Abstract Submitted
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Measurements of Grain Motion in a Bubbling Fluidized Granular bed[1] CHAO HUAN, KEVIN FACTO, DONALD CANDELA, University of Massachusetts, Amherst, RONALD WALSWORTH, ROSS MAIR, Harvard-Smithsonian CFA — The fluctuating motions of grains in a bubbling gas-fluidized granular bed are measured using NMR. Most experimental results, including ours, indicate that a gas-fluidized granular bed is only truly fluid in the bubbling state which occurs at high gas flow rates. In this state large grain-free voids (bubbles) rise through the bed and activate motion at smaller scales throughout the rest of the bed, which remains dense. Thus the fluidized bed is an inherently complex, multi-scale granular flow state. Using NMR we are able to measure the distributions of horizontal and vertical grain motions over time scales from one to several hundred milliseconds, and also to probe correlations of the motion over successive time intervals. As a function of observation time crossovers are observed that appear to delineate grain-scale diffusion as well as coherent and stochastic convection of the granular fluid.

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