchers. In 1952, the physicists Anna Debenedetti and Maria Vigone defended their theses under Wataghin's supervision, respectively, "Componente nucleonica dei raggi cosmici" and "Produzione di neutroni nell'atmosfera per effetto dei raggi cosmici"[74].

In Italy, Wataghin became member of the Turin Academy of Sciences and the Academy of the *Lincei*. In recognition of his avant-garde work and creativity, as well as his important discovery of penetrating showers, in 1951 he was awarded the prestigious Feltrinelli Prize. As we can see, Wataghin's work in Brazil was also recognized in Italy[75]. Throughout his career, Brazil and Italy were connected by strong ties of cooperation. As a result, physicists from both institutions benefited from his major tactic of building international ties to strengthen his dialogue with other research centers, to put his research results and his students in circulation, and to bring improvements to his workplaces.

## 2. *Gleb Wataghin's archive at the University of Turin: sources to understand scientific international relations*

Wataghin went to Brazil as part of a mission of professors supervised by the Italian Ministry of Foreign Affairs. This "missionary" character imposed on those professors a performance beyond the university teaching and scientific activity[76]. As their French colleagues who worked at the same university, they were framed by their governments as a non-official type of "cultural ambassadors"[77]. In the Italian's case, the spreading of cultural products – science and education included – was part of a broader project of foreign policies. To ensure that the Italian mission of professors would effectively act as planned, the Italian government followed their activities in Brazil through reports, letters, and other kinds of documents. To reinforce the temporary character of the work abroad, during their Brazilian time, they remained attached to Italian institutes[78].

The official connection with the Italian academy during the time they remained in Brazil and the obligation to account for their activities abroad are fundamental to understanding the transnational character of their mission. For this reason, those seeking to understand these professors' trajectories in that period might consider a diversity of document typologies from the different institutions and countries where they worked. In this sense, the Historical Archive of the University of Turin is a very important archive for the study of Wataghin's trajectory, not only in Turin but also in Brazil. It preserves different documents about him, from his student time until his death, in 1986, including his participation in the USP Italian mission and his relationship with Brazilian physicists after his return to Italy. Next, I present the general character of his archive, as well as brief descriptions and research leads of selected documents useful to understand his relations with Brazil.

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[74] CLARA SILVIA ROERO, ERIKA LUCIANO, *L'altra metà del cielo nella scienza italiana dal Settecento al Novecento. Ricerche e studi recenti*, «Quaderni di Storia della Fisica», 18, 2013, pp. 107-124.
[75] PREDAZZI, *Gleb Wataghin*, 1999 cit., p. 288.
[76] SILVA, *A Missão Italiana…*, 2015 cit., pp. 91-111.
[77] PETITJEAN, *As Missões Universitárias Francesas…*, 1996 cit.; HUGO SUPPO, *A política cultural da França no Brasil entre 1920 e 1940: o direito e o avesso das missões universitárias*, «Revista de História», 142-143, 2000, pp. 309-345.
[78] SILVA, *Ciência, universidade …*, 2020 cit., p. 108.; *A Missão Italiana…*, 2015 cit., pp. 45-46.

### 2.1. *Gleb Wataghin's personal file*

The Historical Archive of the University of Turin preserves in Gleb Wataghin's personal file (*Fascicolo personale Gleb Wataghin*) the documents related to his professional life. Among the administrative papers, there are different typologies and chronologies, which impose the necessity of understanding not only their contents but also their production conditions. This file is composed of the following sub-files: *Wataghin Gleb, ordin.univ.ta'* (documents related to his retirement); *Necrologia e condoglianze* (necrology and condolences); *Viaggi all'estero, partecipazione a congressi, progetti* (Travels to foreign countries, participation in congresses, projects); *Documenti riguardanti la carriera* (Documents on the career); *Pratica collocamento disposizione Ministero AA. EE., periodo: 20 ottobre 1972 – 20 febbraio 1973* (Practice at the disposal of the Ministry of the Foreign Affairs, between October 20, 1972, and February 20, 1973); *Conferimento di laurea honoris causa, benemerenze, nomina a professore emerito* (Awarding of an honoris causa, merits, emeritus professor nomination); *Incarichi di insegnamento* (Teaching assignments); *Partecipazione a commissioni d'esame* (Partecipation in examination commissions).

Considering Wataghin's Brazilian experience, the first sub-file to be commented on is the "*Wataghin Gleb, ordin.univ.ta*", where there are the documents related to his retirement. As Wataghin could incorporate his time at USP into the retirement calculation, it is not a surprise to find the note "includes documents related to his activity in Brazil"[79] on the cover. In this sub-file, there is Wataghin's Service Status (*Stato di Servizio*), with information about his official attachments to Italian universities. For example, on December 23rd, 1938, Wataghin was nominated as an extraordinary professor of physics at the Faculty of Pharmacy at the University of Sassari. There are also his nominations and confirmations as a professor at the disposal of the Italian Ministry of Foreign Affairs during his Brazilian period. From this document, it is possible to confirm his return to Turin on October 30th, 1948, and the end of his diplomatic mission in Brazil on February 27th, 1949[80].

Another document of this sub-file – and possibly the most important for the study of his Brazilian period – is the Service Status sent by the Consular Service of the Brazilian Embassy in Rome to the Italian Ministry of Public Instruction – Inspectorate for the Retirement. In this document, there are the activities developed by Wataghin in Brazil from June 16th, 1934, to February 28th, 1950, when he was hired as a full professor of the FFCL-USP. In this document, we found that Wataghin's contract with USP was signed in Rome on April 11th, 1934, with Theodoro Ramos. This document presents the chairs and salaries Wataghin received in São Paulo, as summarized in Table 1.

[79] ASUT, Fasc. Pers. *Gleb Wataghin*. In Italian: «Contiene documenti relativi alla sua atività in Brasile»: Wataghin Gleb, ordin.univ.ta'. August 29th, 1978.
[80] ASUT, Fasc. Pers. *Gleb Wataghin*, Wataghin Gleb, ordin.univ.ta'. August 29th, 1978. Prof. Wataghin Gleb. Stato di Servizio, n.d.

Table 1: Gleb Wataghin's salaries at USP by year and chair (1934-1949)

| Year/Chair | General and Experimental Physics | Rational Mechanics Preceded by Vector Calculus | Theoretical Physics | Rational Mechanics and Celestial Mechanics | Theoretical Physics and Mathematical Physics | Superior Physics | Total |
|---|---|---|---|---|---|---|---|
| 1934 | 3.000 lire | | | | | | 3.000 lire |
| 1935 | 3.000 lire | Cr.$1.000,00 | | | | | 3.000 lire + Cr.$1.000,00 |
| 1936 | 3.000 lire | | | | | | 3.000 lire |
| 1937 | Cr.$4.000,00 | Cr.$1.000,00 | 0 | | | | Cr.$5.000,00 |
| 1938 | Cr.$4.000,00 | | 0 | | | | Cr.$4.000,00 |
| 1939 | Cr.$4.000,00 | | 0 | | | | Cr.$4.000,00 |
| 1940 | Cr.$4.000,00 | | 0 | | | | Cr.$4.000,00 |
| 1941 | Cr.$4.000,00 | | 0 | Cr.$1.000,00 | | | Cr.$5.000,00 |
| 1942 | Cr.$4.000,00 | | 0 | Cr.$1.000,00 | | | Cr.$5.000,00 |
| 1943 | | | | | Cr.$4.000,00 | Cr.$1.000,00 | Cr.$5.000,00 |
| 1944 | | | | | Cr.$4.500,00 | Cr.$1.000,00 | Cr.$5.500,00 |
| 1945 | | | | | Cr.$4.500,00 | | Cr.$4.500,00 |
| 1946 | | | | | Cr.$4.500,00 | | Cr.$4.500,00 |
| 1947 | | | | | Cr.$7.650,00 | | Cr.$7.650,00 |
| 1948 | | | | | Cr.$7.650,00 | | Cr.$7.650,00 |
| 1949 | | | | | Cr.$10.200,00 | | Cr.$10.200,00 |

Source: Gleb Wataghin Service Status at the Universidade de São Paulo, Faculdade de Filosofia, Ciências e Letras, June 16th, 1969 In: ASUT. Fascicolo personale Gleb Wataghin. Wataghin Gleb, ordin.univ.ta'. 1978 August 29th. Prof. Wataghin Gleb. Stato di Servizio, n.d.

