PHY 491, Fall 2024 - Homework 7

DUE: Friday 10/18/24, 11:59pm

Problem 3.1 Powder samples A, B, C of three different monoatomic cubic crystals are analyzed with a Debye-Scherrer method using an x ray source of wavelength $\lambda = 1.540562A$. It is known that one sample is face-centered cubic, one is body-centered cubic, and one has the diamond structure. The approximate positions of the first four diffraction rings in each case are:

Table 1: Scattering angles 2Θ (angle between unscattered, transmitted beam and scattered beam) for samples A, B, C.

A	B	C
42.2°	28.8°	42.8°
49.2°	41.0°	73.2°
72.0°	50.8°	89.0°
87.3°	59.6°	115.0°

3.1.1 Identify the Bravais lattices of A, B, C. (14 points)

3.1.2 Calculate the lattice constants a for each structure. (6 points)