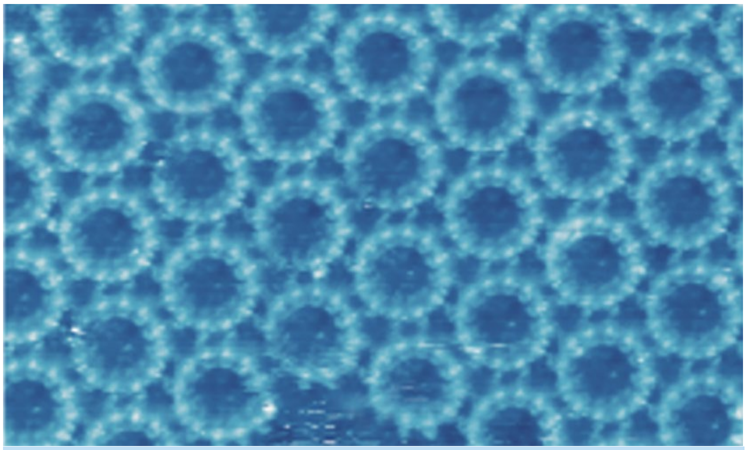
*Nature Reviews Physics* | https://doi.org/10.1038/s42254-019-0092-9 | Published online: 22 July 2019





SOFT MATTER

# A pack of rings

Understanding how to pack regular objects in a volume is not only useful for stacking oranges on a greengrocer's shelf, it is also important for problems from crystallography to self-assembly. Packing is not a simple problem to solve, and if the objects are deformable it becomes even more complicated. Two recent papers demonstrate the importance of deformations for how particles pack and how their packed configurations slowly evolve.

Writing in *Nature Communications*, Alex Summerfield and co-workers report experiments on 10-sided and 12-sided polymer nanorings, showing that the way deformable rings pack depends on the symmetry of the rings themselves. The rings are deposited in monolayers on flat substrates. Because they are made from a small number of monomers, the rings are not exactly circular. Rings with 12 monomers have six-fold symmetry, and readily pack into hexagonal arrays (pictured). However, rings with 10 monomers have an internal symmetry that is incompatible with the hexagonal close pack array, and struggle to form a stable packing. They form small domains of rhombic ordering, and the rings themselves are substantially deformed.

Writing in *Nature Physics*, Nicoletta Gnan and Emanuela Zaccarelli report simulations of the dynamics of deformable elastic rings that are randomly packed at different densities. The configuration of the rings rearranges slower as the rings are packed more closely, but dynamics speed up again above a packing fraction of around 0.9. This speed-up happens because stresses build up and are released by deforming rings, in turn triggering other rings to move. These results help clarify earlier experiments on colloidal glasses that showed that how soft the colloids are determines how their slow dynamics depend on how tightly packed they are.

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**ORIGINAL ARTICLE** Summerfield, A. et al. Ordering, flexibility and frustration in arrays of porphyrin nanorings. *Nat. Commun.* **10**, 2932 (2019)
**FURTHER READING** Gnan, N. & Zaccarelli, E. The microscopic role of deformation in the dynamics of soft colloids. *Nat. Phys.* **15**, 683–688 (2019)