As explained in this document, between 1934 and 1936 he received half of his salary in Brazilian money. According to Wataghin, one of the reasons that brought him to Brazil was the good salary offered by the USP[81]. Beyond the salary and the chairs under his responsibility, this document also presents some details about his international circulation. On October 12th, 1945, the rector of USP granted Wataghin a three-month leave of absence, without deducting salary, starting on October 27th of the same year, for a study trip in the United States. According

[81] WATAGHIN, *Gleb Wataghin ...*, 2010 cit., p. 11.

to the document, it was considered an "extension of his contract"[82]. In 1946, Wataghin was authorized to travel to England, from July 1st to August 31st, for a "cultural exchange travel" and to participate in the Physics International Congress in London. As observed, Wataghin would take profit from the participation in a scientific meeting to circulate in England and possibly establish other contacts. In 1947, USP authorized another leave of absence to Wataghin, of two months, without deducting his salary. This time, he intended to travel to Europe for studies, from November 25th to January 25th, 1948, but no more details were described in the document. In 1949, Wataghin requested a four-month leave of absence, from March 1st to June 28th, following an invitation from the University of Turin[83].

Wataghin's relationship with Brazilian physics is observed also in his engagement with other universities, such as the University of Campinas (Unicamp), at the São Paulo state. This university was founded in October of 1966 and its Institute of Physics was organized by Marcello Damy, one of Wataghin's former students of the USP[84]. In 1971, following a request sent by Damy, the Unicamp University Council granted Wataghin the title of Doctor Honoris Causa, the first to be awarded in the history of that university[85]. In August of that year, the Institute of Physics was renamed with his name, becoming the "Gleb Wataghin" Institute of Physics (IFGW)[86]. According to Vladimir Wataghin, Gleb Wataghin's collaboration with that new institute was the renewal of his ties with the most important actors of Brazilian physics[87].

Wataghin taught cosmology and gravitation at Unicamp between October 20th, 1972, and March 20th, 1973. In the same way as happened when he was a professor at the USP, to teach in Campinas he had to be authorized by the University of Turin and was considered "at the disposal of the Ministry of Foreign Affairs". This information can be found in a note sent by the Italian Ministry of the Foreign Affairs to the Ministry of Public Instruction – Inspectorate for the Retirement in November of 1975[88] and in another sub-file, entirely dedicated to this displacement under the title "Practice at the disposal of the Ministry of the Foreign Affairs, between October 20, 1972, and February 20, 1973"[89].

The sub-file "Travels to foreign countries, participation in congresses, projects" is also relevant to understanding Wataghin's participation in the Brazilian physics community. Beyond Brazil, among the documents of this sub-file, there are several institutional and diplomatic

[82] ASUT, Fasc. Pers. *Gleb Wataghin:* Wataghin Gleb, ordin.univ.ta'. August 29th, 1978. Prof. Wataghin Gleb. Stato di Servizio, n.d. Gleb Wataghin Service Status at the Universidade de São Paulo, Faculdade de Filosofia, Ciências e Letras, June 16th, 1969. Original in Portuguese: «extensão de seu próprio contrato».
[83] *Ibidem*, Wataghin Gleb, ordin.univ.ta'. August 29th, 1978. Prof. Wataghin Gleb. Stato di Servizio, n.d. Gleb Wataghin Service Status at the Universidade de São Paulo, Faculdade de Filosofia, Ciências e Letras, June 16th, 1969.
[84] EUSTÁQUIO GOMES, *O Mandarim: história da infância da Unicamp*, 2 ed., Campinas, Editora da Unicamp, 2007.
[85] UNIVERSIDADE ESTADUAL DE CAMPINAS, CONSELHO UNIVERSITÁRIO – CONSU, *História. Premiações*, in https://www.sg.unicamp.br/consu/historias/premiacoes, accessed on November 7th, 2023.
[86] INSTITUTO DE FÍSICA "GLEB WATAGHIN", *História do IFGW*, in https://portal.ifi.unicamp.br/a-instituicao/historia-do-ifgw, accessed on November 7th, 2023.
[87] WATAGHIN, *This Volume,* 2000 cit., p. ix.
[88] ASUT, Fasc. Pers. *Gleb Wataghin*. Wataghin Gleb, ordin.univ.tà. August 29th, 1978. Prof. Wataghin Gleb. Stato di Servizio, n.d. Prof. Gleb Wataghin: servizio prestato all'estero, November 18th, 1975. Note from the Ministry of Foreign Affairs to the Ministry of Public Instruction – Inspectorate of Retirement.
[89] ASUT, Fasc. Pers. *Gleb Wataghin*. Pratica collocamento disposizione Ministero A.A. E.E. - periodo: 20 ottobre 1972 – 20 febraio 1973.

letters about his displacements to other countries, such as the Soviet Union[90], Japan[91], and the United States[92]. In general, these documents represent a fundamental source to understand part of Wataghin's tactics to maintain and build his international networks of collaboration. Most of the documents are letters and some of them are already chronologically organized according to the travel authorization requested by Wataghin. Some of them are followed by the response of the officer or ministry concerned. Together, these documents allow us to understand the bureaucratic steps that a professor had to respect when invited to participate in international events.

After returning to Turin in 1949, Wataghin maintained collaboration with Brazilian physics, as it is possible to understand from the documents of this sub-file. Wataghin's first request to travel to Brazil is a letter from May 16th, 1952, in which he informs that the Brazilian Academy of Sciences and the Scientific Cooperation Center for Latin America (UNESCO) invited him to participate in an international congress of physics to be held in Rio de Janeiro and São Paulo between July 15th and 29th of the same year. He highlighted that other international physicists should also participate, such as Europeans and US. Also, the Brazilian government and UNESCO would pay the fees for travel and accommodation. In his request to the rector, Mario Allara, Wataghin explained that he was pleased to participate in this event and to present the results he had already achieved with his research at the Institute of Physics in Turin, directed by him[93]. Following Wataghin's request, Allara forwarded his letter to the Ministry of Public Instruction attesting that "as far as this University is concerned, there is no obstacle to accepting the request"[94]. In the same way, some days later the ministry also authorized Wataghin to travel to Brazil and informed that the Ministry of Foreign Affairs was also aware of that[95].

In September 1956, Wataghin wrote to the rector of the University of Turin to request another permission to travel to Brazil. He was invited by the Brazilian Center for Research in Physics (CBPF), in Rio de Janeiro, to give a series of conferences and to supervise research for three months, between October 1st and December 31st of the same year[96]. Some days later, the rector forwarded Wataghin's request to the Ministry of Public Instruction, as demanded by the then-current university bureaucracy[97]. The ministry also authorized Wataghin. However, he was advised to send another document requesting an official leave of absence from his activities in Turin for studies purposes[98]. On October 31st, 1956, when Wataghin was already in Rio de Janeiro, he sent the demanded request to the rector, so it could be forwarded to the ministry[99]. On January 8th, 1957, the ministry requested the rector to be informed if Wataghin had resumed

[90] ASUT, Fasc. Pers. *Gleb Wataghin*. Viaggi all'estero, partecipazione a congressi, progetti. Letter from Gleb Wataghin to the Rector of the University of Turin, May 3rd, 1965.
[91] *Ibidem*, Note from the Ministry of Public Instruction to the Ministry of Foreign Affairs, September 13th, 1961.
[92] *Ibidem*. Letter from Gleb Wataghin to the Rector of the University of Turin, 1958 July 14th.
[93] *Ibidem*, Letter from Gleb Wataghin to the Rector of the University of Turin, May 16th, 1952.
[94] *Ibidem*, Letter from the Rector of the University of Turin, Mario Allara, to the Ministry of Public Instruction, June 3rd, 1952. Original in Italian: «per quanto riguarda questa Università, nulla osta all'accoglimento della richiesta».
[95] *Ibidem*, Note from the Ministry of Public Instruction to the Rector of the University of Turin, June 14th, 1952.
[96] *Ibidem*, Letter from Gleb Wataghin to the Rector of the University of Turin, September 18th, 1956.
[97] *Ibidem*, Letter from the Rector of the University of Turin to the Ministry of Public Instruction, September 27th, 1956.
[98] *Ibidem*, Letter from the Ministry of Public Instruction to the Rector of the University of Turin, September 27th, 1956.
[99] *Ibidem*, Letter from Gleb Wataghin to the Rector of the University of Turin, October 31st, 1956.

his activities at the university[100]. That demand was forwarded to the president of the Faculty of Sciences of the University of Turin by the rector[101] and some days later Deaglio, the president, assured that Wataghin would be back in the late January of that year[102]. As showed in another letter from the president to the rector, Wataghin returned to Turin on January 29th[103]. Consequently, the ministry was informed by the rector some days later[104]. As observed, Wataghin's three-month permanence in Brazil demanded the mobilization of a significant set of correspondence between the Ministry of Public Instruction, the University of Turin, the Faculty of Sciences, and himself.

