ASTROPHYSICS

Check with the BOSS

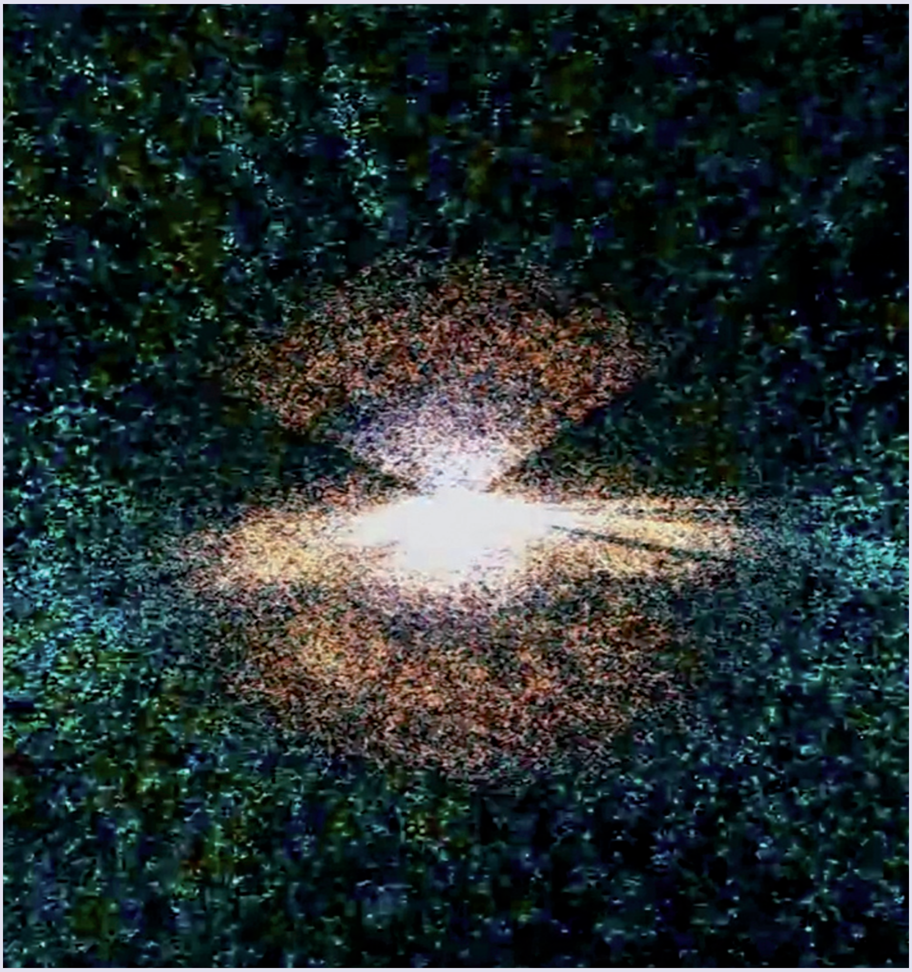
Early results from the third Sloan Digital Sky Survey (SDSS-III) have yielded the largest ever three-dimensional map of the distant Universe, based on 14,000 quasars sampled by the Baryon Oscillation Spectroscopic Survey, or BOSS (Anže Slosar *et al.*, preprint at http://arxiv.org/abs/1104.5244; 2011).

Previous large-scale maps were generated by surveying galaxies (at the centre of the map shown here), whereas BOSS uses the light from quasars (outer blue dots) up to eleven billion light years away. These contain supermassive black holes and lie at the centres of very old galaxies. Quasars are the most energetic objects in the Universe, and their light is useful for the study of the structure and evolution of expanding clouds of hydrogen gas.

Acoustic waves created during the early history of the Universe have resulted in an anisotropic distribution of baryonic matter, which oscillates on the scale of 500 million light years. Clumping of matter led to the formation of galaxies, hence precise measurements of the modulations and expansion of the intergalactic gas over cosmological distances will help constrain candidate theories for dark energy.

The 2.5-metre Sloan Telescope is situated in New Mexico, USA, and is used for four separate surveys in SDSS-III, including BOSS, which by 2014 will have scanned 160,000 quasars.

MAY CHIAO



SLOAN DIGITAL SKY SURVEY

DIAMOND NANOSENSORS

The sense of colour centres

Single colour centres in diamond have already proved their merit for sensing magnetic fields with high sensitivity and spatial resolution. Now they have been shown to be effective atomic-scale probes of electric fields, too.

Dmitry Budker

A defect in a diamond crystalline lattice where a substitutional nitrogen atom (N) sits next to a missing carbon atom (a vacancy, V; see Fig. 1) is a system with many remarkable properties. Writing in *Nature Physics*, Florian Dolde and colleagues report the use of a negatively charged NV^- 'colour centre' for measuring electric fields[1], and thus add an interesting and important sensing capability to what can be done with NV centres.

The last couple of years have seen an explosion of interest in and applications of NV^- centres, whose unique and attractive properties make them, arguably, the 'artificial atoms' of choice for solid-state quantum information processing and electromagnetic sensing alike. Having a magnetically sensitive ground state (Fig. 1) with slow spin relaxation — especially by the standards