

ested in the analogy between chaotic transitions and phase transitions.

Despite these limitations, Schuster's book should be useful to some readers because so much of the primary literature on chaos is obscure. However, *L'Ordre dans le Chaos* should be more successful in communicating some of the novel ideas about nonlinear physics to interested nonspecialists and students.

Kapitza, Rutherford and the Kremlin

Lawrence Badash

129 pp. Yale U.P., New Haven, 1985. \$20.00

One of the main obstacles to doing research in the history of Soviet science is the lack of useful primary sources that provide information outside the framework of the Communist Party line. *Kapitza, Rutherford and the Kremlin*, by Lawrence Badash, is of great importance because it draws from several dozen semiprivate letters of a major Soviet scientist that were made public only recently.

These letters were written in English by Peter Kapitza to his wife Anna in 1934-35, at a turning point in his career. Kapitza was then in the USSR, while Anna lived in Cambridge (Great Britain) with their two children. The circumstances that temporarily separated this family and forced them to correspond in English were most unusual: Between 1921 and 1934 Kapitza was allowed by the Soviet government to live and work in the West, doing research in the Cavendish Laboratory under Ernest Rutherford, while retaining his Soviet citizenship and making almost annual trips to the USSR. He became a leading authority in low-temperature physics and magnetism by 1934. He was elected a Fellow of the Royal Society, and a special research institution, the Mond Laboratory, was created for him in Cambridge. At this high point in his career, his own government suddenly, in the summer of 1934, prevented his return to Cambridge during one of his visits to the USSR.

The letters in question were written between November 1934 and July 1935. Writing in English allowed Kapitza to limit the number of possible Soviet readers and to make the letters also accessible, if need be, to his British colleagues, Rutherford in particular. The book also includes two letters from Kapitza to Rutherford, written in May 1935 and March 1936, as well as Kapitza's letter of May 1935 to Viacheslav Molotov, prime minister of the Soviet Union at the time.

Although the letters are not reprinted in their complete form (they were excerpted by Kapitza's wife) and do not

cover the period immediately after Kapitza's detention in the late summer of 1934, they still create a complex and revealing picture.

As a result of Badash's research, we can conclude that Kapitza was able to overcome the shock of his detention and continue his career in the harsh social environment of Stalinist Russia because he understood quickly that he could not rely on his Soviet colleagues for help or support. They were either unwilling or powerless. In his letters Kapitza complains bitterly about the lack of support from his Soviet colleagues. He singles out his teacher Abram Ioffe as being particularly distant and cold.

About 15 years ago I had an opportunity to learn something about Ioffe's motives from Ioffe's closest assistant, Yakov Dorfman. Dorfman was a prominent Soviet physicist and historian of science; in the 1920s and 1930s he was one of the leading authorities on magnetism and, in a way, Kapitza's rival. Dorfman, as Ioffe's assistant, was involved in the planning of Kapitza's visit to the USSR in 1926—a visit that never materialized. Badash mentions that in 1926 Kapitza received a formal request from the Soviet Government, signed personally by Leon Trotsky, to come to the USSR for consultation. Dorfman claims to have personally procured Trotsky's signature under the direct order of Ioffe. Trotsky readily signed the letter, and Ioffe hoped that Kapitza would react with due respect to this invitation. Kapitza's response came on a piece of paper torn out from a notebook, with

four short words in longhand: "Cannot come: too busy." According to Dorfman, this note enraged Ioffe. He feared such behavior toward the Soviet government would ultimately harm not only Kapitza and Ioffe himself, who had initiated Kapitza's extended stay in Great Britain, but also the whole Soviet physics community.

Ioffe was so concerned that he entrusted Dorfman with a special assignment: During Dorfman's forthcoming trip to Europe he was to drop by Cambridge, have a tête-à-tête with Kapitza and inform him of Ioffe's frustration.

Dorfman indeed met Kapitza in England and expressed Ioffe's concern with Kapitza's behavior. Kapitza responded: "It is not a matter of politesse. You should understand, Yakov, that we British scientists are very proud and independent people." Dorfman responded: "If you consider yourself a British scientist, then my remarks are inappropriate. I should apologize and leave." Of course Kapitza had to beat a retreat. He apologized, saying that it was just a joke, that of course he considered himself a Soviet scientist and would act accordingly.

This must have been an awkward moment for a proud and independent man. It seems he never forgot it, and never forgave Yakov Dorfman, the bearer of bad news. Years later, Dorfman believed, Kapitza played a prominent role in blocking his election to the Soviet Academy of Sciences. When Dorfman died in 1974, his funeral was attended by two of the most accomplished Soviet physicists, Vitaly Ginz-

Outside the Cavendish. This photo, taken by C. E. Wynn-Williams on 4 June 1929, shows P. M. S. Blackett, Peter Kapitza, Paul Langevin, Ernest Rutherford and C. T. R. Wilson in front of the Cavendish Laboratory. The photo appears in the book under review.



burg and Yakov Zel'dovich, but not by Kapitza.

Kapitza's complaints went far beyond his conflicts and frustrations with colleagues. Kapitza felt at that time that the Soviet Union was still not ready to embark on a program of pure academic research, and that it was not using properly his scientific potential. But of course problems of such magnitude could not be resolved within the Soviet academic community. Kapitza had to bring his case directly to the highest echelons of the Soviet government.

We can also conclude that Kapitza's actions after his detention were spurred by the lack of support from his Western colleagues. Badash gives us a detailed account of how the efforts of Rutherford, who wanted very much to save Kapitza from his predicament, were frustrated at every possible avenue. British Marxist physicists, such as J. D. Bernal and J. B. S. Haldane, washed their hands of Kapitza's case. Henry Armstrong, a senior member of the Royal Society, felt relieved when Kapitza returned to Russia, making one more position available for a native Briton. The *Cambridge Review* expressed the opinion that Soviet treatment of Kapitza, though regrettable, still was much better than the Nazis' attitude to their Jewish scientists: "It is at least more intelligible that a country should insist on keeping its scientists because they are its citizens, than that it should expel them for racial reasons."

Rutherford's realization of the impotence of the British and West European scientific community made him sympathetic to Kapitza's decision to accept the inevitable and to resume his research in the Soviet Union. In his letter to Kapitza of 15 May 1936 Rutherford made his attitude pretty clear. He insisted that the harder Kapitza worked, the less time he would have for other troubles, and that "a reasonable number of fleas is good for a dog."

Kapitza emerges from these pages less as a victim of the Soviet totalitarian dictatorship than as a successful, career-oriented scientist who was able to strike a bargain with the Soviet government under most adverse circumstances. In his correspondence we can see how his attitude changed after he was able to win the support of the highest echelons of the Soviet government. Molotov granted him an audience, a magnificent institute was built for him in the choicest area of the capital (on the high bank of the Moskva River) and £30 000 (those heavy pounds of 1935) were allocated for the purchase of the equipment from the Mond Laboratory. The Soviet Academy of Sciences in 1939 finally accepted him as



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