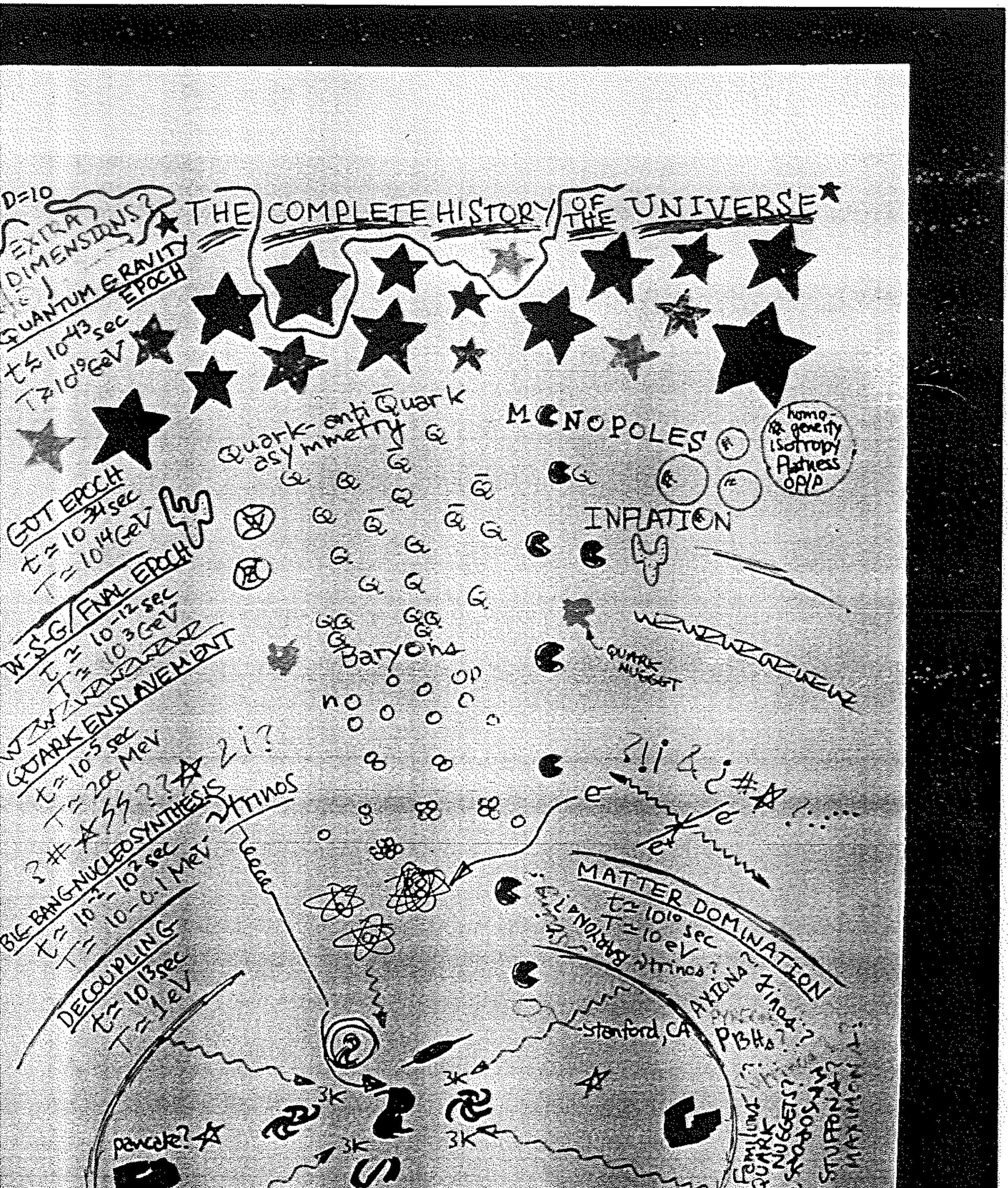

THE COMPLETE HISTORY OF THE UNIVERSE
D=10
EXTRA DIMENSIONS?
QUANTUM GRAVITY EPOCH
t ≈ 10^-43 sec
T ≈ 10^19 GeV
Quark-anti Quark asymmetry
MONOPOLES
homogeneity isotropy flatness δρ/ρ
GUT EPOCH
t ≈ 10^-34 sec
T ≈ 10^14 GeV
INFLATION
W-S-G/FINAL EPOCH
t ≈ 10^-12 sec
T ≈ 10^3 GeV
QUARK NUGGET
Baryons
QUARK ENSLAVEMENT
t ≈ 10^-5 sec
T ≈ 200 MeV
no
op
BIG BANG NUCLEOSYNTHESIS
t ≈ 10^-2 - 10^2 sec
T ≈ 10 - 0.1 MeV
ν-trinos
MATTER DOMINATION
t ≈ 10^10 sec
T ≈ 10 eV
DECOUPLING
t ≈ 10^13 sec
T ≈ 1 eV
Stanford, CA
PBHs?
AXIONS?
3K
pancake?
QUARK NUGGETS?
MACHOS?

