Abstract Submitted
for the DFD06 Meeting of
The American Physical Society

**Temporal Evolution of Particle Clustering in Isotropic Turbulence** LUJIE CAO, JEREMY DE JONG, JUAN SALAZAR, LANCE COLLINS, SCOTT WOODWARD, HUI MENG — The particle radial distribution function (RDF) has been identified as a key variable for quantifying the effect of clustering on binary processes such as collision. Measurements of the RDF are best done in three dimensions (Holtzer & Collins 2002), hence most results to date come from direct numerical simulations at modest Reynolds numbers. To complement our DNS database, we apply digital holographic particle image velocimetry (DHPIV) to perform three-dimensional measurements of particle clustering in nearly homogeneous isotropic turbulence in a box. The turbulence corresponding to different fan speeds has been characterized using particle image velocimetry (PIV), and the turbulent energy dissipation rate was obtained from a fit of the second-order structure function. Metal-coated hollow glass spheres with a well defined particle size distribution were injected and three-dimensional DHPIV snapshots were obtained and analyzed. The three-dimensional RDF was observed to increase with time from injection. By phase averaging the measurements based on the time from injection, it was possible to semi-quantitatively measure the temporal evolution of the RDF. This is believed to be an important feature of the RDF in practical industrial applications (e.g., powder manufacturing) and naturally occurring flows (e.g., cloud droplets), where temporal dynamics may result from changes in the local conditions and/or droplet coalescence (Reade & Collins 2000).

Jeremy de Jong
University of Buffalo

Date submitted: 04 Aug 2006 Electronic form version 1.4