In March of 1960, Wataghin requested another authorization from the University of Turin for travel to Brazil after a new invitation from the CBPF. According to Wataghin, he should give some conferences and supervise research between June and October of that year. He also informed that the institution was attached to the University of Brasil[105] and received funding from the Brazilian Research National Council (CNP)[106]. In the following days, the rector informed the Ministry of Public Instruction about Wataghin's absence[107]. However, this time that Ministry transmitted Wataghin's request to the Ministry of Foreign Affairs – with a copy to the rector. According to the document sent, they expected that the consular authorities were also advised about the matter[108].

In addition to the foundation of an important department of physics and the shaping of an international network of collaboration that involved his Brazilian students and other physics communities around the world, Wataghin's Brazilian experience was also recognized by the Italian government. In the sub-file "Documents on the career", there are some documents that attest to this recognition. Among them, there is a letter sent by the Italian Ministry of Public Instruction to the rector of the University of Turin to inform that

> the Ministry of Foreign Affairs pointed out that Prof. Gleb Wataghin, before his departure to Italy, had gained widespread new acclaim in the academic circles of São Paulo, where he carried out his activity, also due to the success achieved in the atomic field by one of his illustrious students Cesar Lattes. In communicating the above, please express to Prof. Wataghin the satisfaction of this Ministry for the success of the activity carried out by him in Brazil[109].

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[100] *Ibidem*, Letter from the Ministry of Public Instruction to the Rector of the University of Turin, January 8th, 1957.
[101] *Ibidem*, Letter from the Rector of the University of Turin to the President of the Faculty of Sciences, January 18th, 1957.
[102] *Ibidem*, Letter from the President of the Faculty of Sciences to the Rector of the University of Turin, January 22nd, 1957.
[103] *Ibidem*, Letter from the President of the Faculty of Sciences to the Rector of the University of Turin, February 7th, 1957.
[104] *Ibidem*, Letter from the Rector of the University of Turin to the Ministry of Public Instruction, February 18th, 1957.
[105] Currently Federal University of Rio de Janeiro (UFRJ).
[106] ASUT, Fasc. Pers. *Gleb Wataghin*. Viaggi all'estero, partecipazione a congressi, progetti. Letter from Gleb Wataghin to the Rector of the University of Turin, March 15th, 1960.
[107] *Ibidem*, Letter from the Rector of the University of Turin to the Ministry of Public Instruction, March 22nd, 1960.
[108] *Ibidem*, Letter from the Ministry of Public Instruction to the Ministry of Foreign Affairs with a copy to the Rector of the University of Turin, March 28th, 1960.
[109] ASUT, Fasc. Pers. *Gleb Wataghin*, Documenti riguardanti la carriera. Letter from the Ministry of Public Instruction to the Rector of the University of Turin, February 19th, 1949: (original in Italian) «Il Ministero degli Affari Esteri ha fatto presente che il Prof. Gleb Wataghin prima della sua partenza per l'Italia ha raccolto nuovi

Still in this sub-file, we can find the documents related to Wataghin's return to Turin, in the late 1940s. One of them is a letter sent by the Italian Ministry of Public Instruction to the rector of the University of Turin, in which they informed that Wataghin had been transferred from the Faculty of Pharmacy of the University of Sassari to the Faculty of Sciences of the University of Turin on November 1st, 1948[110]. That statement meant that Wataghin was no longer attached to Sassari but to Turin. Nevertheless, he was still a professor in São Paulo. However, that was probably the first step for Wataghin's re-establishment as a professor in Italy. In another document of this sub-file, a letter sent by the Italian Ministry of Public Instruction to the Ministry of Foreign Affairs and to the rector of the University of Turin, there is the information that Wataghin started to work on January 14th. For this reason, he was no longer at the disposal of that Ministry[111]. In other words, from that moment on, Wataghin's mission in Brazil was finished.

Wataghin's activities in Brazil were also recognized by the USP. As some documents from the sub-file "Awarding of an honoris causa, merits, emeritus professor nomination" demonstrate, in 1952 the Brazilian university honored Wataghin with an *Honoris Causa* title. According to a note sent by the Italian Consulate in São Paulo,

> In consideration of the activity carried out by Prof. Wataghin at the University of São Paulo – where he occupied the Chair of Experimental Physics for 14 years and fulfilled the true role of professor by creating an active and already internationally known school of Physics – the Italian-Brazilian Institute of Culture considered appropriate and dutiful, in explicit recognition of the merits he has acquired for the development of nuclear physics studies in Brazil, to offer a reception in honor of Prof. Wataghin[112].

Wataghin established ties with the Italian-Brazilian community since his arrival in São Paulo in 1934, as his colleagues of the USP Italian mission[113]. As we can observe, even when he returned to Italy, he continued to be in contact with the Italian community in Brazil. The USP also took the opportunity to honor Wataghin. According to the Consulate,

> This initiative – which has reached a large number of colleagues and former students of the Professor – was all the more appropriate and significant as three days later the Academic Council

larghissimi consensi negli ambienti accademici di S. Paolo del Brasile, dove egli ha svolto la sua attività, anche per il successo ottenuto nel campo atomico da un suo illustre allievo Cesare Lattes. Nel comunicare quanto sopra, si prega la S. V. di esprimere al Prof. Wataghin il compiacimento di questo Ministero per il successo dell'attività da lui svolta in Brasile».

[110] *Ibidem*, Letter from the Ministry of Public Instruction to the Rector of the University of Turin, November 17th, 1948.

[111] *Ibidem*, Letter from the Ministry of Public Instruction to the Ministry of the Foreign Affairs and to the Rector of the University of Turin, February 27th, 1949, Prof. Gleb Wataghin – Cessazione dal collocamento a disposizione ai sensi art. 96-T.U. R.D. 31.8.1933, n. 1592.

[112] ASUT, Fasc. Pers. *Gleb Wataghin,* Conferimento di laurea honoris causa, benemerenze, nomina a professore emerito. Letter from the Ministry of Public Instruction to the Rector of the University of Turin, October 11th, 1952. Original in Italian: «In considerazione dell'attività svolta dal Prof. Wataghin nella Università di San Paolo – dove egli ha occupato per 14 anni la Cattedra di Fisica sperimentale e disimpegnato vera funzione di maestro creando un'attiva e già internazionalmente nota scuola di Fisica – l'Istituto di Cultura Italo-brasiliano ha ritenuto opportuno e doveroso, a esplicito riconoscimento delle benemerenze che detto Professore si è acquistato per lo sviluppo degli studi di fisica nucleare nel Brasile, offrire un ricevimento in onore del Prof. Wataghin».

[113] SILVA, *A Missão Italiana…*, 2015 cit., pp. 93-101.

> of the Faculty of Philosophy, Sciences, and Letters unanimously approved the proposal to give Prof. Wataghin the 'honoris causa' degree from the University of São Paulo[114].

Wataghin's Brazilian and Italian experiences were fundamental for his recognition also in Italy, as attested by another document from this file. On May 21st, 1976, the Faculty of Sciences Council of the University of Turin decided to award Wataghin an Emeritus Professor title. At the justification, the Council highlighted that he was a Turin faculty member since 1923, when he was assistant, firstly to Guido Fubini and later to Eligio Perucca, at the Turin *Politecnico*. They also mentioned the other institutions he taught, such as the *Reale Accademia e Scuola di Applicazione Artiglieria e Genio*, the USP, and the University of Turin. His "admirable disinterested and tenacious enthusiasm for the scientific research" were among his great merits. His pedagogical engagement and theoretical and experimental competencies were also remarked. More than that, the Council highlighted that

> Both in Brazil and in Italy, prof. G. Wataghin created physics schools that continue to be present internationally. He was a tireless advocate of scientific collaboration between research centers of various nations, which he effectively achieved on more than one occasion. The name of prof. Wataghin is linked to more than one new interpretative idea of physical phenomena. For example, his non-local field notion, and the statistical interpretation of the complex phenomenon that occurs in the collision of two nucleons of very high energy.
> His scientific and educational merits have found international recognition. (…).
> The Physics Institute at the University of Campinas (Brazil) is registered in his name[115].

