Is random close packing of beads well defined? FRANK RIETZ, University Magdeburg, CHARLES RADIN, HARRY L. SWINNEY, UT Austin, MATTHIAS SCHROETER, Max-Planck-Institute Goettingen — The name random close packing refers to the experimental observation that some ways of packing of monodisperse beads (like vertical vibration or sedimentation) can't exceed a volume fraction of $\approx 64\%$. There are several competing theories for this phenomenon [1-3]. However, it is possible to surpass the random close packing limit by cyclic shearing [4]. We investigate the three-dimensional distribution of particles in such a shear cell. Index matching of the surrounding liquid provides access to the interior of the granular bed. A laser sheet is scanned through the sample and by adding a fluorescent dye to the liquid we can determine the particle positions. The experiment starts at packing fractions well below random close packing. After a few thousand cycles packing fractions above 64% are achieved. By determination of Voronoi cells we characterize the local packing densities and measure order parameters around the onset of random close packing. This allows us to comment on the question if random close packing is well defined. [1] Torquato; Phys. Rev. Lett. 84, 2064 (2000). [2] Kamien; Phys. Rev. Lett. 99, 155501 (2007). [3] Radin; J. Stat. Phys. 131, 567 (2008). [4] Nicolas; Eur. Phys. J. E 3, 309 (2000).

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