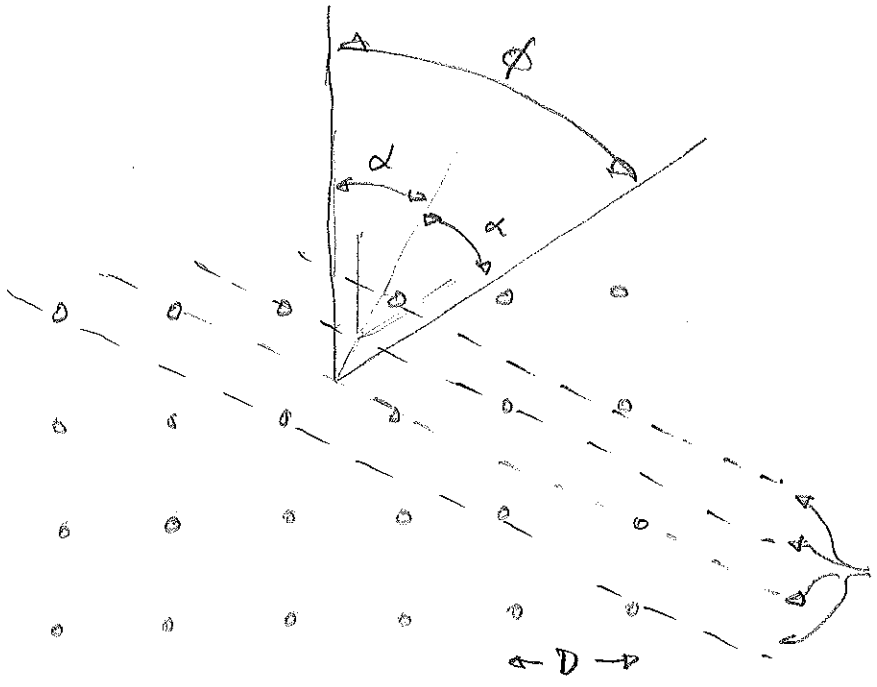
BRAGG DIFFRACTION

AN EFFECT KNOWN AS BRAGG-DIFFRACTION HAD BEEN USED TO STUDY X-RAYS (WAVES!) SINCE 1913.

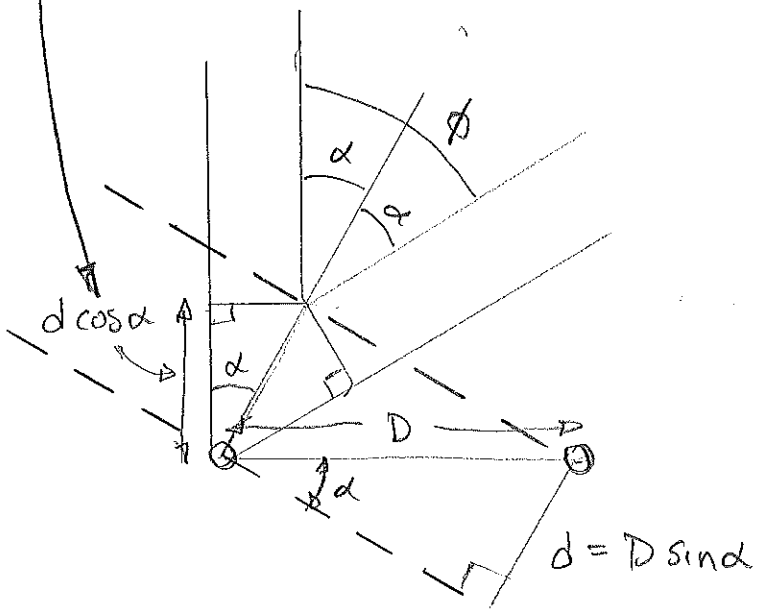


ONE POSSIBLE SET OF PLANES (OF MANY!)

WHAT IS THE CONDITION FOR CONSTRUCTIVE INTERFERENCE? ⇒ THE EXTRA PATH TRAVELED BY A WAVE SCATTERING FROM ONE PLANE MUST BE AN INTEGER NUMBER OF WAVELENGTHS COMPARED TO AN ADJACENT PLANE.

SO THE EXTRA PATH LENGTH IS $2d\cos\alpha$, AND IF THIS IS AN INTEGER NUMBER OF WAVELENGTHS WE WILL HAVE CONSTRUCTIVE INTERFERENCE:

$$n\lambda = 2d\cos\alpha$$



AND WE KNOW $d = D\sin\alpha$, SO

$$n\lambda = 2(D\sin\alpha)\cos\alpha = D\,2\sin\alpha\cos\alpha$$

$$= D\sin(2\alpha)$$

$$\boxed{n\lambda = D\sin\phi}$$

BRAGG'S LAW