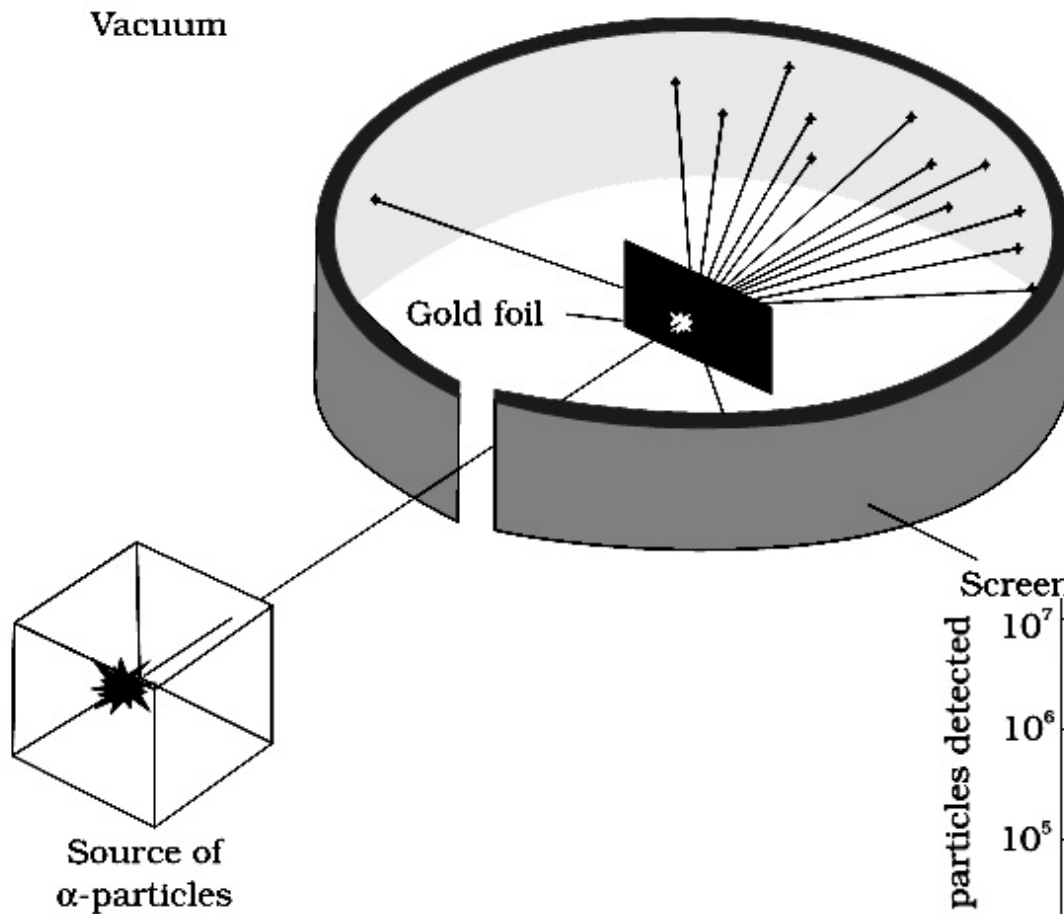
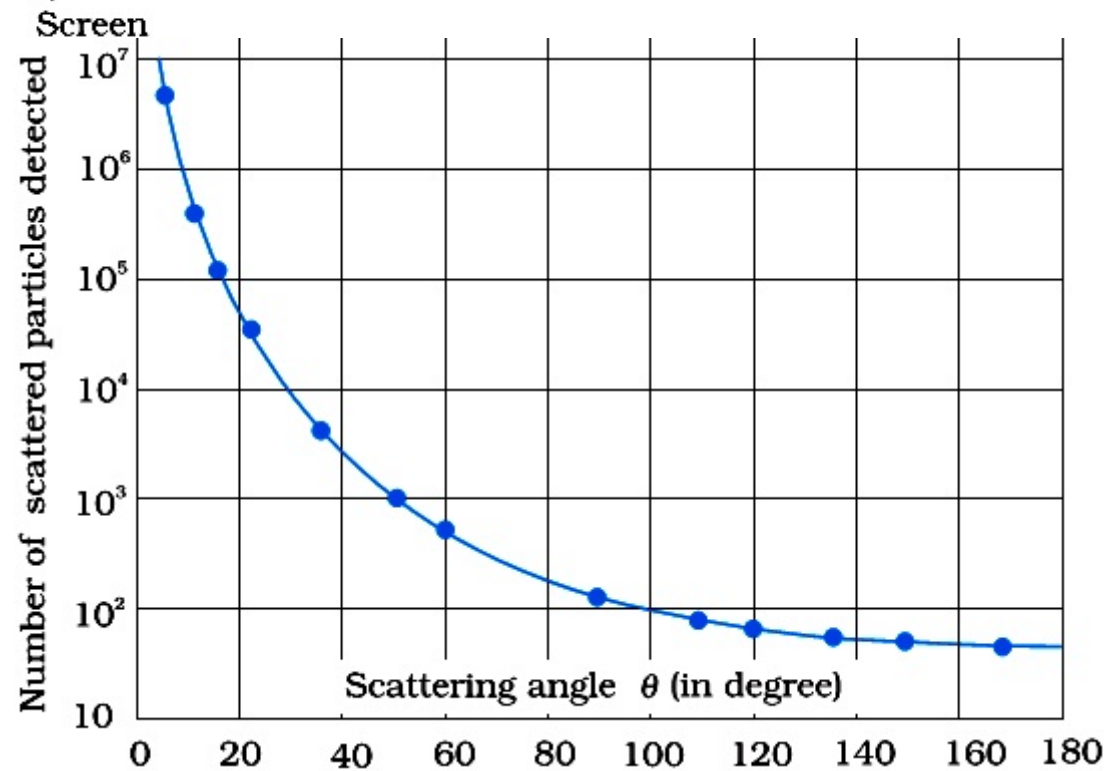


