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Inhomogeneous Broadening in Perturbed Angular Correlation Spectroscopy[1] AUSTIN BUNKER, MIKE ADAMS, JEFFERY HODGES, TYLER PARK, MICHAEL STUFFLEBEAM, WILLIAM EVENSON[2], PHIL MATHESON, Utah Valley University, MATTHEW ZACATE, Northern Kentucky University — Our research concerns the effect of a static distribution of defects on the net electric field gradient (EFG) within crystal structures. Defects and vacancies perturb the distribution of gamma rays emitted from radioactive probe nuclei within the crystal. These defects and vacancies produce a net EFG at the site of the probe which causes the magnetic quadrupole moment of the nucleus of the probe to precess about the EFG. The net EFG, which is strongly dependent upon the defect concentration, perturbs the angular correlation (PAC) of the gamma rays, and is seen in the damping of the perturbation function, $G_2(t)$, in time and broadening of the spectral peaks in the Fourier transform. We have used computer simulations to study the probability distribution of EFG tensor components in order to uncover the concentration dependence of $G_2(t)$. This in turn can be used to analyze experimental PAC data and quantitatively describe properties of the crystal.

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