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Defect Concentration Dependence of Inhomogeneous Broadening in PAC Spectroscopy[1] MIKE ADAMS, AUSTIN BUNKER, JEFFERY HODGES, TYLER PARK, MICHAEL STUFFLEBEAM, WILLIAM EVENSON[2], PHIL MATHESON, Utah Valley University, MATTHEW ZACATE, Northern Kentucky University — Defects in crystals affect the electric field gradient (EFG) tensor components at radioactive probe nuclei. We consider the net EFG from a random distribution of vacancies combined with a single trapped vacancy in a near neighbor position. The net EFG perturbs angular correlation (PAC) and provides information about the concentration of vacancies. For various concentrations (.1 to 15 percent) we have simulated PAC spectra in simple cubic, body centered and face centered cubic crystal structures. Using the probability distributions we found for the EFG tensor components we reconstruct $G_2(t)$ for various defect concentrations. We take these reconstructions and compare them with the simulated $G_2(t)$ functions to check for self-consistency. We can then use the simulated probability distributions to examine the concentration dependence of experimental broadened PAC spectra. This work will be applied initially to broadened PAC data from β-Mn, Al-doped β-Mn, and Sr_2RuO_4.

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Phil Matheson
Utah Valley University

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