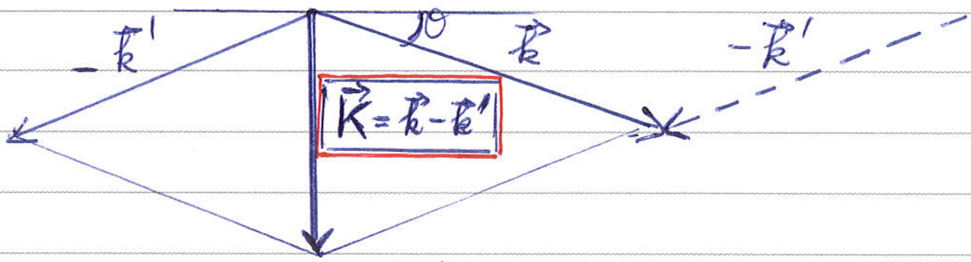
FROM VON LAUE TO BRAGG

DESCRIPTION OF THE CONDITION OF CONSTRUCTING INTERFERENCE

Consider $\vec{k}, \vec{k}'$ (IN, OUT)

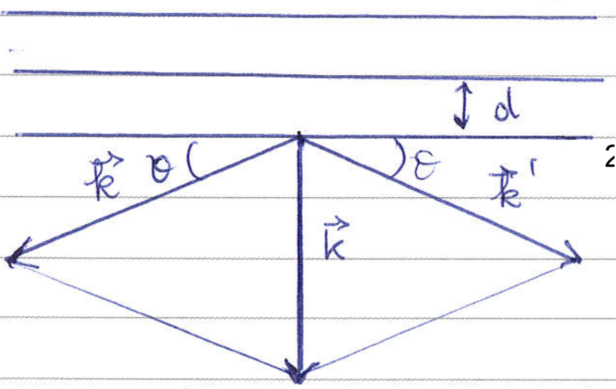
Draw $\vec{k}-\vec{k}'$, which according to the Von Laue condition, is $\vec{K}$; to do this, it is convenient to consider $\vec{k}+(-\vec{k}')$ translating $-\vec{k}'$ on the same origin of $\vec{k}$:



$\vec{K}$ defines a plane $\perp$ to it; let ϑ be the angle formed with this plane by the vector $\vec{k}$.

By construction: $\boxed{k \sin\vartheta = \frac{K}{2}}$ (★)

$\vec{K}$ (like any $\vec{K} \in$ reciprocal lattice) corresponds to a family of lattice planes $\perp \hat{n} = \vec{K}/K$ and equispaced by $\boxed{d = n\,\frac{2\pi}{K}}$ (★★) with n such that $\vec{K} = n\,\vec{K}^*$, $\vec{K}^*$ being the shortest vector $\vec{K}^* /\!/ \vec{K}$.



← This is therefore the family of lattice planes. Note that ϑ is also the incident angle of $\vec{k}$ w.r.t. those planes.

From ★ and ★★ $\Rightarrow$ $\frac{2\pi}{\lambda} \sin\vartheta = n\,\frac{2\pi}{2d}$ $\Rightarrow$ $\boxed{2d \sin\vartheta = n\lambda}$

which is the Bragg condition.