

HISTORIA MATEMATYKI W POLSCE

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A photo of the mathematician Aleksander Rajchman has finally been found

Abstract. Aleksander Michał Rajchman (1890–1940) was a Polish mathematician who had a great influence on the development of mathematical analysis. For a long time there was no known picture of him available, but we have recently located one, which we wish to share with other mathematicians.

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Key words and phrases: 20th century mathematics and mathematicians in Poland, University of Warsaw, Free Polish University in Warsaw, Aleksander Rajchman, Antoni Zygmund.

1. Searching for a photography of Rajchman. We would like to inform you that after many years of searching, a photograph of the mathematician Aleksander Rajchman has been found. We would like to take this occasion to briefly discuss his life and scientific achievements, as well as the history of searching for a photograph of him and the exact place and date of his premature death.

Aleksander Michał Rajchman was a Polish mathematician born on November 13, 1890 in Warsaw, Poland. His father Aleksander Rajchman (1855–1915) was a journalist specializing in arts, a music critique and impresario, and a co-founder and the first director of the National Philharmonic in Warsaw at beginning of the 20th century (1901–1904). His mother, Melania Amelia Rajchman née Hirszfeld (1857–1913), was an educational, social and feminist activist. His older sister Helena Radlińska (1879–1954) was the founder of Polish social pedagogy. His older brother Ludwik Rajchman (1881–1965), a physician and bacteriologist, was an international leader in global health and humanitarian medicine, first director of the League of Nations Health Organization, the founder of the United Nations International Children's Emergency Fund (UNICEF).

Aleksander Rajchman studied mathematics in Paris obtaining "licencié ès sciences" in 1910, at the Sorbonne (1911–1912) and then at the Jagiellonian University in Krakow (1912–1913). In 1919, he obtained a position at the University of Warsaw, first as a junior assistant, and, after obtaining his PhD in 1921, as a senior assistant. In fact, he defended his Ph.D. thesis, On trigonometric series summable by Poisson method, at the University of Warsaw under the supervision of Stefan Mazurkiewicz in 1919 but was promoted only on November 10, 1921. It was the first doctorate in mathematics at the newly established Polish university in Warsaw.

In 1922, Rajchman became a professor at the Free Polish University (Wolna Wszechnica Polska) in Warsaw and in 1925 he completed his habilitation at the University of Warsaw and lectured at this University as a Privatdocent until 1939. He spent the 1929/1930 academic year on a fellowship in Paris, giving lectures at the College de France in Jacques Hadamard's seminar.

Aleksander Rajchman started to work in trigonometric series under the influence of Hugo Steinhaus (cf. [Zy87, p. 219]); he worked also in real functions, probability and mathematical statistics. Rajchman had a great influence on the development of mathematical analysis. Rajchman's students and closest associates were Antoni Zygmund (1900–1992), Zygmunt Zalcwasser (1898–1943), Wacław Kozakiewicz (1911–1959), Stanisław Saks (1897–1943) and Halina Milicer-Grużewska (1901–1981). He also had mathematical contact with Wacław Sierpiński and Stefan Mazurkiewicz in connection with their shared interest in the functions of a real variable. Although he died before 50, the list of his publications counts 40 positions, including three joint ones with Zygmund and one with Saks.

In mathematics, there are concepts and theorems such as: Rajchman theorem, Rajchman measure, Rajchman set, Rajchman algebra, strong law of Rajchman of large numbers, Rajchman's theory of formal multiplication of trigonometric series, inequalities of Rajchman and Rajchman–Zygmund. In the paper [MP17, str. 61–67] the five Rajchman theorems have been listed and discussed.

Rajchman's life and main scientific achievements were described in 1987 in [Zy87] by his student Antoni Zygmund. Zygmund's description in [Zy87] and Duda's information in [Du12] have been supplemented in an extensive article [MP17].

In the article [MP17] we really wanted to have a photo of Aleksander Rajchman, as earlier articles or books did not have such a photo. In Lepalczyk's book [Le02] there are photos of the Rajchmans: Aleksander-father, Melania and her brother Bolesław, Ludwik and many photos of Helena. And in Balińska's biography of Ludwik [Ba95] there are also many pictures of Rajchmans, but none of his younger brother Aleksander. This is because, until then, no photograph had been located or retrieved from family collections. Let us also note that Wikipedia in [AR22] (in English and Polish version) contains a photo of Rajchman the father, but not of Rajchman the mathematician.

The second author of this article began looking for people related to the Rajchman family in 2012 hoping to find a picture of the mathematician. He was able to track down Ludwik Rajchman's great-granddaughter, Marta Aleksandra Balińska. Ludwik had two daughters: Irena and Marta. Irena married Antoni Baliński (1906–1990) and they had a son, Michel Louis (Michał Ludwik) Baliński (1933–2019) – a mathematician and econometrist dealing with operational research and applications of mathematics, with a doctorate from Princeton (1959) from A. W. Tucker. Michel was the father of Maria and Marta Aleksandra Balińska, the author of numerous publications and books, including Ludwik Rajchman's biography [Ba95].

