X-Ray scattering

Interferenz-Erscheinungen bei Röntgenstrahlen.

Von **W. Friedrich, P. Knipping** und **M. Laue.**

Vorgelegt von A. Sommerfeld in der Sitzung am 8. Juni 1912.

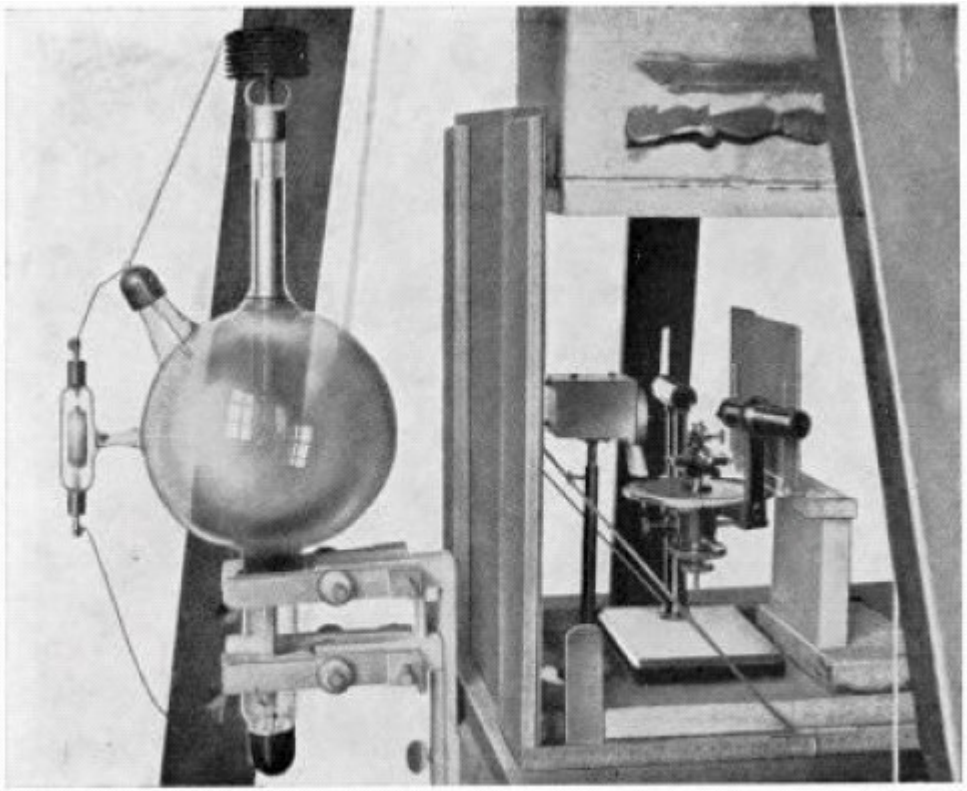


Fig. 4–4(2). Friedrich & Knipping's improved set-up.

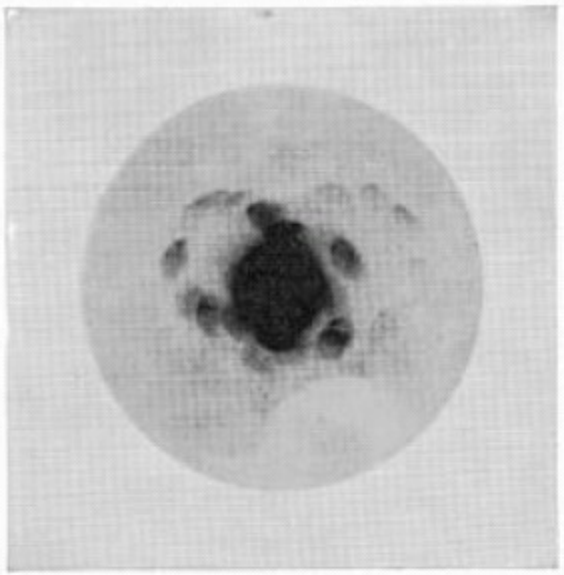
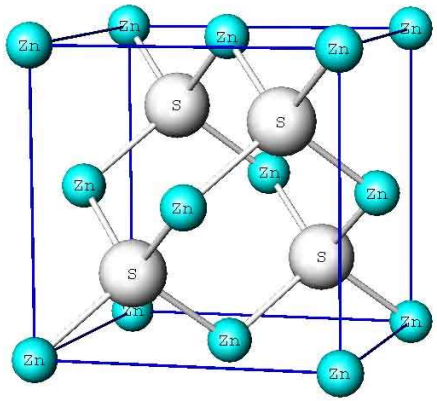


