to generate so-called Weyl orbits (Fig. 1). These orbits have very interesting physical consequences, which could be viewed as 'smoking gun' evidence for electron transport in Weyl or Dirac semimetal phases.

As time is needed for an electron to travel through the sample from the top to bottom surfaces, the SdH frequency related to the surface should depend on the thickness of the sample. To confirm that this is the case, Moll *et al.* provide two pieces of evidence. The first is the dependence of the relative ratio between the amplitudes of two different quantum oscillations on sample thickness. They found that this ratio depends exponentially on the thickness; this is consistent with the behaviour of Weyl obits, which become more and more fragile under impurity scattering as the thickness increases.

The second piece of evidence comes from the behaviour of samples with different shapes. Moll *et al.* successfully fabricated samples with two different shapes: rectangular and triangular. As expected, transport experiments show that the quantum oscillations can only be detected in the rectangular samples as Weyl orbits are formed in the triangular samples with different frequencies at different thicknesses, which leads to destructive interference of the quantum oscillations.

Although many questions about Weyl orbits still remain, these results can be viewed as the first substantial evidence for their formation. But this is surely just the beginning. What types of state will be found in the strong magnetic field limit? Will there be quantum Hall effects from the surface and bulk states in the intermediate regime? Is there a surface contribution to the chiral anomaly — an effect related to charge pumping between Weyl nodes with opposite chiralities? This is new territory for condensed-matter physics, and could provide fascinating potential applications in the future. ❐

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BIO-INSPIRED MATERIALS

Drop and fold

The botanical world provides plenty of inspiration for materials scientists. Copying the structure of lotus leaves, for example, has led to a whole range of superhydrophobic materials with self-cleaning capabilities. Mimicking the curious behaviour of *Mimosa pudica* (pictured) is another challenge: the leaflets of its compound leaf quickly fold inwards when subjected to an external stimulus (touching, for example). William Wong and colleagues have now succeeded in fabricating a structure that exhibits similar stimulated folding and call the feat "mimosa origami" (*Sci. Adv.* **2,** e1600417; 2016).

The core component of their bio-inspired material is a two-layer system: a thin film of a polycaprolactone (PCL) nanofibre network stuck (via van der Waals adhesion) to a layer of polyvinyl chloride (PVC) microfibres. The PCL network structure is very wettable, whereas the PVC layer is superhydrophobic. Because of the contrasting wettabilities, the structure is an example of a Janus bilayer. The PVC component is extremely flexible and elastic, properties that provide the required deformability of the mimosa origami structure — a dynamic stress–strain analysis of the bilayer confirmed its rubbery nature. Wong and colleagues placed the completed stack, with the PVC layer at the bottom, on a substrate (also made from polymers) to avoid wrinkling within the bilayer.


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Putting a water drop on the PCL side of the bilayer stimulated an elastocapillary response: after a few tens of milliseconds, a bulb containing the drop formed. The key ingredient needed for this to happen is sufficient surface energy density — requiring a certain surface roughness — to overcome the bending rigidity.

The authors then exploited the effect to realize the controlled self-organization of their Janus bilayer into particular three-dimensional structures. For example, a rectangular strip of the material with a circular termination developed into a microchannel when a water droplet was placed on the termination. An average folding velocity of 2.5 cm s^{-1} was obtained for a strip length of 6.5 cm — similar to the leaflet-closing speeds observed for *M. pudica*.

The folding process could be reversed: a drop of ethanol induced the unfolded state (by restoring the initial surface equilibrium). Furthermore, the authors were able to derive an estimate for the minimal critical strip width required for activating the origami process — elastocapillary length, characteristic contact angle and roughness all enter the equation.

Quite fittingly, perhaps, the macroscopic scale and directionality offered by mimosa origami provides a new stimulus for the engineering of stimuli-responsive materials.

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