orientation of the coronal magnetic field during the course of a 'confined' flare that occurred on 17 August 2011 — 'confined' here means that the flare did not eject material into interplanetary space. They also observed that these changes are well correlated in both space and time with the appearance of energetic electrons in the 12–25 keV range as observed by the Reuven Ramaty High Energy Solar Spectroscopic Imager (RHESSI).

Although the new observations agree remarkably well with the general expectations of reconnection theory, many issues remain unresolved. Different versions of the theory exist, and all make simplifying assumptions that may or may not be valid[5]. The role of turbulence and various kinetic effects also remain poorly understood from a theoretical perspective. The imaging capabilities of AIA may help to resolve some of these problems in the next few years. ❐

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CONDENSED MATTER

On thin ice

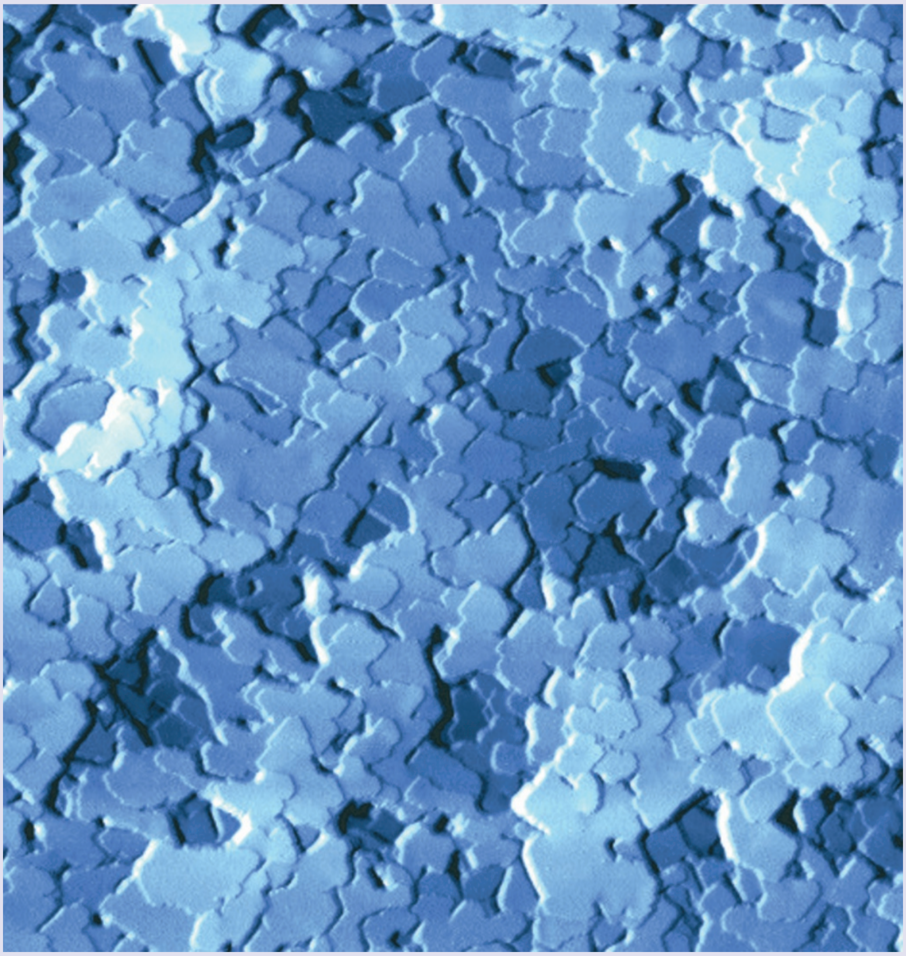
The beautiful, six-fold-symmetric shapes of snowflakes are a manifestation of ice's common hexagonal crystal structure. At temperatures lower than 240 K, however, another form can develop: cubic ice. Although the structural differences between the two variants are well understood — it's a matter of how successive oxygen planes are arranged with respect to each other — the reason for their simultaneous existence remains unclear.

By combining scanning tunnelling and atomic force microscopy, Konrad Thürmer and Shu Nie now show how the growth of a thin ice film evolves, layer by layer, and relate the formation of hexagonal or cubic ice to particular structural defects (*Proc. Natl Acad. Sci. USA* http://doi.org/m8k; 2013).

The authors grew ice films by directing water vapour onto a platinum(111) substrate at temperatures below 150 K. Initially, a 'wetting layer' forms — a one-molecule-thick sheet of ice smoothly covering the substrate. Adding more water molecules results in the emergence of isolated 'ice islands'. Scanning tunnelling microscopy images reveal that the stacking of ice layers in these islands is such that the crystallites have a hexagonal structure.

Depositing still more water molecules makes the islands expand, and where neighbouring crystallite islands merge so-called screw dislocations develop. This type of defect induces spiral rather than plain layer-on-layer growth: spiral growth around a screw-dislocation axis makes the net ice structure cubic.

When the ice film reaches a thickness of about 15 nm, a remarkable change takes place. The surface morphology as captured by atomic force microscopy (pictured) then shows signs of double spiral defects. A hexagonal-ice bilayer twisting around a double screw axis preserves the hexagonal structure. The formation of intertwined double spirals requires more elastic bending than single spirals, but the authors argue that the associated energetic cost is compensated by the higher stability of hexagonal ice.



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