So I asked Marta Balińska for a photo of Aleksander the mathematician. Her responses since 2013 have been chronologically as follows:

- February 2013: unfortunately I cannot help you with the photograph. I long searched for one of Aleksander Rajchman, and a friend of mine found one in Warsaw, but I don't remember where. I myself am very frustrated by this situation.
- May 2015 (a photo from the General Assembly of Cultural Workers in Lvov in May 1936 was found cf. [MP17, photo on page 54]): it seems to me (but I could be wrong!!!) that Aleksander Rajchman might be the third man from the extreme right, standing, with a cane in his hand. I am so frustrated that I can't locate the photograph I had which was a portrait. I have moved so many times in the last years that I have lost track of some of my belongings. I have searched several times the family photographs to no avail. I'm so sorry, but obviously if I come across it in the future I will send it to you.
- August 2015: The face you scanned could be he, but I really cannot guarantee it. The hairline, the body mass resembles him. The eyes less so, but then again he is wearing glasses.
- September 2021: I hope this finds you well. After giving up all hope of ever finding the photograph of my great uncle, I just

discovered it this morning in a box of papers that had remained unopened in my husband's family house in Czechia. I am SO happy this has occurred and I really hope you will publish an erratum because the photograph that accompanied your article was clearly not my great uncle¹.

I look forward to hearing back from you and send warm wishes from Geneva.

Thus, after many years of searching, the only known a photograph of Aleksander Rajchman has been located and we decided to publish it together, as many mathematicians have been wondering what Rajchman looked like. Balińska is convinced of the authenticity of this photograph (as opposed to other supposed photographs of Rajchman) given family resemblances.

There has been much speculation over the circumstances of Rajchman's death at the start of the Second World War. It was long presumed that Rajchman had been arrested during the Sonderaktion Krakau, a mass deportation of academics from the Jagiellonian University Wa78, 261, but it is unclear why Rajchman – who was a professor in Warsaw – would have been in Krakow in November 1939. The Polish resistance believed that he was deported to Auschwitz and tortured to death in March 1940 (see [AK70] – Letter from General Grot-Rowecki to General Sosnkowski, written on January 30, 1941, p. 432; see also [MP17, p. 55]). Incorrect information regarding his death, both place and date, can be found in [Si45] and [KP87]. Recent research located Rajchman's death certificate in Oranienburg at the Sachsenhausen concentration camp (cf. [SMM], see also [MP17, p. 56]). Rajchman is stated to have died in the morning of June 7th 1940 from pneumonia. He was 49 years old. While the exact reasons of Rajchman's deportation remain unknown, it should be recalled that as a Jew, an intellectual, and a member of the Polish communist party, he was triply targeted by the German occupier.

Aleksander Rajchman was in Warsaw during the German occupation. In April 1940 he was arrested and initially detained in prison, then transferred to a concentration camp in Sachsenhausen-Oranienburg. He arrived in the camp on May 4, 1940, and died on June 7, 1940.

¹It was about the photo of Alexander Rajchman as one of the participants of the First All-Union Congress of Mathematicians, which took place on June 24–29, 1930 in Kharkov, USSR. It was a portrait photo on the website along with photos of mathematicians from France and Germany who were also at the Congress. Mrs. Balińska strongly denied that Aleksander Rajchman is on the photo (see [MP17, p. 53]).



Z 1. Aleksander Michał Rajchman

Zygmund's dedicated his monumental work *Trigonometric Series* [Zy59] to the memory of A. Rajchman and J. Marcinkiewicz – his teacher and his pupil, respectively.

We would like to conclude this brief evocation of Rajchman quoting from one of his papers (1937): The most important achievements of science are based on incredibly simple ideas.

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W końcu odnaleziono zdjęcie matematyka Aleksandra Rajchmana

Marta Aleksandra Balińska i Lech Maligranda

Streszczenie. Aleksander Michał Rajchman (1890–1940) był polskim matematykiem i miał wielki wpływ na rozwój analizy matematycznej. Przez długi czas nie było dostępnego dobrego jego zdjęcia i w końcu znaleźliśmy to, czym chcemy się podzielić z innymi matematykami. 2010 Klasyfikacja tematyczna AMS (2010): 01A60, 01A70, 01A73. Słowa kluczowe: Matematyka i matematycy XX wieku w Polsce, Uniwersytet w Warszawie, Wolna Wszechnica Polska w Warszawie, Aleksander Rajchman, Antoni Zygmund.

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