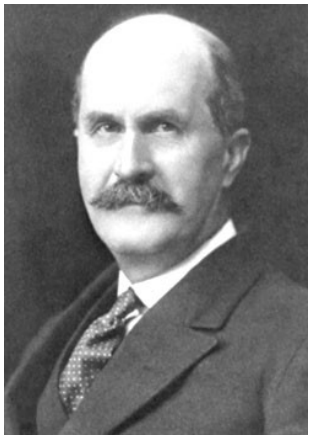
Fig. 4–4(1). Friedrich & Knipping's first successful diffraction photograph.

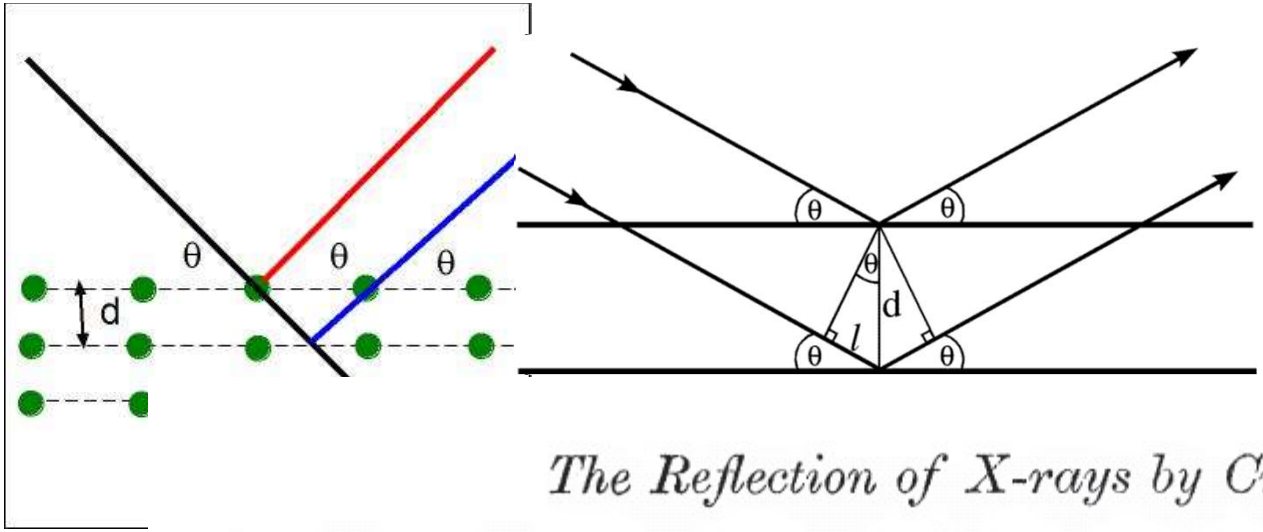
X-Ray scatterng on Copper Sulphate (CuS) Zink-blende structure (FCC lattice)

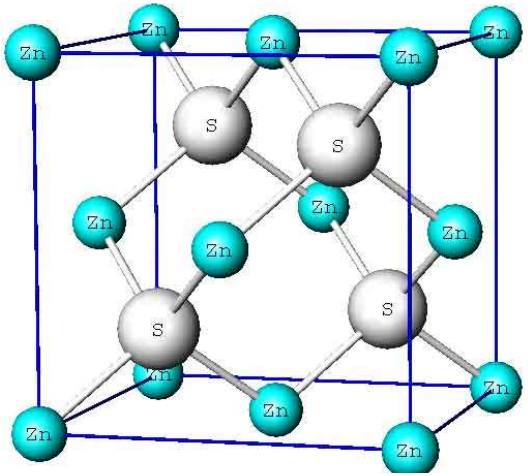
Fig. 4–4(3) and (4). Zincblende Laue photographs along four-fold and three-fold axes. (Laue, Friedrich & Knipping, *Sitz.ber. Bayer. Akademie d. Wiss.* 8. Juni 1912).



