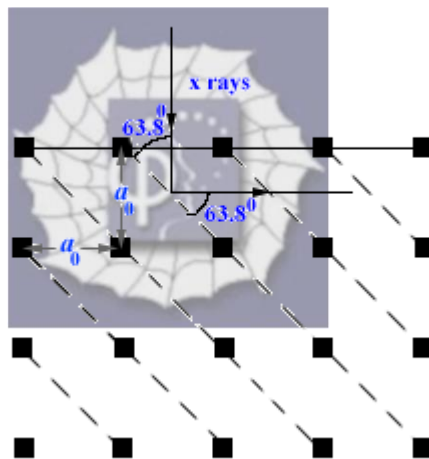


686.

**Problem 47.39 (RHK)**

*First-order Bragg reflection from a certain crystal occurs at an angle of  $63.8^\circ$ ; see the figure. The wavelength of the x rays is 0.261 nm. Assuming that the scattering is from the dashed planes shown, we have to find the unit cell size  $a_0$ .*



**Solution:**

From the lattice we note that the interplanar separation in terms of the unit cell size  $a_0$  will be

$$d = \frac{a_0}{\sqrt{2}}.$$

The angle of incidence is  $63.8^\circ$ . The wavelength of the x rays is 0.261 nm.

The Bragg equation is

$$2d \sin \theta = \lambda,$$

or

$$2 \times \frac{a_0}{\sqrt{2}} \times \sin 63.8^\circ = 0.261 \text{ nm},$$

$$\therefore a_0 = \frac{0.261 \text{ nm}}{\sqrt{2} \times \sin 63.8^\circ} = 0.206 \text{ nm}.$$