Rutherford Streuung



$$N \sim (\sin \theta/2)^4$$



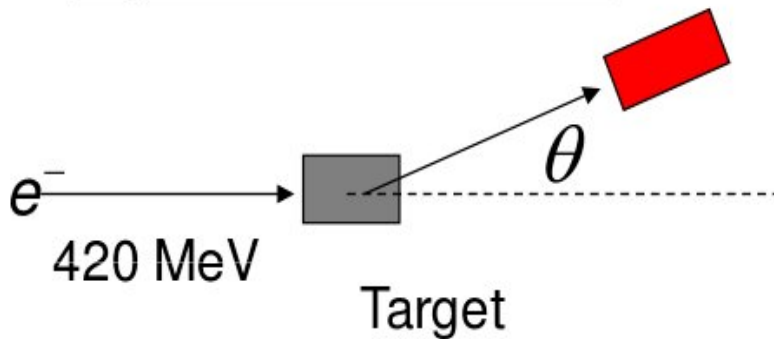
Messung des winkelabhängigen Wirkungsquerschnitts

$$\left(\frac{d\sigma}{d\Omega}\right)_{\text{exp}} = \left(\frac{d\sigma}{d\Omega}\right)_{\text{Mott}} \cdot \underbrace{|F(\vec{q}^2)|^2}_{\text{Fourier-Trf. der Ladungsverteilung}}$$