As noticed, the justification presented by the University of Turin when deciding to honor Wataghin as an Emeritus Professor title was very similar to the one offered by the University of São Paulo in 1952. His pedagogical and scientific qualities, as well as his ability to organize international institutes of physics, were remembered on both occasions. In this sense, these documents permit us to understand the connections among his Brazilian and Italian experiences. In the next section, the analysis of his selected letters will illustrate this further.

### 2.2. *Gleb Wataghin's Correspondence*

The Historical Archive of the University of Turin preserves Wataghin's correspondence of his period as director. In this fund, there are copies of letters sent by him and a few letters he received. Also, there are some letters whose content was related to him. Considering the

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[114] ASUT, Fasc. Pers. *Gleb Wataghin*, Conferimento di laurea honoris causa, benemerenze, nomina a professore emerito: Letter from the Ministry of Public Instruction to the Rector of the University of Turin, October 11th, 1952. Original in Italian: «Tale iniziativa – che ha raccolto un gran numero di colleghi e ex alunni del detto Professore – è risultata tanto più opportuna e significativa in quanto tre giorni dopo il Consiglio Accademico della Facoltà di Filosofia, Scienze e Lettere approvava all'unanimità la proposta di dare al Prof. Wataghin la laurea 'honoris causa' dell'Università di San Paolo».

[115] *Ibidem*, Original in Italian: «Sia in Brasile che in Italia infatti il prof. G. Wataghin ha creato scuole de Fisica che continuano ad essere presenti in campo internazionale. Egli è stato un instancabile assertore della collaborazione scientifica tra centri di ricerca di varie nazioni, ciò che ha realizzato effetivamente in più di una occasione. Il nome del prof. Wataghin è legato a più di una nuova idea interpretativa di fenomini fisici. Si ricordi a questo proposito la sua nozione in campo non locale, e l'interpretazione statistica del complesso fenomeno che si attua nell'urto di due nucleoni di elevatissima energia. I suoi meriti scientifici e didattici hanno trovato riconoscimento internazionale. […] L'Istituto di Fisica dell'Università di Campinas (Brasile) è intestato al Suo nome»: ASUT. Fascicolo personale Gleb Wataghin. Conferimento di laurea honoris causa, benemerenze, nomina a professore emerito. Verbale della seduta del Consiglio di Facoltà ristretta ai professori di ruolo del giorno 21 maggio 1976 alle ore 15. Nell'Aula Magna di Chimica».

objectives of this paper – and the research that motivated it – I will briefly describe and contextualize the letters that may be useful in a study on the relations between Wataghin and Brazilian physics during the 1950s and 1960s.

### 2.2.1. *Wataghin's travels to Brazil*

Some of the letters preserved in this fund are copies or have similar content to those located in Wataghin's personal file. An example is his letter to the rector of the University of Turin, where he informed about the invitation of the CBPF, in Rio de Janeiro, to teach a series of conferences and supervise research at the end of 1956[116]. Although we can have access to this information in both funds, it is interesting to reflect on how the administrative organization of a university impacts scientific activities. As much as Wataghin was habituated to travel abroad, his management activities were as fundamental as his educational and scientific ones for the functioning of the Institute and his international network of collaboration. Thus, at the same time his travel requests should be archived with his personal files, they were also part of his accountability as a director. Most of the letters of this fund have this character.

When Wataghin traveled to Brazil following the CBPF invitation of 1956, he had to reorganize his activities in Italy and appoint other colleagues to replace him. Thus, he indicated Deaglio for two of his positions: the direction of the Turin section of the Italian National Institute of Nuclear Physics[117] and the direction of the Institute of Physics of the University of Turin[118].

In a letter to the rector of the University of Turin, Deaglio informed that "all assignments with the responsible designated by the Faculty Council began regularly according to the timetable sent in due time to the Faculty Secretariat", except to two chairs, one of them the Spectroscopy, which was held by Wataghin. According to Deaglio, Wataghin, who was responsible for this chair in the academic year of 1956/1957, would be in Brazil until the beginning of January, for a "scientific mission". For this reason, he was replaced by his assistant, Augusto Gamba[119].

### 2.2.2. *Wataghin's relations with Brazilian physics*

In February of 1956, Wataghin sent a letter to the Brazilian physicist Fernando de Souza Barros, who was at the Laboratory of Cosmic Physics, in La Paz, Bolivia, at the moment. Wataghin aimed to communicate to him and his wife, the physicist Susanna Lehrer de Souza Barros, that they had been accepted to study at the Institute of Physics of the University of Turin[120]. They would research "problems about the cosmic radiation, in the year 1956/1957, so

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[116] ASUT, *G. Wataghin*, Copia Corrispondenza. Letter from Gleb Wataghin to the rector of the University of Turin, September 18th, 1956.
[117] *Ibidem*, Letter from Gleb Wataghin to E. Amaldi, G. Bernardini, P. Cardirela, A. Restagni, G. Salvini, September 8th, 1956.
[118] *Ibidem*, Letter from Gleb Wataghin to the rector of the University of Turin, October 9th, 1956.
[119] *Ibidem*, Letter from Romolo Deaglio to the Rector of the University of Turin, January 21st, 1956. Original in Italian: «tutti gli incarichi coi titolari designati dal Consiglio di Facoltà hanno avuto regolarmente inizio secondo l'orario trasmesso a suo tempo alla Segreteria di Facoltà».
[120] Susana Lehrer de Souza Barros (1929-2011) was born in Argentina. In 1952, she got her physics degree from the University of Buenos Aires. In 1953, she did an internship at the University of São Paulo, where she was introduced to experimental research in cosmic rays. Fernando de Souza Barros (1929-2017) was born in Recife,

far as the 'Centro Brasileiro de Pesquisas Físicas' [CBPF] grant you both a scholarship sufficient to cover your travel and stay expenses in Turin. During this period you can participate in one of the current researches"[121]. It is not possible to confirm if they went to Turin at that time, but this invitation can also be considered a source for Wataghin's interest in receiving Brazilian young physicists at his laboratory. Furthermore, this is also a source to study the importance of the Brazilian scholarships for the international circulation of researchers, in times when the national structure of scientific and technological policies was under construction[122]. As observed, Wataghin's relationship with the Brazilian funding agencies was also a fundamental part of his work in Italy. Another example is a letter sent by him in April of 1957 to the President of the CNP to request the renewal of the scholarship of Giovanni Cocito for his capacity and well performance[123]. Cocito came from the Aeronautics Institute of Technology of São José dos Campos, in São Paulo's State. In Turin, he worked with Wataghin and G. Chilesi in the 31-Mev betatron[124].

Wataghin's presence in Turin meant the possibility for Brazilian physicists to be in contact with the other physicists of that institution. This can be observed in a letter sent by Deaglio to Roberto A. Salmeron in October of 1956[125]. As we can assume by reading the content, Salmeron had initially written to Wataghin, who was absent from his position at the moment

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Brazil, got his civil engineering degree in 1952 from the Federal University of Pernambuco, and was also introduced to the research field of cosmic radiation in the 1950s. After working in Bolivia, they went to England, where they got their PhD. Later, they went to Carnegie Mellon University. They returned to Brazil in the 1970s and were fundamental for the organization of the physics graduation at the Federal University of Rio de Janeiro. Susana Lehrer de Souza Barros was very influential in the consolidation of the Brazilian field of physics education and Fernando de Souza Barros was awarded the Joseph Burton Prize for his engagement in the fight for a «Latin America without nuclear weapons». For more information, see MARCUS VINICIUS DA SILVA, *Susana Lehrer de Souza Barros (1929-2011)*, in https://memoria.cnpq.br/web/guest/pioneiras-view/-/journal_content/56_INSTANCE_a6MO/10157/2139070, accessed on May 5th, 2024, and CENTRO BRASILEIRO DE PESQUISAS FÍSICAS, *Falece físico pioneiro da pesquisa experimental em raios cósmicos no Brasil*, in https://www.gov.br/cbpf/pt-br/assuntos/noticias/falece-fisico-pioneiro-da-pesquisa-experimental-em-raios-cosmicos-no-brasil, accessed on May 5, 2024.

