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The packing and compaction dynamics of granular polymers LING-NAN ZOU, XIANG CHENG, HEINRICH JAEGER, SIDNEY NAGEL, The James Franck Insitute, The University of Chicago — While the packing of hard spheres has been the subject of intense research, the packing of objects with reduced symmetries is far less well-studied, both experimentally and theoretically. Here, we report an experimental study on the packing of a granular polymer analogue — chains of hollow, spherical brass beads, 1.9 mm in diameter, ranging in length from a 1 to 42 700 beads per chain. In particular, we systematically measure the density ρ of the bead-chain pack as a function of the number of beads per chain M (*i.e.* the molecular weight of the granular polymer). The density decreases from the random close packed density $\rho_{RCP} \approx 0.64$ for single beads to an asymptotic density $\rho_\infty \approx 0.39$ in the limit of very long chains; the form of the density fall-off is rather slow, the effect is noticeable even when M is much larger than the chain persistence length. In terms of dynamics, the compaction of bead-chain packs appears to obey the same logarithmic relaxation form found in the compaction of single bead packs [1], but with a puzzling, M-dependent sensitivity to initial conditions. We shall discuss these results in the context of, and attempt to make connections to, the packing of single hard spheres on one hand and the physics of polymer melts on the other. [1] J. B. Knight *et al.*, Phys. Rev. E **51**, 3957 - 3963 (1995).

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