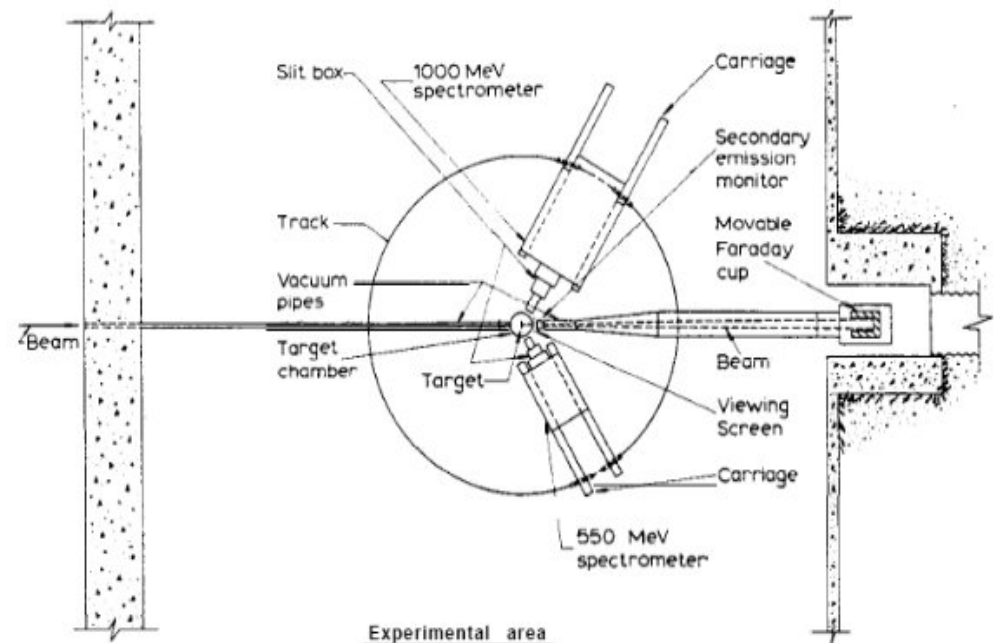
Fourier-Trf. der
Ladungsverteilung

Bei fester Energie der einfallenden Elektronen misst man für verschiedene Streuwinkel des Elektrons den WQ. Verschiedene Streuwinkel θ entsprechen verschiedenen q^2 Werten.

Experimenteller Aufbau



“Rutherford II”