[121] ASUT, *G. Wataghin*, Copia Corrispondenza. Letter from Gleb Wataghin to Fernando de Souza Barros, February 16th, 1956. Original in Italian: «problemi riguardanti la radiazione cosmica, per l'anno, 1956/1957, qualora il 'Centro Brasileiro de Pesquisas Físicas' vi conceda una borsa sufficiente per coprire vostre spese di viaggio e permanenza a Torino. Durante questo periodo potrete partecipare ad una delle ricerche in corso».

[122] The first Brazilian federal scientific-technological policies were created in 1951, notably the National Council of Research (Conselho Nacional de Pesquisas – CNP), later National Council of Scientific and Technological Development (Conselho Nacional de Desenvolvimento Científico e Tecnológico – CNPq) and the National Campaign of Superior Level Staff Improvement (Campanha Nacional de Aperfeiçoamento de Pessoal de Nível Superior – CAPES), later Coordination of Superior Level Staff Improvement, with the same acronym: AFRÂNIO GARCIA, LETÍCIA CANÊDO, *Bolsistas brasileiros e doutorados internacionais*, in C.B. MARTINS (ed.), *Diálogos entre o Brasil e a França: formação e cooperação acadêmica*, Recife, FJN, Ed. Massangana, 2005, pp. 107-123.

[123] ASUT, *G. Wataghin*, Copia Corrispondenza. Letter from Gleb Wataghin to the President of the National Research Council, April 11th, 1957.

[124] ASUT, *G. Wataghin*, Copia Corrispondenza. Relazione sull'attività delle Sezione di Torino dell'INFN nell'anno 1956/57, June 10th, 1957.

[125] Roberto Aureliano Salmeron (1922-2020) initiated his career with Wataghin, in São Paulo. He was one of the founders of the CBPF, in the 1950s. He got his doctoral degree at the University of Manchester supervised by Patrick M. S. Blackett with a UNESCO scholarship. Between 1955 and 1963, he was a researcher at the CERN. Between 1964 and 1965, he was a Full Professor at the University of Brasilia, in Brazil, but he left the institution following political pressure from the Brazilian military dictatorship (1964-1985). In 1966, he returned to CERN and, in 1967, he went to the Polytechnic School, in Paris, as a CNRS researcher. He was a member of the editorial committee of several journals and participated in some scientific societies. For more information, see ACADEMIA BRASILEIRA DE LETRAS, *Roberto Aureliano Salmerón*, in https://www.abc.org.br/membro/roberto-aureliano-salmeron/, accessed on May 5, 2024.

because he was in Brazil. However, Deaglio took profit of the opportunity to invite Salmeron to visit Turin on January 8th "to talk about the important topics you mentioned, which are also of great interest to the physicists of Turin"[126]. The content of Deglio's letter leads us to imagine that Salmeron, in his previous letter, had signaled his intention to go to Turin on that date to talk to Wataghin about certain research topics. Although Salmeron's answer to Deaglio has not been found, it is interesting to note the expansion of Wataghin's Italian-Brazilian networks also to his colleagues of both countries, who probably knew each other. In May of 1958, Wataghin invited Salmeron to present a seminar in Turin about "A cloud chamber study of the production of strange particles in light and heavy materials"[127].

When he was in Brazil, Wataghin also included scientists from other fields of research in his network. His attention to the already existent Brazilian institutes, such as the Academy of Sciences, in Rio de Janeiro, was part of his tactics to connect people and seek grants and support, as discussed in the first part of this paper. When he returned to Italy, these contacts were also maintained. This can be observed in his letter to the renowned physician and biophysicist Carlos Chagas Filho (1910-2000), professor at the Faculty of Medicine of the University of Brasil, Rio de Janeiro, in February 1957. Wataghin informed him about the series of congresses to be held in Turin in early June, as part of the international medical-surgical meetings, as well as the international congress of nuclear medicine. Wataghin was pleased to invite Chagas to those events by presenting a paper, possibly something about dosimetry and protection[128].

Wataghin's return to Italy, after his experience in São Paulo, was also important for the international circulation of Brazilian knowledge. In a letter he sent to Pietro Caldirola, professor at the university of Milan, in May of 1957, he attached the draft of a note written by the Brazilian physicist Jayme Tiomno (1920-2011)[129]. According to Wataghin, the paper "Note on the gamma decay of Neutral Pions" was about

> an application of the new theory of hyperons and K mesons proposed at the Rochester Conference, beyond Tiomno, by Gell-Mann and Schwinger.
> I think Tiomno's work is very remarkable and I am in favor of its publication in the Nuovo Cimento both in the form of a letter to the Editor or as a normal publication.
> Given the interest that Tiomno's contribution has aroused in Rochester and that the present work deserves, I would also be grateful if you could accept his request for an urgent publication[130].

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[126] ASUT, *G. Wataghin*, Copia Corrispondenza. Letter from R. Deaglio to Roberto Salmeron, November 5th, 1956. Original in Italian: «per parlare degli importanti argomenti da Lei accennati, argomenti che interessano molto anche i fisici di Torino».
[127] *Ibidem*, Letter from Gleb Wataghin to Roberto Salmeron, May 12th, 1958.
[128] *Ibidem*, Letter from Gleb Wataghin to Carlos Chagas, February 22nd, 1957.
[129] Tiomno obtained a physics degree from the University of Brasil in 1941 and, in 1945, he went to USP for postgraduate studies with Mario Schenberg, Wataghin's former student. In 1949, he participated in the organization of the CBPF, in Rio de Janeiro. For more biographical information about him, see http://acervo.if.usp.br/bio15, accessed on November 7th, 2023. See also JOSÉ MARIA FILARDO BASSALO, FRANCISCO CARUSO, *Jayme Tiomno, que quase foi Nobel de Física,* in L. E. DE MAGALHÃES (ed.), *Humanistas e Cientistas do Brasil: Ciências Exatas*, São Paulo, EDUSP, SBPC, 2015, pp. 97-114; KARIN FORNAZIER, ANTONIO VIDEIRA, *Os anos de formação de um físico teórico brasileiro: Jayme Tiomno entre 1942 e 1950*, «Ciência e Sociedade», vol. 5, 2018, pp. 1-12.
[130] ASUT, *G. Wataghin*, Copia Corrispondenza, Letter from Gleb Wataghin to Caldirola, May 29th, 1957. Original in Italian: «una applicazione della nuova teoria degli iperoni e dei mesoni K proposta alla Conferenza di Rochester, indipendentemente dallo stesso Tiomno, da Gell-Mann e da Schwinger. Penso che il lavoro di Tiomno sia assai

Wataghin's effort was positive for Tiomno, whose paper would be published in the *Nuovo Cimento* of July 1957, as a letter to the editor. As Wataghin explained to Tiomno at that time, he was also waiting to review the draft of another paper, that should be published in the same edition. Also, Tiomno had sent another manuscript recently and Wataghin should forward it to the *Nuovo Cimento* as well. Wataghin took advantage of the letter to congratulate Tiomno for his recent works and to invite him to go to Turin for a stay of some months in the next year, with a salary paid by the Institute of Physics[131]. In June of 1958, when Tiomno planned to go to a conference in Geneva, Wataghin profited from inviting him to present a communication at the Turin seminar. All the expenses would be paid by the university[132].

Another of Wataghin's Brazilian former students who was helped to travel to Europe was Jean Meyer (1925-2010)[133]. In June of 1957, Wataghin responded to the Atomic Energy Commissary in Paris attesting that he knew that physicist for a long time. In his words,

> He [Meyer] was 18 years old when he came to study and work in the Physics Laboratory of the University of S.Paulo (Brazil) of which I was the director. He did his studies very well and participated in many theoretical and experimental works still in Brazil. For me, he is a man of great talent and very solid knowledge of physics. He works well in a team and knows a lot of special techniques, having worked in different laboratories in France, Italy, and Brazil[134].

In February of 1958, when Meyer was working in Saclay, France, Wataghin wondered if he could do a visit to the place. Wataghin planned to know some of the laboratories and present a seminar[135]. As observed in these letters, over time Meyer became a reference for Wataghin in Saclay. In September of that same year, Wataghin sent another letter to him, presenting two collaborators of his institute, Giancarlo Bonazzola and Luigi Gonella. Wataghin explained that they participated in the International Colloquium on Nuclear Electronic, but were not part of the group that visited Saclay. As they wanted to visit the laboratories of that institution, Wataghin hoped that Meyer could help them in some way[136]. In a two-way collaboration, Wataghin was also willing to help Meyer, as observed in a letter sent by him to Cesar Lattes, where he explained the rules for obtaining an Associate Professor title (libera docenza) in Italy and the peculiarities of Meyer's case[137].

