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Controlling the shear profile of highly strained granular materials JONATHAN BARES, BOB BEHRINGER, Duke University — Bi et al. (Nature 2011) have shown that, if sheared, a granular material can jam even if its packing fraction (ϕ) is lower than the critical isotropic jamming point ϕ_J. They have introduced a new critical packing fraction value ϕ_S such that for ϕ_S¡ϕ¡ϕ_J the system jams if sheared. Nevertheless, the value of ϕ_S as a function of the shear profile or the strain necessary to observe jamming remain poorly understood because of the experimental complexity to access high strain without the formation of shear bands. We present a novel 2D periodic shear apparatus made of 21 independent, aligned and mirrored glass rings. Each of ring can be moved independently which permits us to impose any desired shear profile. The circular geometry allows access to any strain value. The forces between grains are measured using reflective photoelasticity. This talk will present this novel apparatus and discuss the effect of the shear profile and shear amplitude on the jamming transition.

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