ASTROPHYSICS

Black hole sports huge 'bubbles'

Pioneering radio telescope reveals remnants of energetic explosions at Milky Way's heart.

BY DAVIDE CASTELVECCHI

In its first major result, just over a year after it began operating, a super-sensitive South African telescope has discovered two giant 'radio bubbles' above and below the central region of the Milky Way. The features stretch over a total of 430 parsecs (1,400 light years), about 5% of the distance between the Solar System and the Galaxy's centre.

The bubbles are gas structures that can be observed because electrons stirring inside them produce radio waves as they are accelerated by magnetic fields. This activity suggests that the bubbles are the remnants of an energetic eruption of hot gas several million years ago, say the authors of a paper describing the features, published in *Nature* on 11 September (I. Heywood *et al. Nature* **573**, 235–237; 2019).

One possible explanation is that the supermassive black hole at the centre of the Galaxy underwent a period of intense matter-gobbling that created the outburst, say the researchers. Another could be a 'starburst' event — the near-simultaneous formation and subsequent fiery death of around 100 large stars. The shock waves of their explosions could have combined to blow a hole through the thick interstellar matter of the Galaxy's central region.

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Oliver Pfuhl, an astronomer at the European Southern Observatory in Garching, Germany, says that both starburst and black-hole activity might have contributed, and even reinforced each other. And researchers know of a starburst that took place in the region around seven million years ago. "It is intriguing to relate the radio bubble to this star-formation event," he says.

Researchers working with South Africa's MeerKAT radio telescope — a 64-dish precursor to what will be the world's largest radio telescope, the Square Kilometre Array — discovered the bubbles when they created an image of the Galactic Centre to celebrate the observatory's inauguration and test-drive their brand-new facility, beginning in April 2018, says radioastronomer Fernando Camilo, the observatory's chief scientist. Typically, it takes years for researchers to get a new observatory to work properly and to produce science with it. But with MeerKAT, they were stunned by how smoothly things went. "It kind of worked right out of the box," Camilo says.

The bubbles could also solve an old puzzle in radioastronomy. It's possible that the electrons accelerating inside them are the source of bright 'filaments' of matter tens of parsecs long, first seen in 1984, that stretch out of the Galactic Centre (F. Yusef-Zadeh *et al. Nature* **310**, 557–561; 1984). ■