Abstract Submitted
for the 4CF14 Meeting of
The American Physical Society

Unavoidable Asymmetries in Distributions of Electric Field Gradients FRANK SULLIVAN, PHIL MATHESON, Utah Valley University, WILLIAM E. EVENSON[1], Retired — Evenson, et. al. [1] have addressed topologically appropriate coordinates for probability distribution functions (PDFs) used to describe electric field gradients (EFGs) in solid materials. In many situations of interest, such as Perturbed Angular Correlation (PAC) studies, the distribution of material defects that give rise to EFGs are nearly amorphous. Czjzek, et al. [2] provided a theoretical foundation for such a distribution of EFGs in an amorphous solid. However, most applications of his work seem to ignore the inherent asymmetry of the PDF that must arise from nearest neighbor defects in real materials, whether or not that material is amorphous. Such asymmetries may make it difficult or impossible to remove correlations between EFG components, thwarting attempts to find separable, independent PDFs such as are used to explore hyperfine phenomena. We use Evenson's parameterization of the EFG coordinates to study the asymmetries introduced into the PDFs of cubic materials, looking to see how strongly these asymmetries affect attempts to find separable PDFs for use in characterizing PAC spectra.

[1] William E. Evenson, et. al., *Topologically appropriate coordinates for (V_{zz}, η) joint probability distributions*, in preparation.
[2] G. Czjzek, et al., *Atomic coordination and the distribution of electric field gradients in amorphous solids*, Phys. Rev. B, vol. 23, (6), 15 Mar. 1981.

[1]Professor Emeritus Brigham Young University, Professor Emeritus, Utah Valley University

Phil Matheson
Utah Valley University

Date submitted: 10 Sep 2014 Electronic form version 1.4