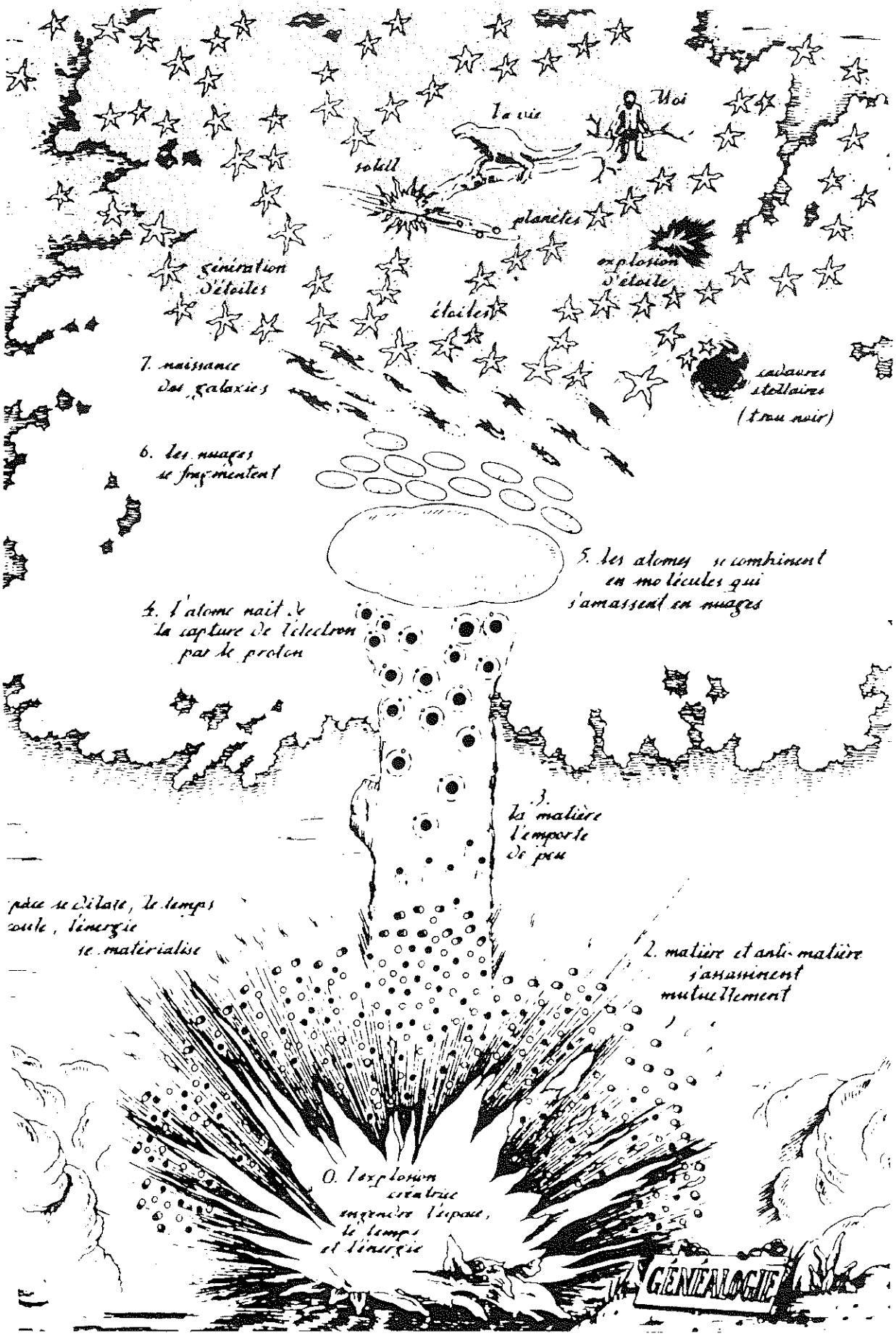

la vie
Moi
soleil
planètes
explosion d'étoile
génération d'étoiles
étoiles
cadavres stellaires (trou noir)
7. naissance des galaxies
6. les nuages se fragmentent
5. les atomes se combinent en molécules qui s'amassent en nuages
4. l'atome naît de la capture de l'électron par le proton
3. la matière l'emporte de peu
2. matière et anti-matière s'annihilent mutuellement
0. l'explosion créatrice engendre l'espace, le temps et l'énergie
