Wave properties of neutrons, atoms and ions

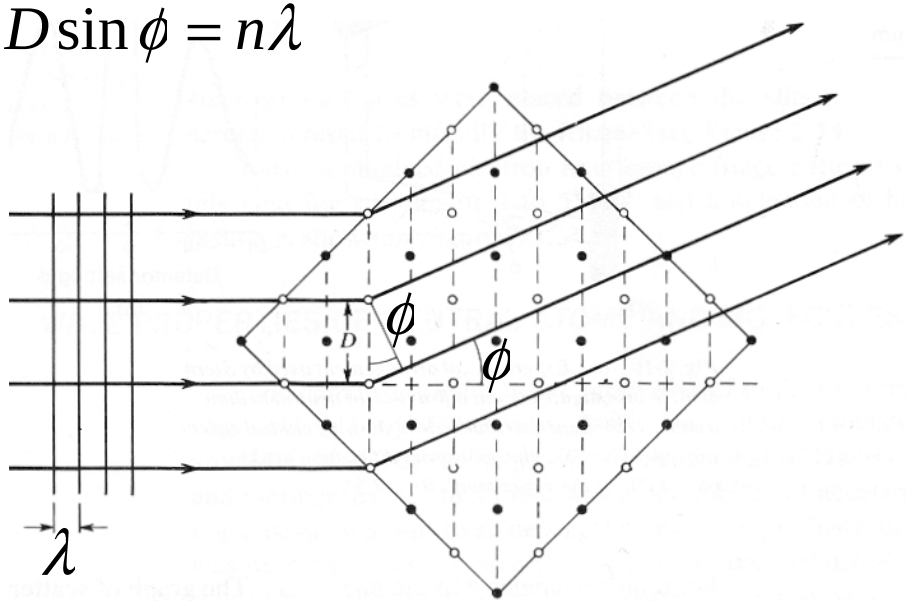
Stern and Estermann (1930)

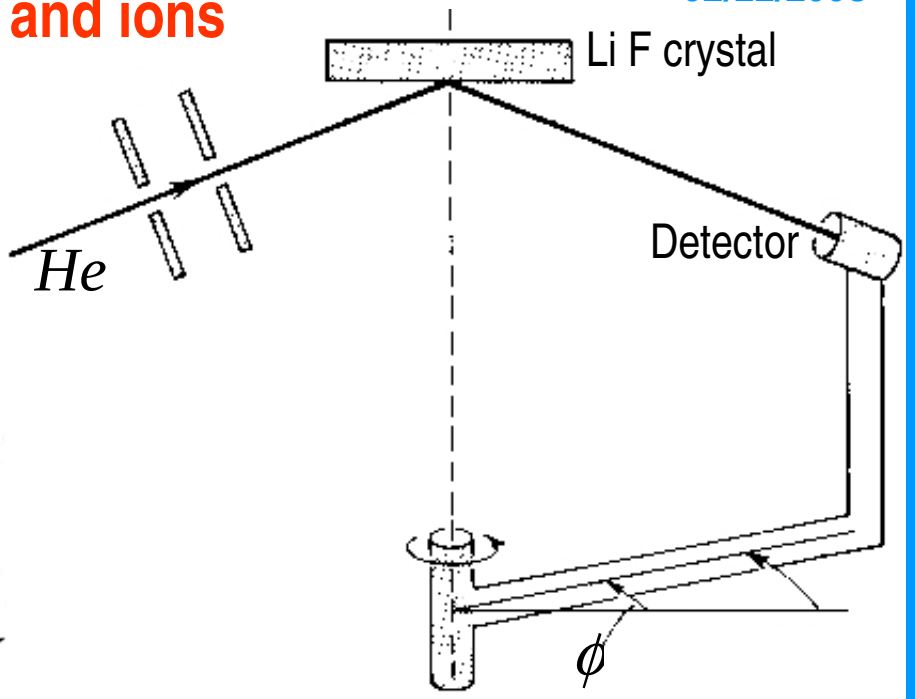
➔ Interference pattern for helium atoms.