With time, other Brazilian physicists contacted Wataghin to help in the organization of internships for their students or colleagues. That was the case of Elly Silva, from the USP. According to Silva, at the time he went to Turin, he had just finished his PhD in São Paulo and

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notevole e sono favorevole alla sua pubblicazione sul Nuovo Cimento sia nella forma di una lettera all'Editore, sia come normale pubblicazione. Dato l'interesse che il contributo di Tiomno ha suscitato a Rochester e che il presente lavoro si merita, ti sarei anche grato se potessi accogliere la sua domanda di una pubblicazione urgente».

[131] *Ibidem*, Letter from Gleb Wataghin to Jayme Tiomno, June 15th, 1957.

[132] *Ibidem*, Letter from Gleb Wataghin to Jayme Tiommo, June 19th, 1958.

[133] For more information about Meyer, see http://acervo.if.usp.br/bio12, accessed on November 7th, 2023. See also JEAN ALBERT MEYER, *João Alberto Meyer (depoimento, 1977)*, Rio de Janeiro, CPDOC, 2010.

[134] ASUT, *G. Wataghin*, Copia Corrispondenza, Letter from Gleb Wataghin to the Commissariat à l'Energie Atomique, June 23rd, 1957. Original in French: «Il [Meyer] avait 18 ans quand il est venu à étudier et travailler dans le Laboratoire de Physique de l'Université de S.Paulo (Brésil) dont j'étais le directeur. Il a fait ses études très bien et a participé à beaucoup des travaux théoriques et expérimentaux encore au Brésil. Je le juge d'être un homme de grand talent et de très solide culture en physique. Il travaille bien en equipe et connait beaucoup des techniques spéciales, ayant travaillé dans des differents laboratoires en France, en Italie et au Brésil».

[135] *Ibidem*, Letter from Gleb Wataghin to Jean Meyer, February 11th, 1958.

[136] *Ibidem*, Letter from Gleb Wataghin to Jean Meyer, September 13th, 1958.

[137] *Ibidem*, Letter from Gleb Wataghin to Cesar Lattes, November 28th, 1962.

was able to participate in an internship abroad. At the time, the United States was the most popular destination for Brazilian students. However, because of McCarthyism, everyone who wanted to enter the country was thoroughly investigated. Wataghin was very well known among the Brazilian physicists and his presence in the direction of the Physics Institute of Turin was decisive for the attraction of some Brazilians[138]. Initially, Wataghin established the details of his time in Turin with José Goldemberg (1928-), a professor at the USP[139]. On January 2nd of 1958, he sent a letter to the director of the Brazilian CNP to attest that Silva had begun his internship at that Institute of Physics on that same day[140]. Six months later, when his scholarship was about to finish, Wataghin sent another letter to the president of the CNP to attest to the results achieved by him in Turin. In his words,

> Dr. Silva demonstrated great competence and talent in his research work, taking part in four experiments, whose conclusions were published in journals in Italy and the United States – as can be seen from the reports sent by him.
> I think it is in Mr. Silva's and this Institute's best interest that he has the possibility of completing these important researches in collaboration with the physicists in Turin. I believe that a longer stay here will benefit science and teaching in Brazil. These are the reasons that lead me to ask whether this Council can renew Dr. Elly Silva's scholarship for another year[141].

In the next semester, Wataghin requested another renewal for Silva's scholarship in Turin. That is what we observe in a letter sent by him to the director of the FFCL-USP, Paulo Sawaya. In Wataghin's words,

> With this letter, I want to suggest the concession to Dr. Elly Silva, Assistant at this Faculty, the extension of his leave of absence until November of this year, allowing him to continue the interesting research he is carrying out at this Institute.
> I am pleased to congratulate the Faculty for the value of the Brazilian scientist who is taking such an active part in the work of this Institute[142].

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[138] ELLY SILVA, *Una collaborazione internazionale: Torino-S. Paulo*, in UNIVERSITÀ DEGLI STUDI DI TORINO, FACOLTÀ DI SCIENZE MATEMATICHE, FISICHE E NATURALI, ISTITUTO NAZIONALE DI FISICA NUCLEARE, SEZIONE TORINO, *Il Laboratorio del Sincrotrone di Torino nel cinquantenario della sua costruzione (1956-2006)*, Turin, Società Italiana di Fisica, 2006, p. 19.
[139] ASUT, *G. Wataghin*, Copia Corrispondenza, Letter from Gleb Wataghin to Goldemberg, November 22nd, 1957.
[140] *Ibidem*, Letter from Gleb Wataghin to the Scientific Director of the National Research Council – Rio, January 2nd, 1958.
[141] *Ibidem*, Letter from Gleb Wataghin to the CNP President, June 28th, 1958..Original in Portuguese: «Dr. Silva mostrou muita competencia e talento no trabalho de pesquisa, tomando parte na realização de quatro experiências, cujas conclusões são objetos de publicações em revistas da Itália e dos Estados Unidos – como se pode apreender dos relatórios remetidos pelo bolsista. Penso que seja do interesse do referido Sr. Silva e deste Instituto que o mesmo tenha possibilidade de terminar as pesquisas mais importantes em colaboração com os físicos de Torino. Acredito que uma permanência mais longa aqui venha favorecer a ciência e o ensino no Brasil. Estes são os motivos que me induzem a indagar se esse Conselho pode renovar por mais um ano a bolsa do Dr. Elly Silva».
[142] *Ibidem*, Letter from Gleb Wataghin to the FFCL Director, January 20th, 1959. Original in Portuguese: «Com o presente venho sugerir a concessão ao DR. Elly Silva, Assistente dessa Faculdade, a prorrogação do seu afastamento até o mês de novembro do corrente ano, permitindo-lhe prosseguir nas interessantes pesquisas que realiza neste Instituto. Tenho o prazer de congratularme com a Faculdade pelo valor do cientista brasileiro que está tomando parte tão ativa nos trabalhos deste Instituto».

Some years later, when Silva became a professor at the FFCL-USP[143], he returned to the Institute of Physics in Turin for another internship[144], to develop research with the 100-MeV electron synchrotron[145]. In February of 1968, Wataghin received him in Turin once more[146].

The USP professor Goldemberg was engaged in the international collaboration between his department of physics in Brazil and Wataghin's institute in Turin. More than that, it is interesting to highlight the role of the exchanges of young physicists in this process. In May of 1959, Wataghin sent a response letter to Goldemberg informing him that he was pleased to receive Ottavia Borello, who was going to Turin with a CNP scholarship[147]. Some details about Borello's work environment in Turin can be seen in the report *Principali Caratteristiche dell'elettrosincrotrone da 100 MeV Installato nella Sezione di Torino dell'I.N.F.N. - Attività attualmente in corso al laboratorio sincrotrone*, preserved within Wataghin's correspondence[148]. In August of 1961, Wataghin sent another letter to Goldemberg, informing that Borello's internship should be finished in September. As Wataghin had already pointed out in his report to the CNP, she had done great work in the Turin electron synchrotron. For this reason, he and his colleagues in Turin wanted to extend her exchange for one more year. In this case, the Institute of Physics in Turin could hire her as a researcher and pay a salary for that period[149].

Borello's time in Turin was not limited to her internship. When she went to Italy, she had already graduated and obtained her PhD in physics at USP. At that time, she was teaching and researching at that university. She stayed in Turin with the CNP scholarship between 1960 and 1961 and, in that year, she decided to leave her position in São Paulo to move to Italy. In November of 1961, she became an extraordinary assistant at the University of Turin. A few times later, she was transferred to the Turin *Politecnico*, until her retirement[150].

Goldemberg was also invited to travel to Turin following Wataghin's invitation. In a letter sent in April of 1965, Wataghin pointed out that he would be glad to receive the colleague there, who was also invited to present a conference in their seminar[151].

Wataghin's relations with Brazilian physics were also reinforced by familial ties. As observed in a letter sent by him in May of 1959 to the editorial team of *Nuovo Cimento* journal, his son, the physicist Andrea Wataghin (1926-1984), was in Brazil at that time and had not received copies of that journal. In his letter, Wataghin confirmed his son's address in Brazil as the CBPF, in Rio de Janeiro[152].