R. Hofstadter, Stanford 1956/57

500 MeV Linearbeschleuniger

Nobelpreis 1961

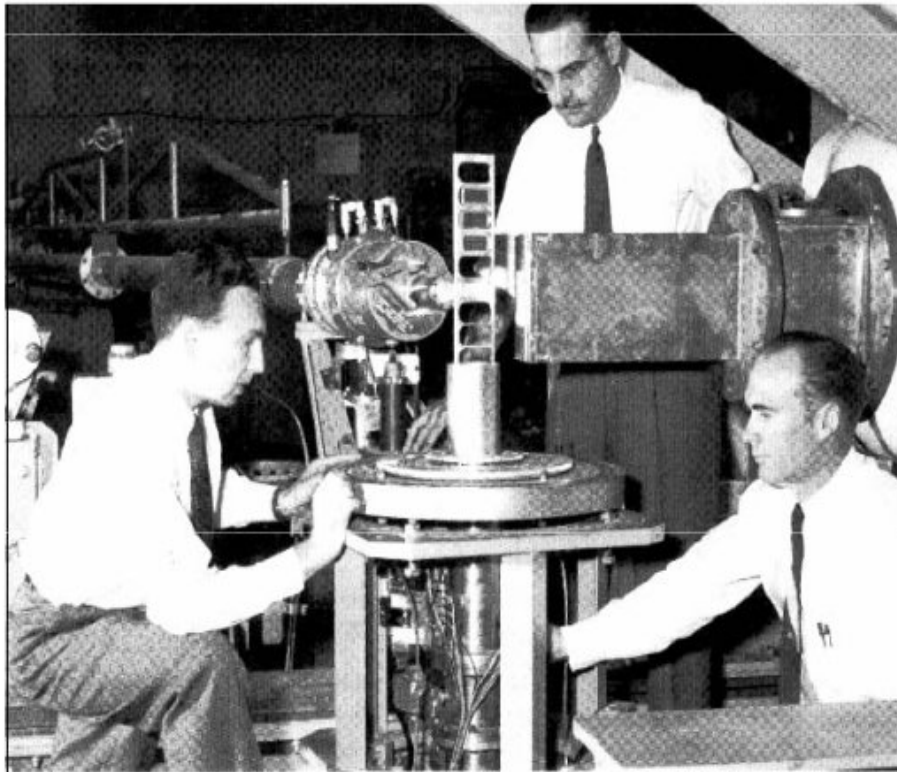
