

Captive galaxy

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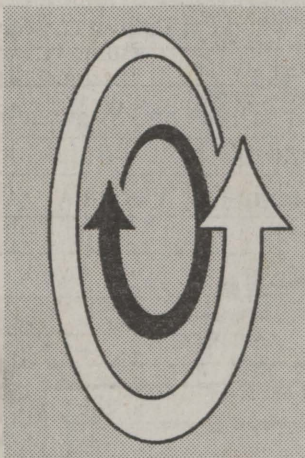
The astonishing observation of a galaxy whose central region is spinning rapidly in a direction opposite to that of its main body has been reported by two astronomers based at the US Space Telescope Science Institute near Baltimore.

The observers say the galaxy was probably formed by the merger of two pre-existing galaxies, and that a search for other such objects may show how often galaxies collide with one another.

The galaxy is known by its catalogue number, IC 1459, and is most easily recognized by its output of radio waves. It is a giant elliptical galaxy, probably containing many more stars than does the Milky Way (which has 100,000 million million). Three years ago, the galaxy was found to be accompanied by faint wispy-like structures in its outer regions.

Martin Franx (originally from *Sterre wacht Leiden* in the Netherlands) and Garth D. Illingworth described in last month's *Astrophysical Journal Letters* how their striking results compelled them to report their measurements on IC 1459 in advance of a more extensive survey they have undertaken.

The galaxy lies roughly 200 million light years from the Earth, and is globular in shape, measuring up to 50,000 light years in the longest of its elliptical diameters. The exceptional part of the galaxy, which is rotating in the direction opposite to that of the main body, is concentrated in a



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central region some 2,000 light years across.

Although IC 1459 is by no means one of the most distant galaxies of the Universe, it is too far away for individual stars in the galaxy to be identified even with the powerful telescopes at the Cerro Tololo Inter-American Observatory and the European Southern Observatory, both in the Chilean Andes.

The rotation of the galaxy has instead been measured by records of the spectral light emitted from different regions of its surface, which provide a measure of rotational velocity because of the way in which the wavelength of a known spectral line is shifted towards the red or blue if its source star is moving away from or towards the Earth. Measurements of galactic rotation based on the observation of separate stars have so far been

possible only for a handful of the nearest galaxies.

The finding that so surprises Franx and Illingworth is that the rotational velocity in the outer regions of the galaxy amounts to an average of 28 miles a second, about the shortest of the diameters of the ellipse, and that the rotational velocity within 2,000 light years of the centre is almost four times as much (105 miles a second) in the opposite direction but about the same axis to within 15 degrees.

An even more striking feature of the galaxy is that the cloud of electrically ionized gas with which it is filled appears also to be rotating with the main body of the stars, and in the same direction, even in the central regions where the stars, on average, are moving in the wrong direction.

The simplest explanation, that the central core of IC 1459 is a smaller galaxy which has fallen into the centre of a pre-existing elliptical galaxy, seems to be inconsistent with the large velocities at the centre. Franx and Illingworth believe it more likely that the composite galaxy has been formed first by the capture, and then the tidal disruption, of a smaller galaxy. The wispy structure seen three years ago suggests galactic capture.

Whatever the explanation, there is bound now to be a search for similar phenomena, as well as a more detailed study of IC 1459 itself.

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