Bragg condition







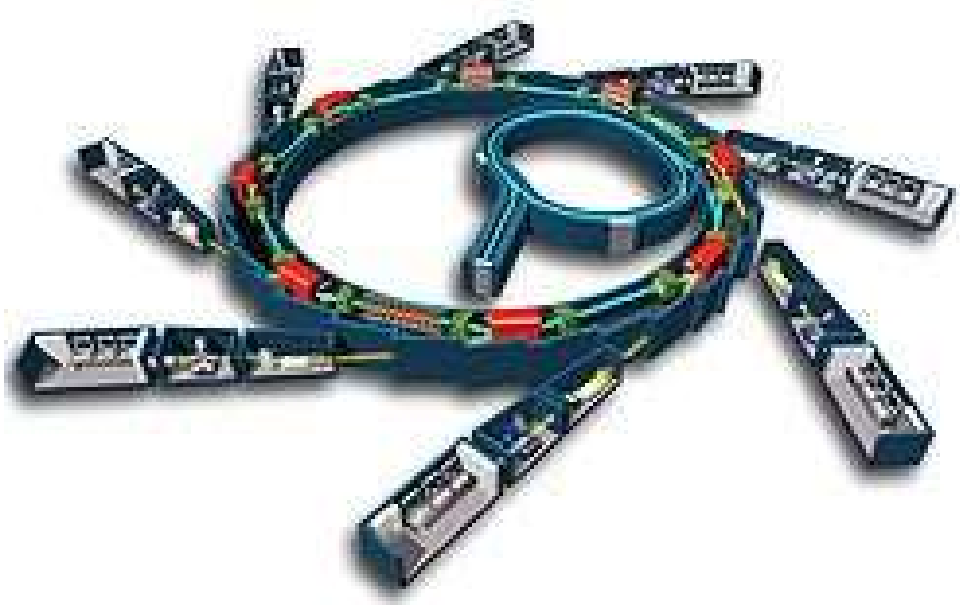
The Reflection of X-rays by Crystals.

By W. H. Bragg, M.A., F.R.S., Cavendish Professor of Physics in the University of Leeds; and W. L. Bragg, B.A., Trinity College, Cambridge.

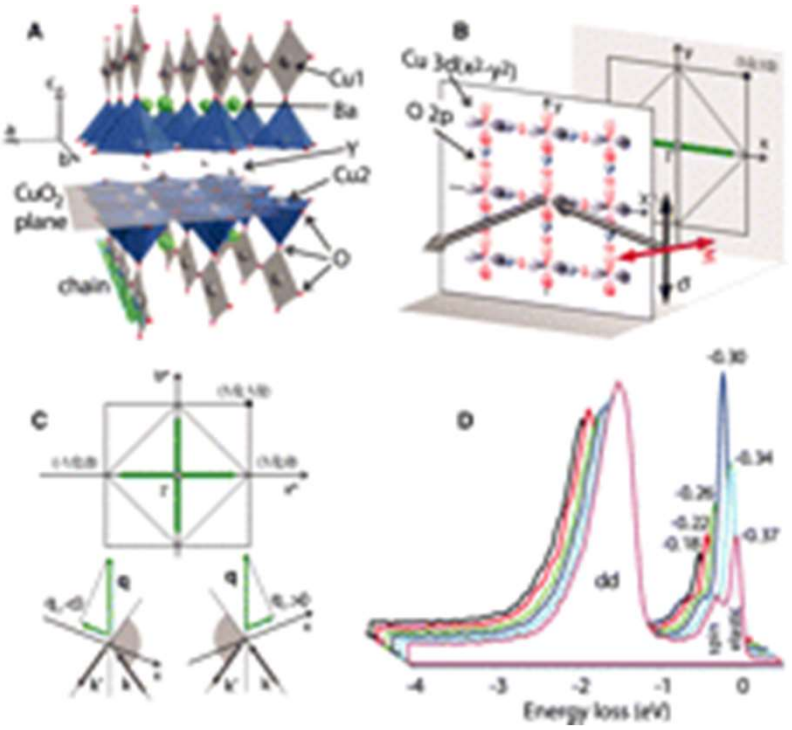
(Received April 7,—Read April 17, 1913.)

