Supplementary Information

1 Determination of persistence length of the chains

Persistence length is the length scale over which the correlation of tangent angle along the chain length decays. It is defined as

$$\langle cos(\theta_2 - \theta_1)\rangle = exp(-d/\xi_p) \tag{1}$$

where $\theta_2 - \theta_1$ is the angle between any two adjacent links of the chain, d is the sphere diameter, ξ_p is the persistence length and $\langle ... \rangle$ denotes average over all possible configurations [1]. We measure the angles between two consecutive links in the smallest possible loop formed by closing the chain on itself in the form of a ring (Fig. 1a of main text). We find that the maximum among these angles, θ_{max}, is equal to 41.1^0. Assuming that the angle between adjacent links i.e. $(\theta_2 - \theta_1)$ is uniformly distributed between $-\theta_{max}$ to θ_{max} when all possible configurations of the chains are sampled, we get $\langle cos(\theta_2 - \theta_1)\rangle = 0.92$ and $\xi_p = 11.47d = 22.94mm$. The number of spheres contained within a single persistence length in our experiments is $N_p \approx 8$.

2 Packing of granular chains

Packing of granular chains was characterised by pouring a fixed mass of 1.78 Kg of chains of any given length into a cylinder attached to a vertical vibration set-up. The cylinder is vibrated vertically, which is equivalent to mechanical tapping, for 30 mins. Post this, the final volume fraction is measured. The volume fraction decreases with increase in chain length, consistent with previous studies [2] (Fig. S1). Shorter chain lengths equilibrate close to a volume fraction of 0.64 which corresponds to the random close packing of spheres.

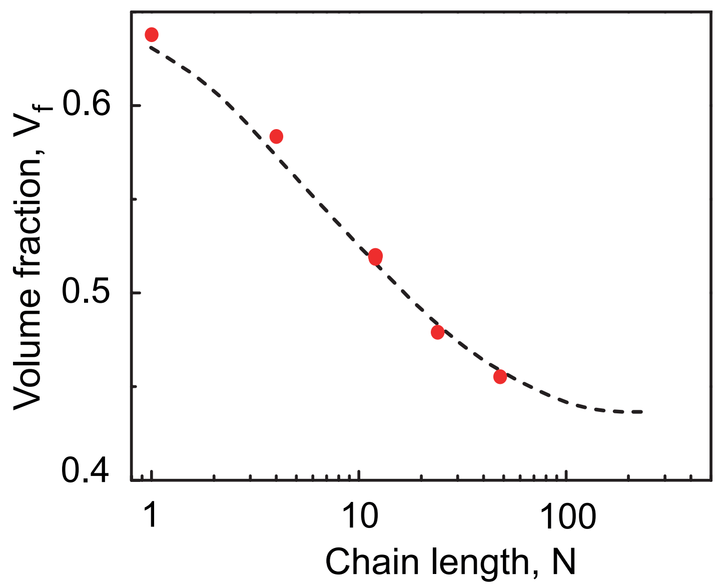

Figure 1: Volume fraction (red circles) of granular chains, post mechanical tapping, as function of chain length. The dotted line is interpolated data of [1].

3 Comparison between experimental data and theoretical predictions of critical heights

We define $\alpha_D = \frac{H_{cr}}{E^{\frac{1}{3}}}$ to compare predictions from Euler buckling instability and experimental data.

α_{D1}/α_{D2}	**N=12 (expt.)**	**N=12 (theory)**	**N=24 (expt.)**	**N=24 (theory)**	**N=48 (expt.)**	**N=48 (theory)**
$\alpha_{60mm}/\alpha_{30mm}$	2.63 ±0.41	1.55	2.05 ±0.56	1.55	1.88 ±0.16	1.59
$\alpha_{30mm}/\alpha_{22mm}$	1.37 ±0.13	1.26	1.57 ±0.18	1.26	1.56 ±0.15	1.25
$\alpha_{60mm}/\alpha_{22mm}$	3.61 ±0.57	1.94	3.22 ±2.13	1.96	2.93 ±0.21	1.96

4 Movie captions

Movie S1. This movie shows deposition of granular chains of length $N = 48$ through a cylinder of diameter $D = 22mm$. Scale bar, $1cm$. Deposition is done for a total fixed mass of chains, $1.2\,Kg$. The cylinder is pulled at speed of $\approx 1\,mm/s$. A conical pile is formed though repeated buckling of exposed chain column.

Movie S2. This movie shows deposition of granular chains of length $N = 48$ through a cylinder of diameter $D = 60mm$. Scale bar $1cm$. Deposition is done for a total fixed mass of chains, $1.2\,Kg$. The cylinder is pulled at speed of $\approx 1\,mm/s$. The exposed chain column remains stable throughout the process and final shape of the pile is a column.

Movie S3. This movie shows flow field, calculated using particle image velocimetry, during deposition of chains of length $N = 48$ through a cylinder of diameter $D = 60mm$. Scale bar, $1cm$. Deposition is done for a total fixed mass of chains, $1.2\,Kg$. The cylinder is pulled at speed of $\approx 1\,mm/s$. There is complete absence of surface flows during the entire deposition process.

Movie S4. This movie shows flow field, calculated using particle image velocimetry, during deposition of chains of length $N = 48$ through a cylinder of diameter $D = 22mm$. Scale bar, $1cm$. Deposition is done for a total fixed mass of chains, $1.2\,Kg$. The cylinder is pulled at speed of $\approx 1\,mm/s$. Unsteady surface flows occur on the surface of exposed column as its height approaches a critical height above which buckling takes place followed by column collapse event.

Movie S5. This movie shows flow fields, calculated using particle image velocimetry, during deposition of chains of length $N = 4$ through cylinders of diameters $D = 22mm$ and $D = 60mm$. Scale bar, $1cm$. Both depositions used the same total fixed mass of chains of $1.2\,Kg$. The cylinder is pulled at speed of $\approx 1\,mm/s$. Uniform surface flows are evident throughout the deposition process.

Movie S6. This movie shows deposition of granular chains of length $N = 24$ through a cylinder of diameter $D = 30mm$ for two different initial aspect ratios. Scale bar, $1cm$. The cylinder is pulled at speed of $\approx 1\,mm/s$. The initial aspect ratio was varied by filling different total mass of the chains into the cylinder. Lower aspect ratio results in a stable column and higher aspect ratio results in a conical pile.

References

[1] Kevin Safford, Yacov Kantor, Mehran Kardar, and Arshad Kudrolli, Physical Review E, **79**, 408 (2009).

[2] Ling-Nan Zou, X. Cheng, M. L. Rivers, H. M. Jaeger, and S. R. Nagel, Science, **326**, 408 (2009).