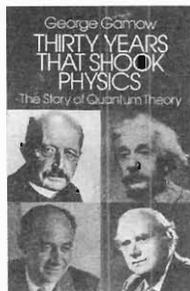


The Story of Quantum Theory

Abhijit Saha



George Gamow – Thirty Years
That Shook Physics
Dover publications
New York, first published in Dover
1985, \$8.95 in USA.

George Gamow was the great explainer of his age. His popular writings made the rapidly advancing and apparently exclusive world of scientific research accessible to the interested layman. Only a few years before his death, he wrote *Thirty Years that Shook Physics*, the story of the development of Quantum Theory during the first three decades of the twentieth century. It is more or less chronological, and reveals the evolution of the subject as new ideas were put forward, and verified or moderated. Gamow's account provides biographical sketches of several of the principal people who developed this "new physics". This is the story of a period of giant intellectual advance. This is also the story of intellectual giants who ushered in a completely new and counter-intuitive understanding of nature. Since Gamow was himself a participant in this revolution, much of his account is firsthand. We are left to marvel at his clear exposition of the ideas, and how he manages to reach the interested lay reader without taking liberties with the scientific content. And all the while he regales

the reader with his keen observations of the people involved, and with his erudite humour. Originally published in 1966 by Doubleday, the book was soon out of print until Dover reprinted it beginning in 1985.

The chronicle takes us from Planck's resolution of the "Ultraviolet catastrophe" conundrum by the hypothesis that radiation is quantized, to the recognition of strong interactions and the subsequent confirmation of pions. Along the way there are many interesting stops: Einstein's validation of Planck's quantization from the results of the experiments on the photoelectric effect; Bohr's quantization of electron orbits in an atom and the explanation of atomic spectra; de Broglie's "pilot waves"; Heisenberg's uncertainty principle; Schrödinger's wave mechanics; Dirac's relativistic quantum mechanics which predicted the existence of anti-particles; and the structure of the atomic nucleus and the forces (and particles that are exchanged for the weak and strong interactions to work). We also get to meet some of the above people (plus other key players including Sommerfeld, Pauli, Fermi, and Yukawa) in extra-academic settings, often through the author's personal knowledge of them.

Gamow explains abstract concepts (and quantum mechanics is certainly full of that!) using his particular kind of 'imagine if...' parables (also tellingly used in his Mr. Tompkins books). At the same time, he does not shy away from using simple algebra or the occasional graph (unlike so many of his contemporaries who were likely coerced to do

so by their publishers) when they are needed to make the point *correctly*. Rather, he narrates those thirty years in his whimsical way, which cajoles the reader into making the extra effort to work through the mathematics in order to get the whole story. But even a mathematically challenged reader can get the gist, as is evident by what a lay reader had to say about this book on www.amazon.com:

“Makes me wish I stayed awake in Math class. Some of the text is made up of formulas that make my head spin. However I am enjoying reading the stories of the men and their reasoning behind the explanations [sic] of how the world works at the atomic level versus the “real world “ physics of Newton and others. Definitely a time when what we knew to be true was vastly different from what was actually true.”

As an insider of that era (one of “Bohr’s boys”), Gamow provides us with a ringside seat not only to the emerging new science, but also to the exchanges, both personal and intellectual, that forged the fellowship of those thirty years. The book is illustrated with several photographs of the key people, often in non-academic settings: Bohr and his wife on a motorcycle, Pauli and Gamow in lederhosen, a shirtless Fermi playing tennis, to mention a few. It is also illustrated with Gamow’s own sketches of many of the personages.

Many currently practicing professional scientists (this reviewer among them) encountered this book when they were students. With its biographical sketches and whimsical anecdotes about the key players, it read like a

historical romance which inspired many a young reader to take up physics as a career. Not only for the intellectual pursuit, but also as an honest and visionary way of life. Even those who did not read the book have been regaled at coffee-house *addas* and *bull sessions* with stories that are contained here. For instance, while surely all physicists know about the Pauli Exclusion Principle, I dare say that thanks to this book, there are only a few who do not also know about the ‘Pauli Effect’ (Pauli’s proximity to an experimental setup was known to cause it to break!). There is Bohr’s theory explaining why in western movies, the good guy always wins the shoot-out, even though the villain draws first. Gamow even describes the experiments Bohr conducted to demonstrate the veracity of his argument! In another tale, Gamow was curious enough about the allegation that the taciturn Dirac once introduced his own wife as “... this is Wigner’s sister” (which she was), that he proceeded to ask Mrs. Dirac if that was indeed what happened. You will have to read the book to find the answer (following, in spirit, if not in insurmountability, Gamow’s own exercise to the reader, exhorting them to verify Dirac’s allegation that Dostoevsky’s *Crime and Punishment* mentions the sun rising twice in the same day).

Through these real life stories Gamow dismantles the all too popular portrayal of scientists as stodgy, strange and self-absorbed curiosities. He shows them as they really are (or perhaps as they really *were*), where quirkiness is natural, and where humour

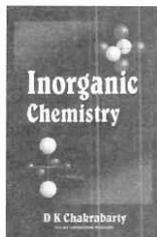
comes in a brand that is predicated on knowledge and understanding. To wit, the book concludes with a play written by Bohr's students which was performed in 1932 in Copenhagen. It is a spoof of Goethe's Faust: Pauli (Mephistopheles) tries to seduce a reluctant Ehrenfest (Faust) with the idea of a weightless neutrino (Gretchen).

Gamow's world is intellectually demanding, but also one that is very much alive, honourable, and fun. A world to which he makes us want to belong.

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Inorganic Chemistry

K C Patil



Inorganic Chemistry
D K Chakraborty
 New Age International Publishers
 New Delhi, p.383, 2003
 ISBN: 81-224-1462-1

Inorganic chemistry deals with the preparation, properties and applications of a hundred odd elements (metals and non-metals) and their compounds. Modern inorganic chemistry has experienced an impressive renaissance due to the recent developments in organometallics, bioinorganic and solid state chemistry. Particularly, advances in structure, bonding and reactivity of inorganic solids have been spectacular.

The present book on inorganic chemistry by D K Chakraborty is aimed at meeting the requirements of undergraduate students (BSc level) of Indian universities. It contains 18 chapters similar to 18 groups in the modern periodic table of elements. Twelve chapters are devoted to hard-core inorganic chemistry

like the periodic table; s, p, d and f block elements; acids-bases; oxidation-reduction; coordination compounds (complexes); organometallics and bioinorganic chemistry. The remaining six chapters describe the structure of the atom, bonding, electronic spectra and magnetic properties. The subject is dealt with scholarly and clearly with suitable illustrations. Solved problems and exercises at the end of each chapter help the students to understand the subject better.

The book though well written, contains mistakes in formulae, balanced equations and structures which could have been avoided with careful proof reading. Particularly the absence of groups 17 and 18 in the periodic table (p.31, *Figure 2.2*) is quite glaring. The Bibliography on inorganic chemistry texts is incomplete without the reference to standard books by James E Hugheey and T Moeller.

In summary, the author has succeeded in achieving his goal of providing an excellent textbook of Inorganic Chemistry to Indian students at an affordable price.

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