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[143] SILVA, *Ciência, universidade e diplomacia científica*..., 2020 cit.
[144] ASUT, *G. Wataghin*, Copia Corrispondenza. Elly Silva's statement, signed by Romolo Deaglio, May 18th, 1964.
[145] *Ibidem*, Elly Silva's statement, signed by Romolo Deaglio, June 10th, 1964.
[146] *Ibidem*, Letter from Gleb Wataghin to Leite Lopes, February 2nd, 1968.
[147] *Ibidem*, Letter from Gleb Wataghin to José Goldemberg, May 30th, 1959.
[148] *Ibidem*, Principali Caratteristiche dell'elettrosincrotrone da 100 MeV Installato nella Sezione di Torino dell'I.N.F.N. [1960].
[149] *Ibidem*, Letter from Gleb Wataghin to José Goldemberg, August 21st, 1961.
[150] ALBERTA MARZARI CHIESA, *Ottavia Borello*, in E. LUCIANO, C.S. ROERO (eds.), *Numeri, Atomi e Alambicchi, Donne e Scienza in Piemonte dal 1840 al 1960*, Torino, Centro Studi e Documentazione Pensiero Femminile, 2008, pp. 305-307.
[151] ASUT, *G. Wataghin*, Copia Corrispondenza. Letter from Gleb Wataghin to José Goldemberg, April 3rd, 1965.
[152] *Ibidem*, Letter from Gleb Wataghin to the Editorial Team of Nuovo Cimento, May 6th, 1959.

In September of 1959, Wataghin sent a letter to Bruno Brunelli, of the Physics Institute at the University of Rome, to present the young Brazilian engineer of the Polytechnic School in São Paulo, Giorgio Gambirasio. Wataghin was introduced to him by one of his Brazilian colleagues, Walter Schützer, of USP. In the letter, Wataghin explained that Gambirasio was planning a three-month stay in Italy, with a Brazilian scholarship. According to Wataghin,

> This young scholar would like to visit and attend the ionized gas laboratory in Frascati and Rome during December, January, and February. Prof. Schützer tells me that he does not believe that Dr. Gambirasio is capable of collaborating in the study of plasma, but he would like to familiarize himself with some plasma measurement techniques. Schützer is the author of some works on the quantum theory of plasma which he published under the direction of Prof. E. Wigner. The engineer G. Gambirasio studied the classical plasma theory with Prof. Schützer[153].

Wataghin sent a similar letter to Enrico Persico, who was at the Institute of Physics at the University of Rome, highlighting that Gambirasio was interested in following the ongoing experiences of his ionized gases laboratory[154]. A few days later, Wataghin sent a letter to Schützer to inform that Gambirasio was accepted by Brunelli[155].

Wataghin's correspondence fund also permits the study of his involvement with Brazilian politics. During the military dictatorship in Brazil (1964-1985), many scientists were persecuted for their ideas and public positions. That was the case of the physicist and professor at USP, Mario Schenberg (1914-1990), Wataghin's former student. Besides being a physicist, Schenberg had also been a deputy for the Brazilian Communist Party (PCB). In 1948, when the PCB became illegal in the country, he lost his parliament position[156]. Given his political engagement, he was arrested for fifty days in 1964, after the military coup d'État[157]. Schenberg's arrest mobilized the Brazilian and the international scientific community[158]. At that time, Wataghin's sociability network also participated in the movement against the political persecution of scientists in Brazil[159]. At the Wataghin's correspondence fund, there is a letter sent by him to Occhialini in October of 1965, as follows:

> Dear Beppe,
> I am sending you here an enclosed copy of the telegram I spoke to you about by phone.
> I believe that the Brazilian authorities, recalling the previous interventions, in favor of Schoenderg [sic], by Japanese, Italian, and French physicists, will no doubt that a formal protest on our part, based on precise data, will be sent by us to these Authorities, if we do not receive satisfactory assurance on the situation of our colleagues in Brazil.

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[153] ASUT, *G. Wataghin*, Copia Corrispondenza. Letter from Gleb Wataghin to Prof. Brunelli, September 7th, 1959. Original in Italian: «Questo giovane studioso vorrebbe poter visitare e frequentare il laboratorio dei gas ionizzati a Frascati e a Roma durante I mesi di dicembre, gennaio e febbraio prossimi. Il Prof. Schützer mi dice che non crede che il Dr. Gambirasio sia in grado di collaborare nello studio del plasma, ma vorrebbe famigliarizzarsi con qualche tecnica di misura sul plasma. Lo stesso prof. Schützer è autore di alcuni lavori sulla teoria quantistica del plasma che egli ha pubblicato sotto la direzione del Prof. E. Wigner. L'Ing. G. Gambirasio ha studiato la teoria classica del plasma con il Prof. Schützer».
[154] *Ibidem*, Letter from Gleb Wataghin to Enrico Persico, September 7th, 1959.
[155] *Ibidem*, Letter from Gleb Wataghin to Walter Schützer, September 14th, 1959.
[156] ALBERTO LUIZ DA ROCHA BARROS, *Schenberg: nada que é humano lhe era estranho*, «Estudos Avançados», 11, vol. 5, 1991, pp. 195-198.
[157] ILDEU DE CASTRO MOREIRA, *A ciência, a ditadura e os físicos*, «Ciência e cultura», 4, vol. 66, 2014, pp. 48-53.
[158] MOREIRA, *A ciência*…, 2014 cit., p. 50; FREIRE JR., SILVA, *Scientific Exchanges…*, 2019 cit., p. 296.
[159] SILVA, *Ciência, universidade e diplomacia científica…,* 2020 cit., pp. 285-296.

> You will maybe receive a response from the Member of Parliament Saturnino Braga, in which case I would be grateful if you keep me informed. Thank you.
> Kind regards. Yours (G. Wataghin)[160].

In a letter to Paulo Duarte (1899-1984), lawyer and one of the founders of the USP, also persecuted by the military dictatorship in Brazil when he was a professor at that university[161], Wataghin expressed his concerns about the Brazilian political situation and his availability to cooperate with his colleagues:

> I have been touched by the kind words that you had for me, impressed by the difficulties of university life, and I can declare that on my part I also remain entirely devoted to my old friends and Brazil, to which I feel connected by the many years of cooperation and feelings of gratitude[162].

Wataghin's ties with the Brazilian scientific field were also appreciated by the Italian academy. In 1966, when the Brazilian Academy of Sciences was completing 50 years of existence, the Italian Academy of the *Lincei* invited Wataghin to represent Italy in the celebration in Brazil. In a letter response to the invitation, Wataghin highlighted that he was a member of that academy since 1934, the year he arrived in Brazil, and would be glad to represent Italy there. However, he was not able to leave Turin at that time, so he could not travel to Brazil[163]. In any case, although he did not participate in the event, this letter can be considered part of the documentary set of this fund that allows us to understand how Wataghin kept his ties with Brazil active after his return to Italy.

As observed in some letters of this fund, Wataghin continued participating in the scientific life of Brazilian physics. For example, in February of 1968, in a letter to Elly Silva, who was at the Linear Accelerator Laboratory in Orsay, Paris, Wataghin reinforced his invitation to Silva for a stay in Turin. Also, Wataghin informed that

> This morning I received a letter with an unofficial invitation to come and discuss the accelerator problems for Rio in the first week of March. In addition to the usual type of accelerator up to 500-MeV, Goldemberg's proposal for a linear accelerator for high-intensity 600-MeV electrons is being studied. I will be happy to discuss these issues with you[164].

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[160] ASUT, *G. Wataghin*, Copia Corrispondenza. Letter from Gleb Wataghin to Giuseppe Occhialini, October 26th, 1965. Original in Italian: «Caro Beppe, Ti invio quì acclusa copia del telegramma di cui Ti ho parlato per telefono. Credo che le Autorità brasiliane, ricordando gli interventi precedenti, in favore di Schoenderg [sic], da parte dei fisici giapponesi, italiani e francesi, non avranno alcun dubbio che una protesta formale da parte nostra, basata su dati precisi, sarà da noi inviata a tali Autorità, se non riceveremo assicurazione soddisfacente sulla situazione dei colleghi di Brasile. Può darsi che riceverai una risposta dal Deputato del Parlamento Saturnino Braga, in tal caso sarei grato se Tu mi terrai informato. Grazie. Molto cordialmente. Tuo (G. Wataghin)»:

[161] ERASMO GARCIA MENDES, *Paulo Duarte*, «Estudos Avançados», 22, vol. 8, 1994, pp. 189-193.