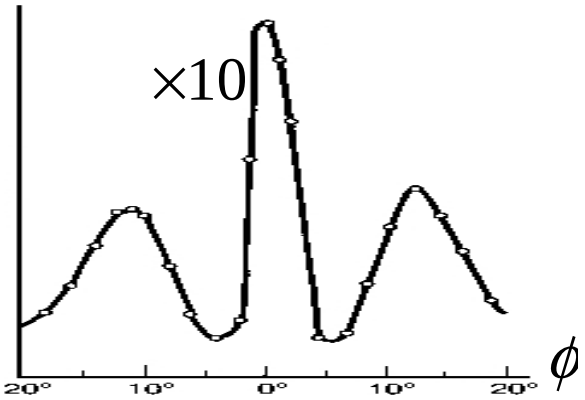
Similarly helium ions show interference.

Interference after reflection on a surface, top view:

$$D \sin\phi = n\lambda$$







T=300K, E=1/2 k T , λ=2.5A, 0.012eV

Neutrons, discovered in 1932, also show interference patters and can be used for diffraction experiments, for example in the new SNS laboratory in Tennessee.

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Spalation Neutrino Source – SNS Oak Ridge Tennessee

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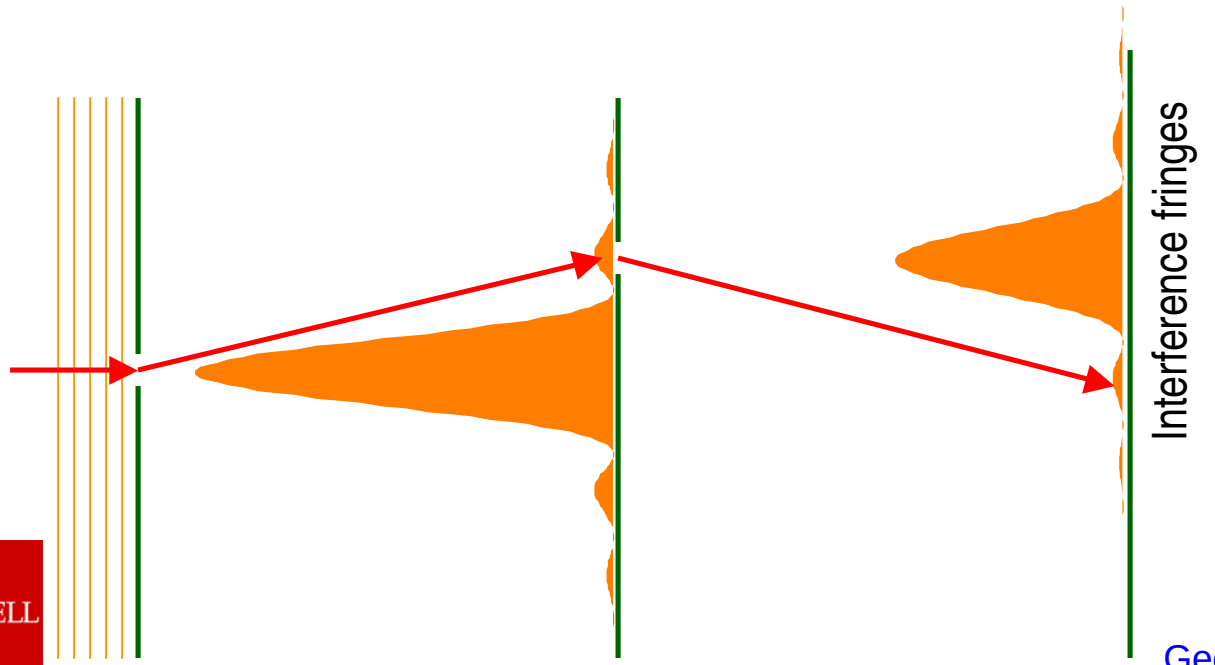
Non-particle like properties of photons

- Photons move into shadowed regions by defraction
- One cannot associate a field vector to an individual photon.
- Wave properties of light can only be found when very large numbers of photons are investigated.

Particle wave duality:

Wave properties are an expression of the probabilistic or statistical behavior of large numbers of identically prepared quantum particles.



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