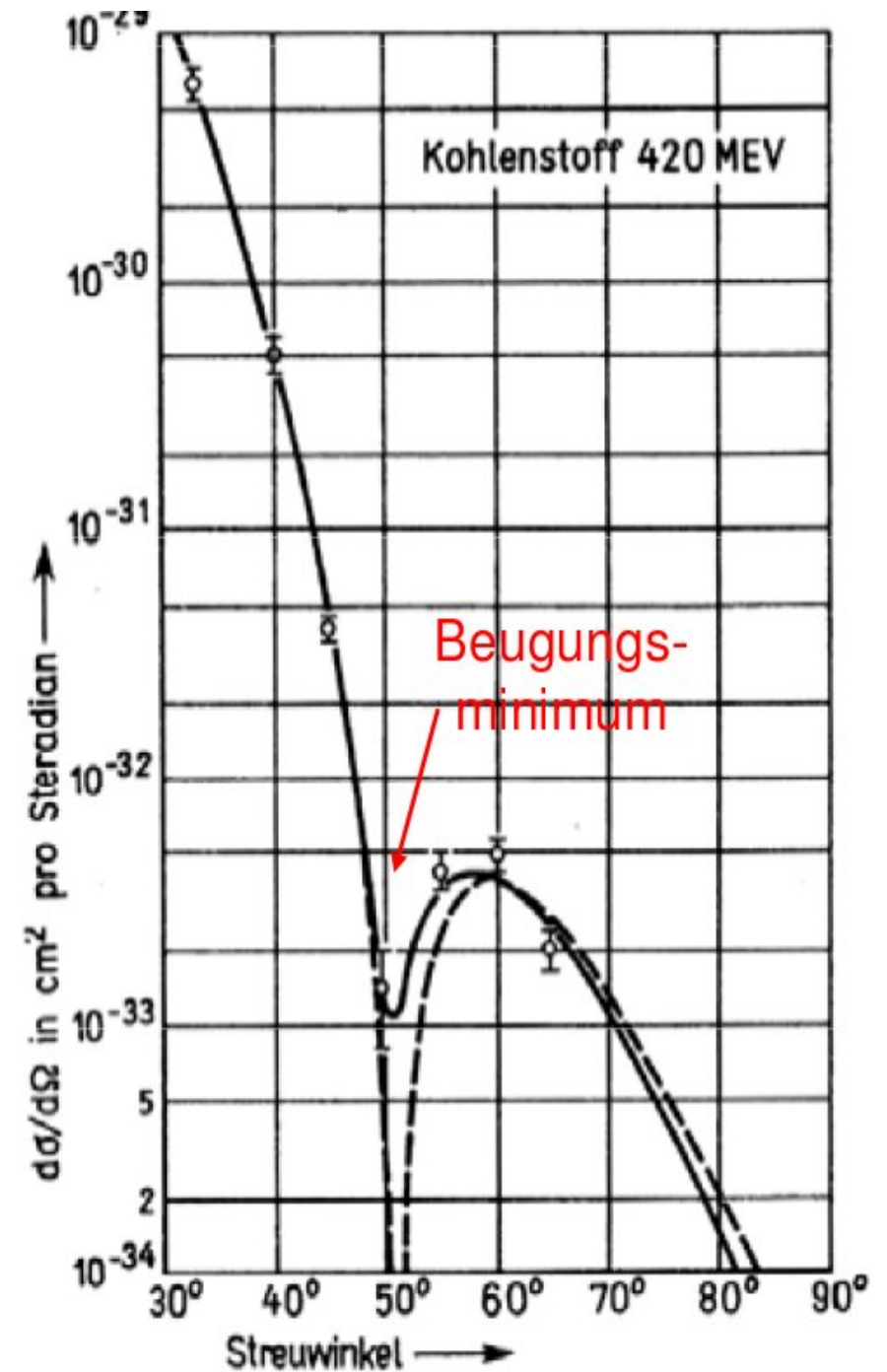
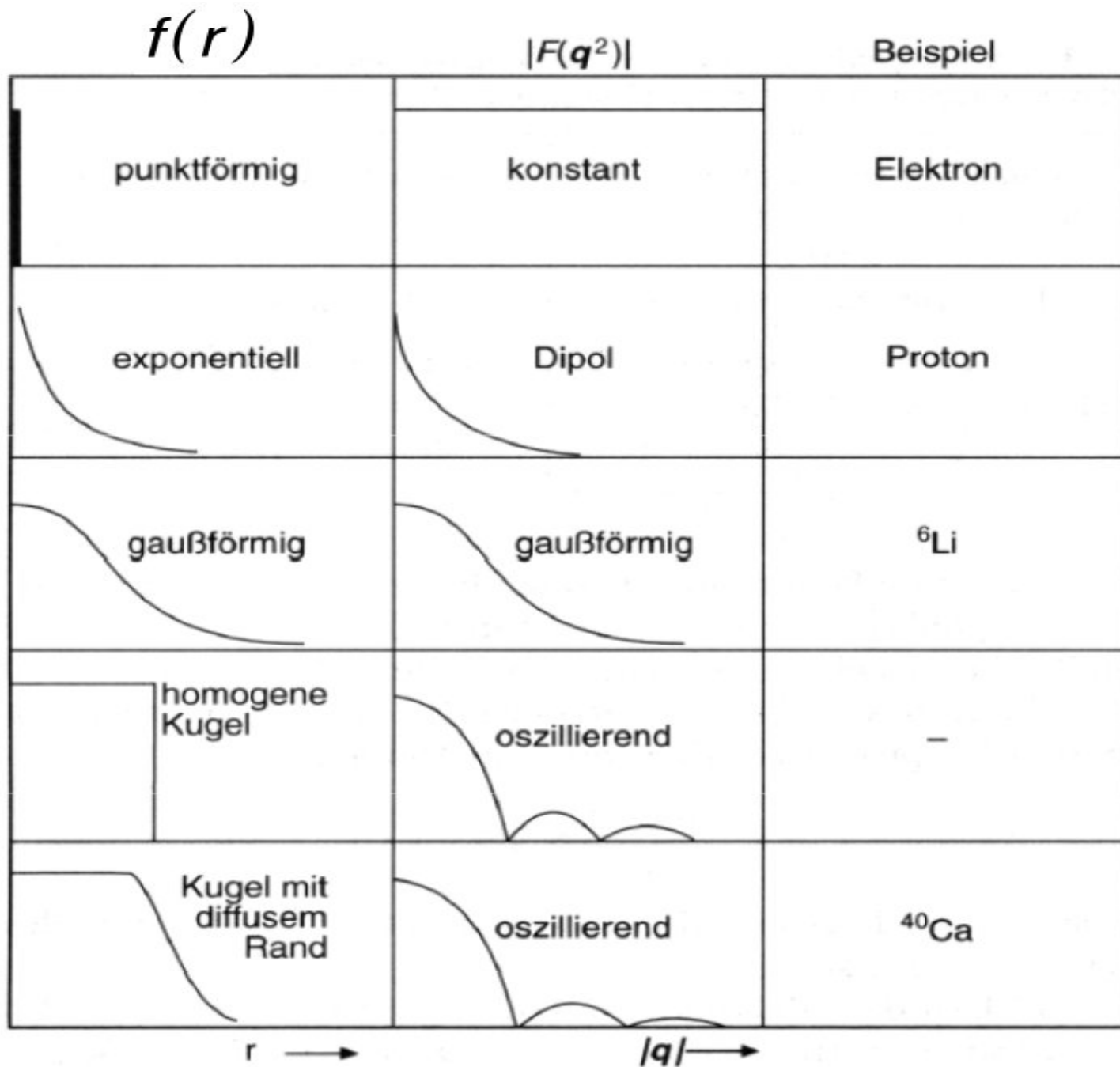


