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Folding and buckling pathways in spherical shells with soft spots JAYSON PAULOSE, Harvard School of Engineering and Applied Sciences, Cambridge, MA 02138, DAVID NELSON, Department of Physics, Harvard University, Cambridge, MA 02138 — Thin elastic spherical shells subject to an external pressure undergo a buckling transition when the pressure reaches a critical value. Past the buckling instability, the shell typically takes on a shape with one or more inversions that focus the elastic deformation energy within narrow circular regions on the sphere. These inversions are associated with large volume changes and hysteresis, and their location is highly sensitive to very slight imperfections in the sphere. Recently, it has been demonstrated [1] that natural pollen grains have evolved soft sectors in their hard outer walls which guide them toward particular folding pathways when their internal volume is reduced due to dessication, thus avoiding sudden and uncontrolled changes in shape. Motivated by these results, we study the effect of circular soft spots on the buckling of otherwise uniform spherical shells. Through a combination of scaling arguments and numerical simulations, we demonstrate that the shell can be tuned to follow distinct buckling pathways by varying the size and stiffness of the soft spot. [1] E. Katifori *et al*, *Proc. Natl. Acad. Sci. USA* **107**, 7635 (2010)

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