MS48-01 **X-rays and crystallography. A story through the stamps.** Santiago García-Granda, Jose Montejo-Bernardo, *Department of Physical and Analytical Chemistry.University of Oviedo. Asturias. Spain*
E-mail: sgg@uniovi.es

On November, 8, 1895, Wilhelm Conrad von Röntgen, a professor of physics at the University of Wüzburg (Germany) discovered the X-rays when it was working with cathode rays and Crookes tubes. About a century later, on August, 6, 1996, the Brithis postal service (Royal Mail) issued a stamp honoring Dorothy Crowfort Hodgkin, a pioneer of protein crystallography (Great Britain's first female Nobel laureate, in 1964, in Chemistry). Postage stamps have always been offbeat means to remember and/or to paying homage to events and people that contributed to the development of science [1,2]. Thus, many of the Nobel laureates of the past century appear on labels in countries around the world [3]. In this work, the authors take a quick tour through the main advances arround X-rays, their use in crystallography, and its makers. Some dates and few words. Images are responsible for postage stamps. Unfortunately, the relationship between science and postal stamps is not understood by everyone in the same way:

"Physics is the only real science. The rest are just stamp collecting".

Ernest Rutherford.

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Keywords: philately, science history, teaching

MS48-02 **History of the Establishment and Development of X-Ray Analysis Methods in Russia - The USSR. First 20 Years.** Nikolai Fedorchuk, Ivan Fedorchuk, Victor Prikhodski, Anton Chuev. Russia,
E-mail: chuev.a.a@mail.ru, nmfchru@mail.ru

Western scientists are not well aware of the history of the USSR science or know it in fragments. The science history expert G.E.Gorelik wrote, "… the task of Russian scientists is to help western colleagues overcome the barrier of Cyrillics". This paper devoted to the "Discovery of the X-ray Diffraction Centenary" is also aimed at this aspect of the problem.

The beginning of X-ray analysis in Russia. The advance experiments on vieving x-ray wave nature were begun before Easter (07.04.1912). We think that the experiments by W.Fridrich and P.Knipping were carried out on April 1-3. M.Laue learnt about the results in a day after that. The first data on the Laue's discovery appeared in Moscow in the autumn 1912 owing to G.Wulf who came back from his foreign business trip. The first data on the Laue's discovery became known to the crystallographer E.Fedorov in St.-Petersburg in the autumn of 1912; he was informed on the results of L.Bragg's research at the end 1913 by the English crystallographer T. Barker. On 11 February, 1914, at the session of the Mineralogical Society, E.Fedorov recommended to elect M.Laue and L.Bragg honorary members of the Society par acclamation. This is the first mentioning of Laue-Friedrich-Knipping experiments in the Russian and, very possibly, world educational literature, A.Eihenvald's course "Electricity", 1913 and the textbook of Physics by O.Hvalson (author D. Rozhansky) 1914. In Russia experiments with X-ray diffraction were carried out by M. Glagolev, B. Zubarev and R. Bursian in 1913.

St.-Petersburg school of X-ray analysis. Systematic research using X-ray has been conducted at Leningrad State Physical Technical Institute (LSPTI) since 1919, when A.Ioffe invited N.Selyakov from Moscow. N.Selyakov was heading the X-ray laboratory LSPTI. In his autobiography, he wrote that together with his colleagues they created a base for the development of x-ray diffraction analysis in the USSR. The laboratory became famous for its works on glass structure (L. Strutinsky and A. Krasnikov); martensite nature (G. Kurdyumov and N. Gudtsov); X-rays thin structure (A. Krasnikov and T. Stelletskaja). In 1922, N.Selyakov together with G.Aksenov using X-ray diffraction discovered elastic stresses in polycrystalline materials. Among N.Selyakov's colleagues at LSPTI there were Ę.Alekseeva, O.Zvyagintsev, M.Korsunsky; E.Kaminskij, B.Finkelstein, A.Alihanov, L.Artsimovich, V.Arharov and others. In the following time were V. Mikheev, V. Budaev, E. Sovz. He was an associate professor at Leningrad Polytechnic Institute (LPI). At LPI, N.Selyakov delivered the course of lectures on Physics of X-rays. Later, on the basis of these lectures, there were published two books – "X-rays and the Structure of Substance" (1923) and "Technology and X-rays" (1925). These were the first books in the USSR considering the ideas of X-ray analysis. In 1924, N.Selyakov published a paper on defining the sizes of crystallites using P.Debye's diffraction ring widening. In 1930 N.Selyakov's laboratory and he were repressed. The laboratory was ended.

