Rudolf Peierls - a Local Hero of Global Stature

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“My God, what have we done?” Reportedly, these were the words of Robert Lewis, the co-pilot of Enola Grey, the B-29 that dropped the first atomic bomb on Hiroshima on 6th August 1945.

Little more than five years earlier, in the spring of 1940, in the basement of a university building in Birmingham, two refugee scientists, the Austrian Otto Frisch and the German Rudolf Peierls, had joined forces to consider some of the consequences of the discovery, in 1939, of nuclear fission. “Suppose someone gave you a quantity of pure 235 isotope of uranium - what would happen?” Frisch asked. Several back-of-envelope calculations later, he and Peierls came to the shocking conclusion that - contrary to perceived wisdom in the scientific community - a lot would happen. With a relatively modest amount of pure uranium it would be possible to create a self-sustaining chain reaction which could be used in the creation of a nuclear bomb!

The two scientists went on to draft a memorandum explaining their findings and - most remarkable for a scientific document - to discuss the implications of the possible use of a weapon, starting from a discussion of radioactivity and radioactive fall-out and ending with the moral implications of using such a weapon. The memorandum, regarded as so explosive in itself that the two ‘enemy aliens’ were not allowed to see it again as it was classified as a top-secret document, led to the creation of a working group and, eventually triggered Anglo-American collaboration which would result in a concerted international effort: the Manhattan Project!

What If?

What if Frisch and Peierls, as most scientists at the time, had allowed themselves to be content with the perceived wisdom that a nuclear self-sustaining chain reaction and the creation of an atomic bomb were ‘merest moonshine’, as Ernest Rutherford, one of the ‘gurus’ of nuclear physics at the time had proclaimed? What if the Austrian and German had not emigrated to the UK and the calculation had been made in their native countries, used by Germany and Austria instead? What if the British authorities, on seeing the memorandum had not put in place a machinery to put the still highly theoretical considerations to the test? These hypothetical questions serve no other purpose than to emphasize the significance of what happened in the basement of this university 65 years ago: a calculation which had immense impact on global developments; an impact which has not always been fully comprehended and has often been overlooked.

The Life and Work of Sir Rudolf Peierls

Rudolf Peierls’ calculations of the critical mass of uranium may have been his scientific contribution with the most far-reaching consequences, but it was not his most significant scientific achievement. He added to our understanding of the world with his work in solid state, nuclear and particle physics, and equally significantly, he built an outstanding school of theoretical physics here at Birmingham as professor of mathematical physics between 1937 and 1964.

My most recent research project which is going to be completed with the publication of a two-volume edition of the private and scientific correspondence of Rudolf Peierls has focussed on making accessible a valuable collection of documents to the wider research community. Unlike many other scientists of great stature and impact, Rudolf Peierls left a remarkable collection of material, and among others an almost complete correspondence, consisting of letters received as well as carbon copies of letters he sent. His life (1907-1995) spanned almost a century; his correspondence spans almost seven decades (1926-1995) and covers a wide variety of topics: science, culture, and politics. It witnesses the life of a German-born Jew who studied with the greatest scientists of his time, Einstein, Planck, Heisenberg, Pauli, Bohr, Nernst, and who was friends with most of the greatest physicists of his own generation Bethe, Placzek, Frisch, von Weizsäcker, Rotblat, Oppenheimer, to name but a few. The correspondence gives insights into the life of those individuals, it explains the dynamics of an academic community under extreme pre-war and war-time circumstances; it throws light on the trials and tribulations of Jewish scientists under Hitler and their fate as émigrés in the United Kingdom and the United States. It opens insights into war-time science in universities and well beyond; it reflects the efforts to return to peace-time leadership in the world of academic science, and it demonstrates how Peierls, in an almost single-handed effort built, virtually from nothing, a world-class department of theoretical physics which could compete with any in the country, Europe, and arguably world wide.

The edition of a selection of Rudolf Peierls’ letters with a comprehensive scholarly apparatus attempts to make this valuable source accessible to a wide range of scholarship: scientific, historical and science historical. It puts the letters into their historical and scientific context and thereby aims to tell a multi-facetted story of a most significant local hero of global stature.

More Information:
http://www.hero.ac.uk/uk/research/archives/2004/spy_story.cfm?view=print (http://www.hero.ac.uk/uk/research/archives/2004/spy_story.cfm?view=print)