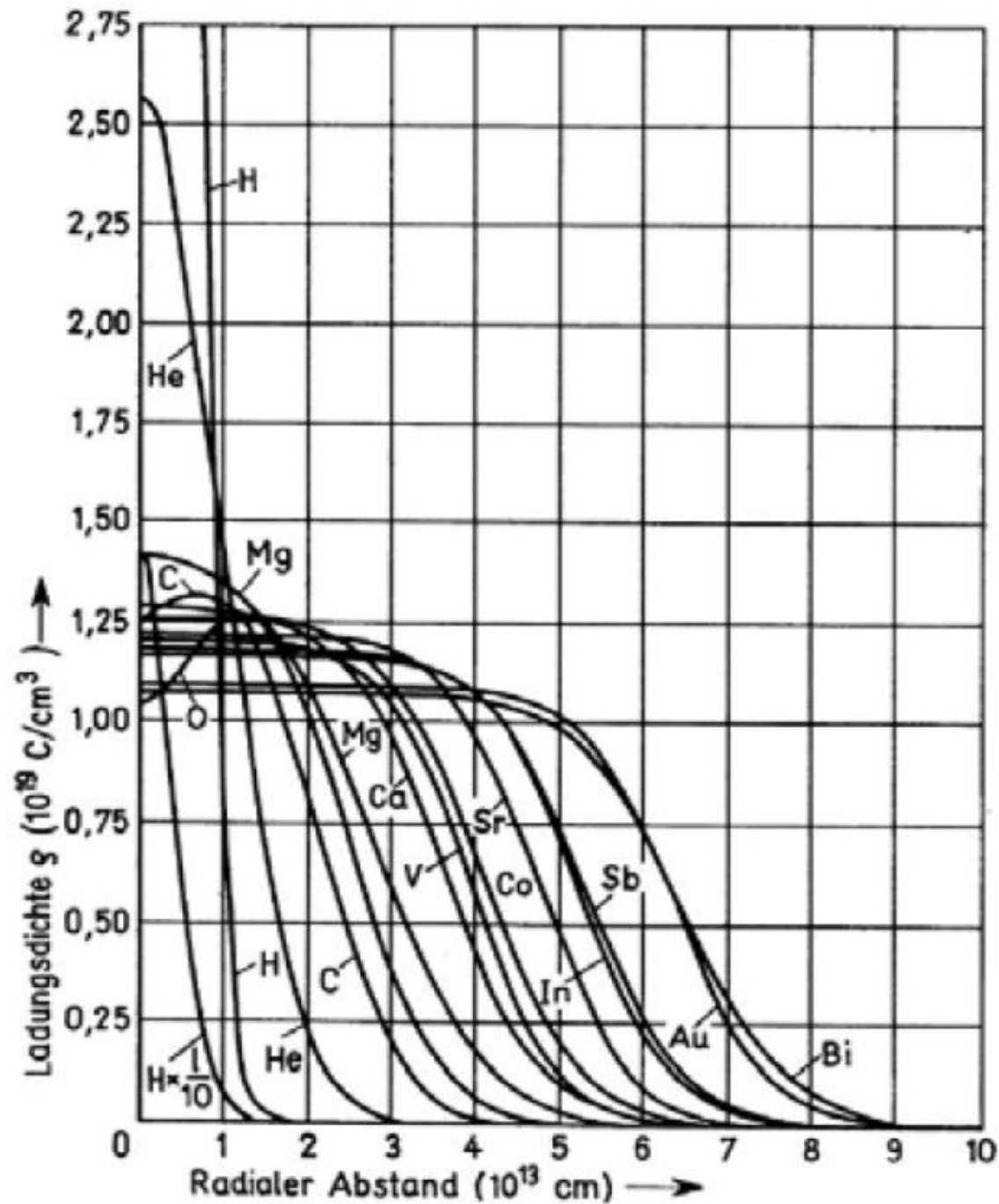
Abb. 3.3: Das Experiment von Robert Hofstadter (links) bei SLAC; neben ihm seine Kollegen Lance Rogers (oben) und Bud Bunkers (Foto SLAC).