l'espace se dilate, le temps coule, l'énergie se matérialise
GÉNÉALOGIE

FIG. 86c.

FIG. 86d.

FIG. 86*a*.

FIG. 86*b*.

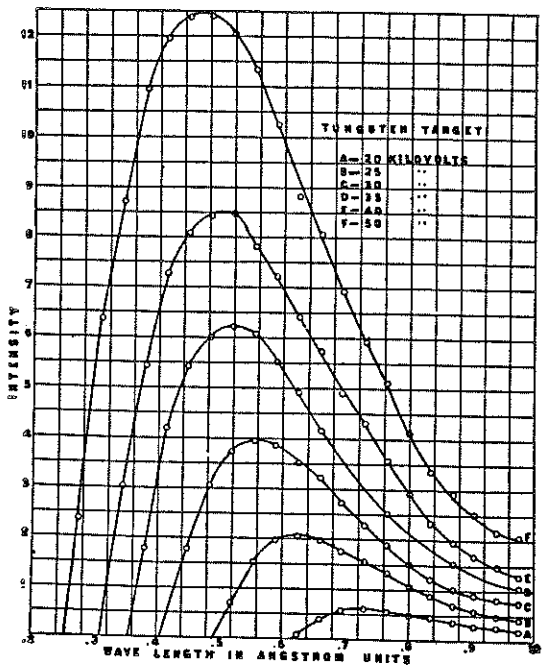


FIG. I–30. Continuous X-ray Spectra at Different Constant Potentials. (Ulrey.)

Duane & Hunt $Ve = h\nu_{max}$

Einsteins photo-electric $\frac{1}{2} m v^2 = h\nu - w$

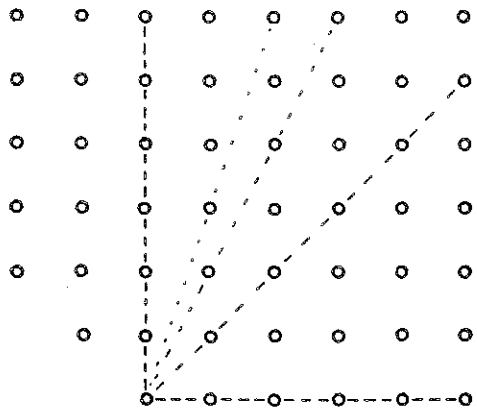


FIG. I–22. A Two-dimensional Point Array. The linear density of points is especially large along the dotted lines.

