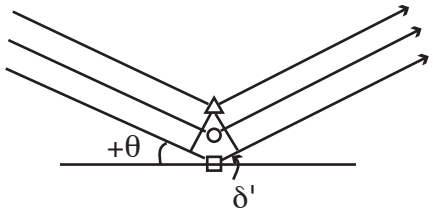
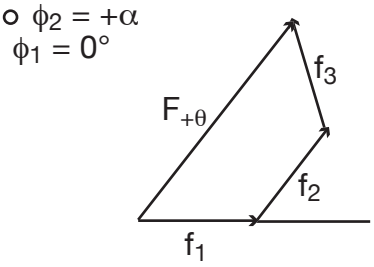
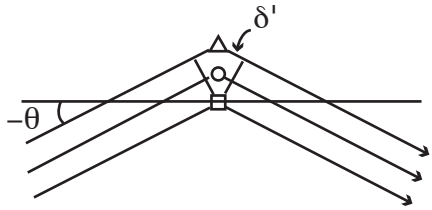
Now let us consider the phase relationships within each triatomic molecule of the crystal lattice on the last page. The geometry is the same for reflections from opposite sides of the crystal, except that for the +θ case the rays from the triangle and circle atoms are ahead of the reference ray (square atoms) and for the -θ case they are behind.

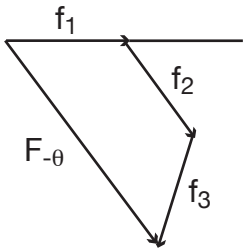


△ $\phi_3 = +\beta$
○ $\phi_2 = +\alpha$
□ $\phi_1 = 0°$



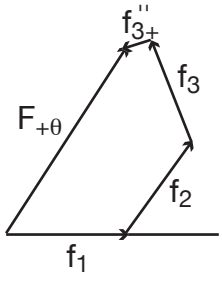


△ $\phi_3 = -\beta$
○ $\phi_2 = -\alpha$
□ $\phi_1 = 0°$

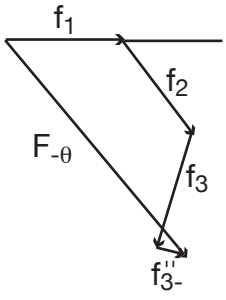


$|F(+\theta)| = |F(-\theta)|$ because the vector diagrams would superimpose if the -θ one were reflected up onto the +θ one; so the Friedel pair reflections have the same intensity. But suppose one of the atoms (say, the triangles) has anomalous scattering: then an f" term with a 90° phase advance is added onto its f vector. Now when we superimpose the two diagrams as at the right the f" parts do <u>not</u> fall on top of each other and $|F(+\theta)| < |F(-\theta)|$.

These intensity differences between $|F_{hk\ell}|^+$ and $|F_{hk\ell}|^-$ are small, but measurable.



△ $\phi_{3+} = +\beta$
△ $\phi''_{3+} = +\beta + 90°$



△ $\phi_{3-} = -\beta$
△ $\phi''_{3-} = -\beta + 90°$