Ladungsverteilung und zugehörige Formfaktoren



Gemessenen Ladungsverteilung von Kernen



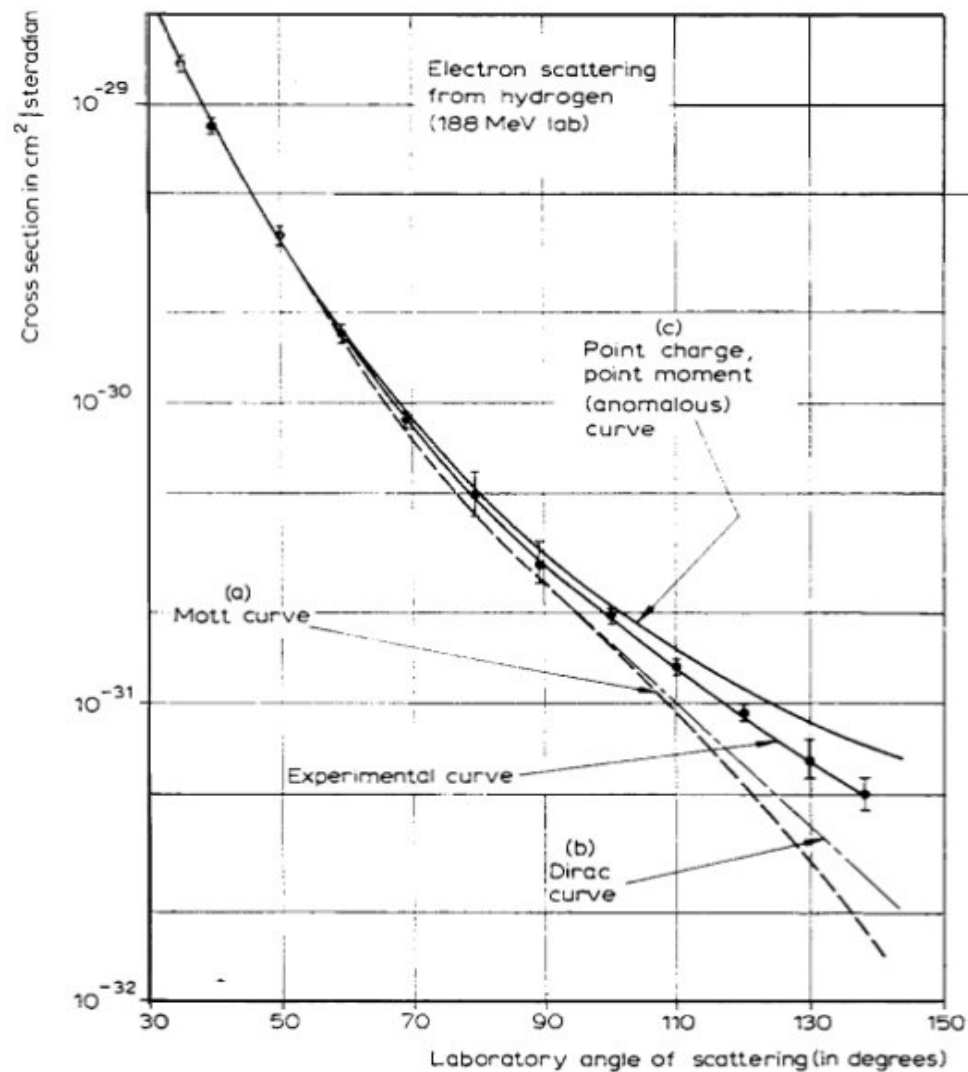


Fig. 9. Electron scattering from the proton at an incident energy of 188 MeV. Curve (a) shows the theoretical Mott curve for a spinless point proton. Curve (b) shows the theoretical curve for a point proton with a Dirac magnetic moment alone. Curve (c) shows the theoretical behavior of a point proton having the anomalous Pauli contribution in addition to the Dirac value of the magnetic moment. The deviation of the experimental curve from the Curve (c) represents the effect of form factors for the proton and indicates structure within the proton. The best fit in this figure indicates an rms radius close to $0.7 \cdot 10^{-13}$ cm.