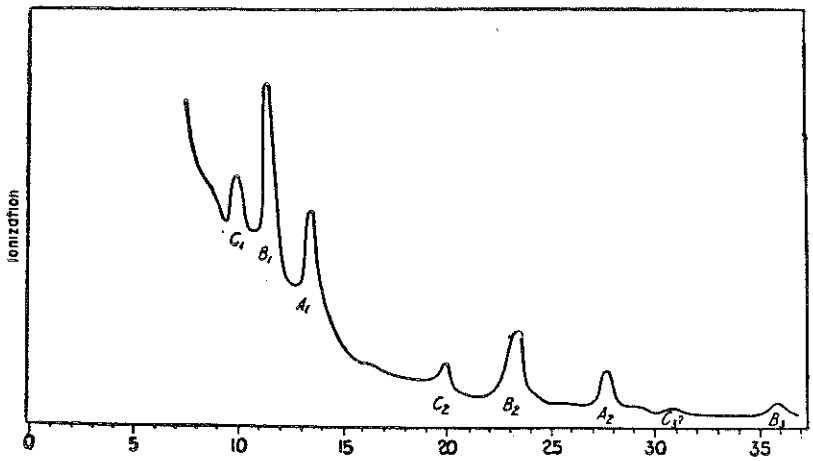


FIG. I–24. The First X-ray Spectrum. (W. H. Bragg.)

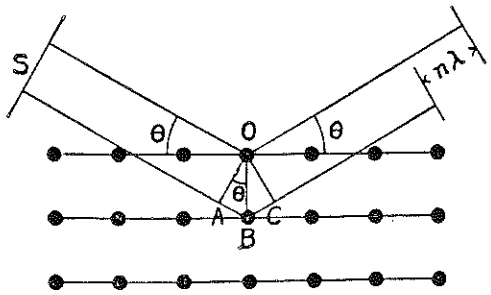


FIG. I–25. Illustrating the Elementary Derivation of the Bragg Law.

Bragg's Law

$n\lambda = 2d \sin\theta$ $\qquad d = \overline{OB}$

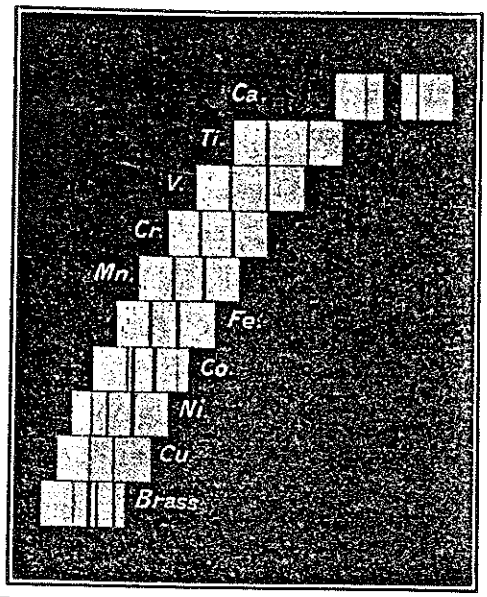


FIG. I–27. Typical *K* series Spectra. (Moseley.)

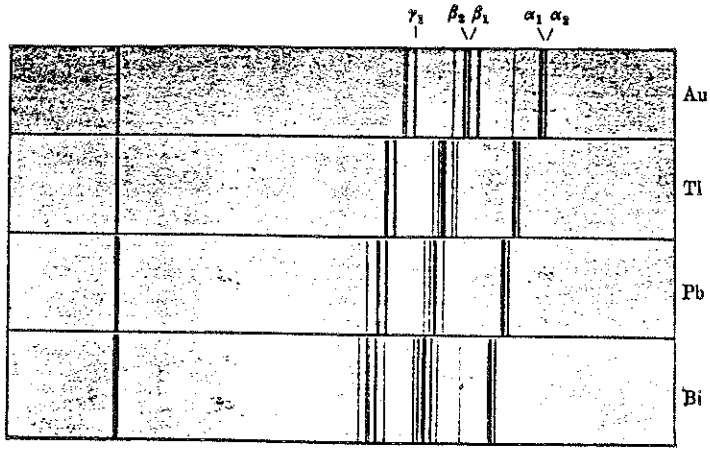


FIG. I–28. Typical *L* Series Spectra. (Siegbahn.)