[162] ASUT, *G. Wataghin*, Copia Corrispondenza. Letter from Gleb Wataghin to Paulo Duarte, December 1st, 1965. Original in Portuguese: «Fiquei comovido pelas palavras bondosas que o Snr. teve em relação a mim, impressionado pelas dificuldades atuais de vida universitária, e posso declarar de que também por parte minha permaneço inteiramente devotado aos velhos amigos e ao Brasil, ao qual me sinto ligado pelos muitos anos de cooperação e pelos sentimentos de gratidão».

[163] *Ibidem*, Letter from Gleb Wataghin to Beniamino Segre, March 5th, 1966.

[164] *Ibidem*, Letter from Gleb Wataghin to Elly Silva, February 5th, 1968. Original in Italian: «Questa mattina ho ricevuto una lettera con un invito non ufficiale di andare a discutere I problemi dell'acceleratore per Rio nella prima settimana di marzo. Oltre all'acceleratore fino a 500 MeV del tipo consueto, si studia la proposta di Goldemberg di un acceleratore lineare per elettroni da 600 MeV di grande intensità. Avrò piacere di discutere questi problemi con Lei».

During the same period, Wataghin also sent a letter to the Brazilian physicist José Leite Lopes (1918-2006), a professor at the University of Brasil, in Rio de Janeiro [165]. Wataghin was responding to an invitation for a meeting to be held in Rio and informing that he would see Elly Silva soon in Turin [166]. In March of the same year, Wataghin sent a response letter to Carlos Martins Thompson Flores, the Brazilian Ambassador in Rome. As observed, Brazilian diplomacy was also aware of Wataghin's cooperation with the physics in Brazil at the time, once Wataghin informed the ambassador that he had already confirmed to Leite Lopes that he had "accepted the invitation to participate as a consultant in the work aimed at creating a Theoretical Physics and High Energy Laboratory" [167]. By the end of March, Wataghin sent a request to the rector of the University of Turin, Mario Allara, to inform about the invitation to travel to Brazil and help in the organization of that new physics laboratory. In this letter, the scientific diplomatic meaning of Wataghin's cooperation with Brazil appears more clearly, as follows:

> Magnificent Rector,
> I am honored to inform you hereby that I have received an invitation from the Federal University of Brasil to participate in the creation of a national laboratory of Theoretical Physics and High Energy in Rio de Janeiro.
> The Brazilian ambassador in Rome has personally requested my membership and informs me that the meetings relating to the discussion of the creation of this laboratory will begin in early April.
> I should be absent for about ten days, during which my assistants will ensure that there are no interruptions to the lessons.
> I will be grateful if you want to authorize my trip which will be undertaken in the spirit of promoting cultural exchanges between Italy and Brazil agreed between the two Governments [168].

Although other sources about Wataghin's participation in the organization of this laboratory in Rio de Janeiro were not found in this fund, this correspondence is very useful to understand Wataghin's awareness about the importance of bilateral cooperation in science, and his engagement in the future of Brazilian physics.

## 3. *Final remarks*

Gleb Wataghin was an important name for Brazilian and Italian physics. In both countries, his attention to the new trends in physics, his theoretical and experimental abilities, his pedagogical qualities, as well as his capacity to build international networks of cooperation

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[165] After obtaining a degree in physics at the University of Brasil, Leite Lopes moved to São Paulo to work with Wataghin and his group at USP in the 1940s. See http://acervo.if.usp.br/bio14, accessed on November 7th, 2023. See also HERÁCLIO DUARTE TAVARES, ANTONIO AUGUSTO PASSOS VIDEIRA, *César Lattes, José Leite Lopes e o nacionalismo científico no Brasil dos anos 1940*, «Revista de História», 179, 2020, pp. 1-33.

[166] ASUT, *G. Wataghin*, Copia Corrispondenza. Letter from Gleb Wataghin to Leite Lopes, February 6th, 1968.

[167] *Ibidem*, Letter from Gleb Wataghin to the Brazilian Ambassador in Rome, Carlos Martins Thompson Flores, March 7th, 1968. Original in Italian: «accettato l'invito di partecipare in qualità di consulente ai lavori diretti alla creazione di un Laboratorio di Fisica Teorica e Alte Energie».

[168] *Ibidem*, Letter from Gleb Wataghin to the rector of the University of Turin, March 27th, 1968. Original in Italian: «Magnifico Rettore, Mi onoro di comunicarLe con la presente che ho ricevuto l'invito da parte dell'Università Federale del Brasile di partecipare ai lavori della creazione di un laboratorio nazionale di Fisica Teorica ed Alta Energia a Rio de Janeiro. L'ambasciatore del Brasile a Roma ha sollecitato personalmente la mia adesione e mi comunica che le adunanze relative alla discuzione della creazione di tale laboratorio avranno inizio nei primi di aprile. Dovrei assentarmi per un periodo di una decina di giorni, durante il quale i miei assistenti di ruolo avranno cure a che non vi sia interruzione delle lezioni. Sarò grato alla M.V. se vorrà autorizzare il mio viaggio che sarà intrapreso nello spirito di favorire gli scambi culturali fra l'Italia ed il Brasile concordatti fra i due Governi».

were appreciated. In the Brazilian's case, his efforts were fundamental for the organization of the first Department of Physics of one of the first universities in the country. In the Italian's case, he was invited to contribute to reconstructing the Institute of Physics after years of uncertainty and forced emigration of physicists affected by the war, fascism, and racist laws[169].

Wataghin's life was also marked by displacements. After leaving his homeland during the Russian Civil War, his European period was also interrupted by fascism. Following an opportunity to travel to Brazil in the 1930s, Wataghin took advantage of the situation to establish new international collaborations. However, his involvement with the Russian community and the anti-communist mentality in Brazil led him to Italy once again. Therefore, if Wataghin's displacements were motivated by diplomatic accords and ruptures, so were his international networks.

Wataghin's career was as important for local and national centers, like Brazil and Italy, as for the production of knowledge in the transit between countries. Other physicists also benefited from the networks he helped build. In the same way, the exchanges of young scholars and senior colleagues were fundamental to strengthening the already existing collaborations. To understand a trajectory like that, from the perspective of the transnational production of knowledge, it is relevant to incorporate historical sources from different countries and institutions. For the analysis of Brazilian-Italian cooperation, the analysis of sources from both countries is also fundamental.

This paper presented the documents from Wataghin's archive at the Historical Archive of the University of Turin useful for understanding his connections with Brazilian physics. The first appointment about his funds is on the diversity of documentary typologies. Gleb Wataghin's personal file is mainly composed of administrative documents, related to his career. For his attachment to Italian universities during the time he remained in Brazil when we analyze his retirement process, it is possible to see all his activities and itinerary in that country. Also, thanks to the university bureaucracy, it is possible to know his travel requests and, consequently, the times he went to Brazil after his return to Turin. As we can estimate, these visits were crucial for keeping his network of collaboration in activity. In the same way, the letters found in Wataghin's correspondence fund are also important to understand how his Brazilian former students entered his network of collaborations as strategic actors and points of connection with other physics centers beyond Brazil and Italy.

The selected documents from Wataghin's archive in Turin, presented in this paper, are sources for understanding his role in the building of good Brazilian-Italian relations after the Second War. As we can observe in his trajectory, Wataghin was always attentive to the importance of the diplomatic apparatus for the establishment of scientific relations. In the 1950s and 1960s, when Brazil was organizing and institutionalizing its scientific-technological policy federal structure, through the creation of the CNP and other agencies, Wataghin could take advantage of the new scholarships to strengthen his previous ties with Brazil. Finally, this paper is a small contribution to the understanding of the research possibilities from the documents of

[169] BUSTAMANTE, VIDEIRA, *Gleb Wataghin ...*, 1993 cit., p. 270; PREDAZZI, *Gleb Wataghin*, 1999 cit., p. 287; DE ALFARO, *Fisica*, 1999 cit., p. 224.; TAVARES, *Estilo de pensamento …*, 2017 cit., p. 17.; SILVA, *Ciência, universidade ...,* 2020 cit., pp. 298-304; TAVARES, BAGDONAS, VIDEIRA, *Transnationalism …*, 2020 cit., pp. 265-266.

Wataghin's archive. There are many other possibilities for projects and other sources to be explored from other points of view.

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