Moscow school of X-ray analysis. The early period of this school is represented by Lebedev's school (N.Uspensky). P.Lebedev was the first Russian physicists who was nominated on Nobel prize (1905, 1912). Diffraction graphs of the rolled metal structures for the first time in the USSR were published by N.Uspensky and S.Konobejewski (1922); they

have theoretically proved the correlation of structural graphs with partial or full orientation of crystallites in a certain direction (G.Zhdanov, V.Iveronova, J.Umansky). In the 30s of the XX century, the X-ray analysis was actively used at Moscow Machine-building Iinstitute (X-ray laboratory was headed by E.Bahmetev who was repressed in 1935). E.Bahmetev designed an original rotational chamber for getting diffraction graphs of mono-crystals; in co-authorship with A.Bochvar, G.Zhdanov, J.Umansky he published a monograph on «Re-crystallization of metals» in 1933. V Ginzburg, who will be russian Nobel's prizer (2003), was started his researcher work in Bahmetev's laboratory.

A. Shubnikov the Russian crystallographer, consulted with V. Goldshmidt on the X-ray diffraction apparatures in 1927 in Oslo. He also known W. Zachariasen and in date of 100 years we can tell about it.

Keywords: history of science; history of crystallography; history of physics.

MS49-01 **Crystallography in Erice: Past, Present and Future.** Annalisa Guerri,[a] John J. Irwin, [b] Giovanna Scapin, [c] Paola Spadon,[d.] [a] *Department of Chemistry,University of Florence, Italy,* [b] *Department of Pharmaceutical Chemistry, University of California San Francisco, USA,* [c] *Department of Global Structural Chemistry, Merck & Co, USA,* [d] *Department of Chemical Sciences, University of Padova, Italy.*
E-mail: annalisa.guerri@unifi.it

The idea of establishing an International School of Crystallography [1] at the "Ettore Majorana" Centre for Scientific Culture in Erice (Italy) was the brainchild of two young crystallographers, Michael M. Woolfson and Lodovico Riva di Sanseverino. The first course of the school was on Dýrect Methods and was held in 1974; since then it has been held almost every year, initially under the direction of Dorothy Hodgkin (Nobel prize, 1964), and then of Sir Tom Blundell.

The ancient Elymian walls of Erice have seen many innovative and notable ideas being born and discussed among teachers and students; many of the young crystallographers later came back as teachers themselves, after establishing succesfully crystallographic carreers.

The school is organized as a series of lectures and hands-on workshops led by world experts. Personal interaction between teachers and students is emphasized during both the formal teaching and the social program. In recent years, lectures have been recorded and distributed, broadening their impact. The school has a strong technology component supporting intensive practical workshops. Student feedback, both formal and informal, has strengthened the school by encouraging continual improvement.

As this abstract was submitted we are running the 45th Course of the School, "Present and Future Methods for Biomolecular Crystallography". We are also discussing and planning in details the next year's school "The Future of Dynamic Structural Science", and the early stages of five future meetings. The courses cyclically cover different areas of crystallography every six or seven years like macromolecular crystallography, high pressure crystallography, methods for biomolecular crystallography, electron crystallography, structural crystallography, pharmaceutical crystallography. This ensures that the most innovative and up-to-date developments are presented during the school. Courses have been programmed until 2018.

[1] www.crystalerice.org.

Keywords: teaching, crystallography, training;