Moseley's Law

$$\nu^{\frac{1}{2}} = K(Z - \sigma)$$

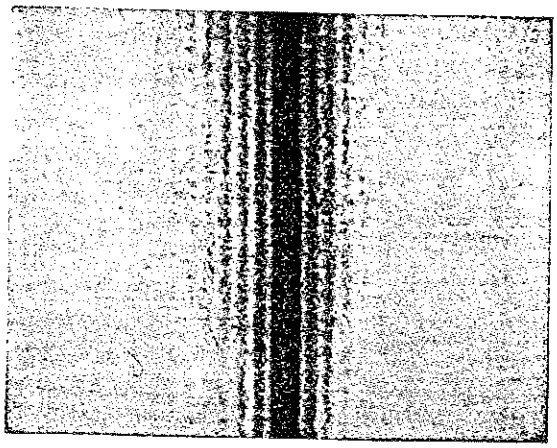


FIG. I–14. Enlargement of Diffraction Pattern of 8.3 A. X-rays Traversing 0.0055 mm Slit. (Larsson.)

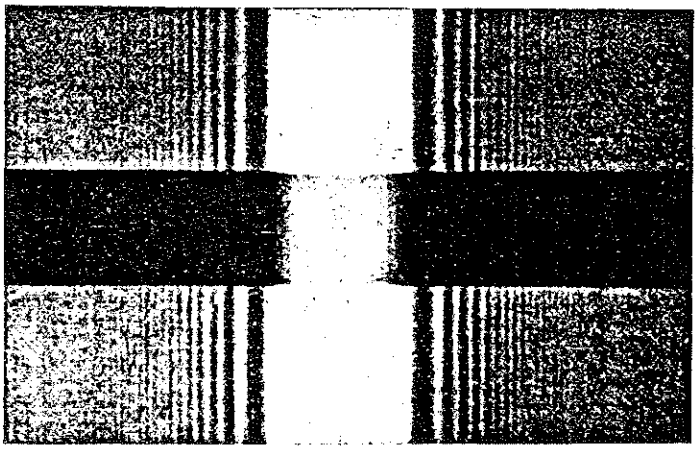
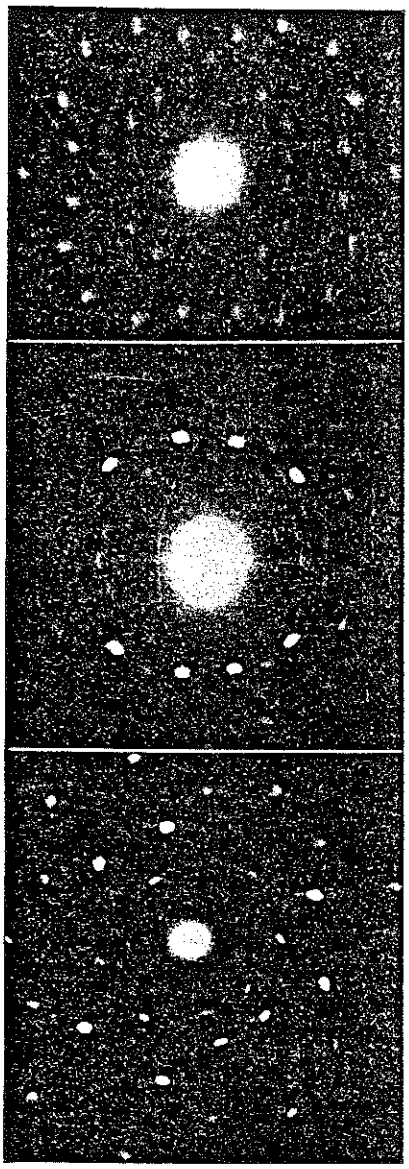


FIG. I–15. Diffraction of 8.3 A. X-rays by 0.038 mm Wire, Enlarged 73 Times. Middle portion printed darker. (Kellström.)



