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Measurements of contact forces at the bottom of a droplet pile HAO WANG, Department of Physics, University of Massachusetts Amherst, T. PRISK, J. ZHOU, A. DINSMORE — We measure the contact forces at the bottom of a container of frictionless liquid droplets as a function of compression and of distance to the container wall. Glass cylinders are used to contain 20-micron-radius droplets of silicon oil; Brownian motion is not significant for this size. Reflection interference contrast microscopy is used since we are particularly interested in contacts with the bottom surface. By looking at the Newton's Ring interference pattern, we measure the deformation of each droplet, which arises from gravity and pressure from the whole pile transmitted through droplet contacts. We also measure the radius of each droplet and thereby obtain the vertical contact force. We vary the pile height to change the compressive stress and then measure the corresponding forces, probability distributions, and correlations of rearrangements. The results elucidate the roles that friction and confining walls play in granular systems and also shed light on force chains in bulk of the material.

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