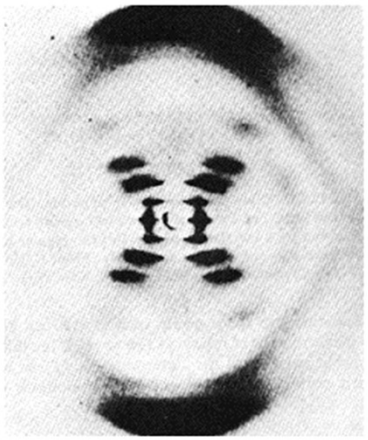
Modern Xray experiments

Synchrotrone facilities



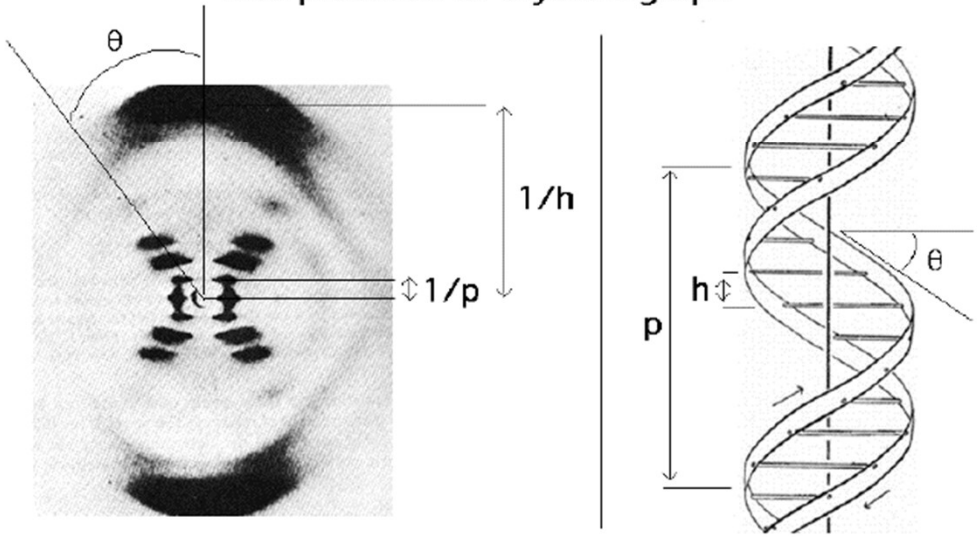
Resonant soft-Xray





X-ray diffraction pattern from B form of DNA

Interpretation of crystallograph

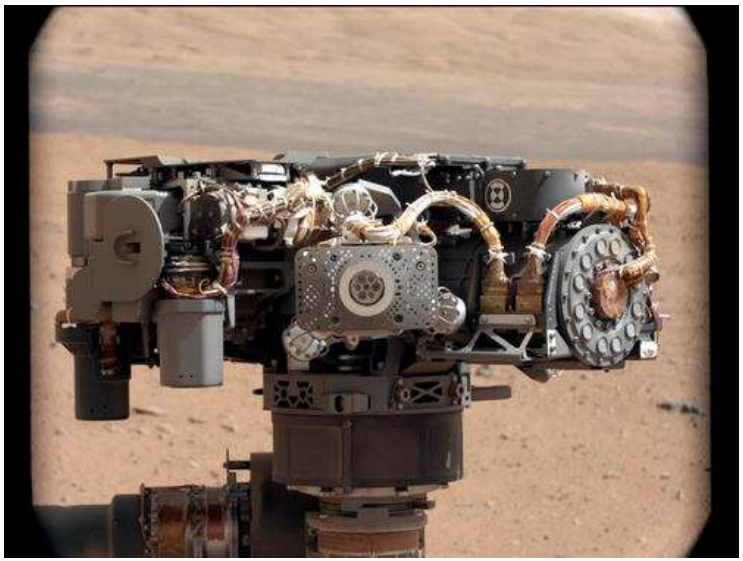


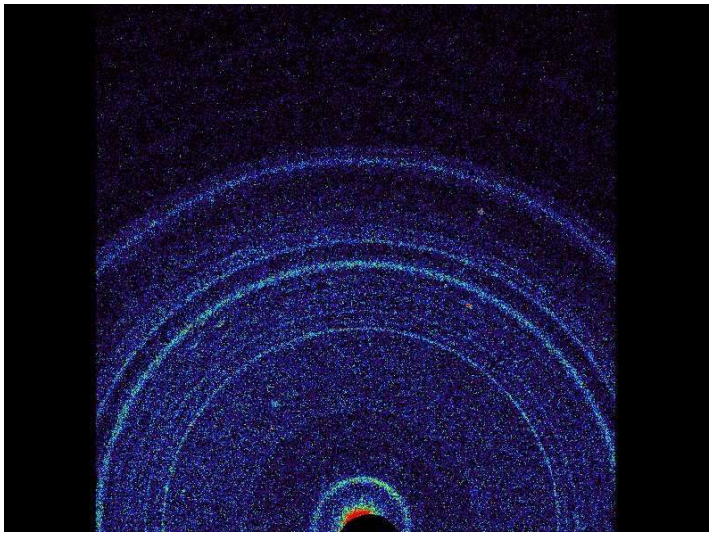
θ - tilt of helix (angle from perpendicular to long axis)

h = 3.4 Å (Distance between bases)

p = 34 Å (Distance for one complete turn of helix; Repeat unit of the helix)

1923	First organic structure solved: hexamethylenetetramine.
1930	The first cyclotron (first circular particle accelerator) is built.
1934	Bernal and Hodgkin report the first X-ray diffraction pattern from a protein (pepsin), the birth of protein crystallography.
1934	Hodgkin begins research at the University of Oxford into the structure of insulin.
1937	Hodgkin determines the three-dimensional structure of cholesterol.
1945	Hodgkin determines the three-dimensional structure of penicillin.
1953	Using X-ray diffraction, Crick, Watson, Wilkins and Franklin determine the three-dimensional structure of DNA.
1953	Perutz shows the use of heavy atoms could be used to solve the structures of proteins, a technique coined multiple isomorphous replacement.
1954	Hodgkin determines the three-dimensional structure of vitamin B12.
1955	Sanger solves the primary structure of insulin.
1956	First demonstration of the use of synchrotron radiation in experiments (first generation).
1957	The structure of myoglobin determined to a resolution of 6 Å by Kendrew in Cambridge.
1958	Sanger awarded the Nobel Prize in chemistry for his work on the structure of proteins, especially that of insulin.
1962	Perutz and Kendrew awarded the Nobel Prize in chemistry for determining the structures of haemoglobin and myoglobin, the first protein structures to be determined. Crick, Watson and Wilkins were awarded the Nobel Prize in Physiology or Medicine the same year for their discoveries concerning the molecular structure of nucleic acids and its significance for information transfer in living material. This was recognition for their work in solving the structure of DNA.
1964	Hodgkin awarded Nobel Prize in Chemistry for her determinations by X-ray techniques of the structure of important biochemical substances. This was recognition for her work in solving the structure of penicillin and vitamin B12, a substance used to help treat anaemia.





NASA’s Mars rover Curiosity performed X-ray analysis of the dust and soil of Mars. Results are consistent with Martial soil being similar to weathered basaltic soils
of volcanic origin in Hawaii