A. X-rays perpendicular to cube face (100 plane).

B. X-rays perpendicular to cube edge (110 plane).

C. X-rays along cube diagonal (111 plane).

FIG. I–21. Laue Diffraction Patterns with Rock-salt.

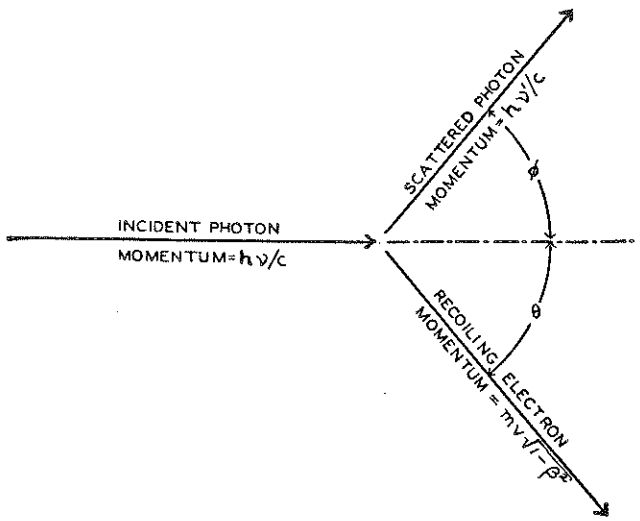


FIG. III–47. When an x-ray photon is scattered by an electron at an angle ϕ, the electron recoils at an angle θ, using some of the photon's energy and hence reducing its frequency.

$$\lambda' = \lambda + \frac{h}{mc}(1 - \cos\phi)$$

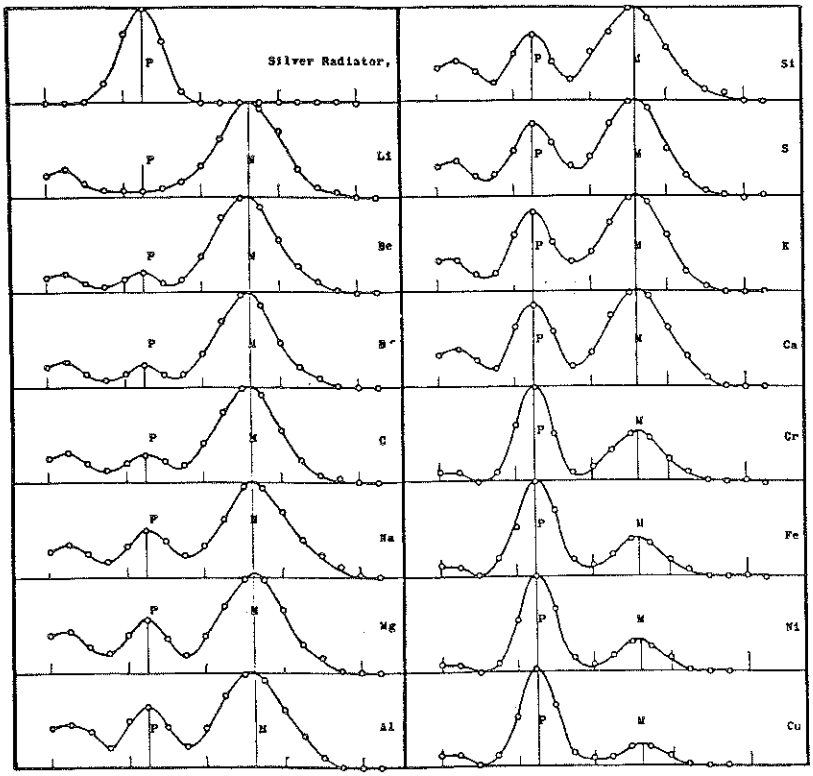


FIG. III–48. Spectra of silver $K\alpha$ line scattered by different elements, showing the increase in prominence of the unmodified line with increasing atomic number. (Woo.)

Conservation of momentum as well as energy