

Edited by Emma Sanders

VLT discovers early galactic cluster

How the first groups of galaxies formed is one of the biggest mysteries in modern cosmology. Now another piece of the puzzle has been identified by the Very Large Telescope (VLT) in Chile, with the discovery of a cluster of 20 galaxies at a redshift of 4.1. This is the furthest cluster of galaxies ever observed.

Studies of early galaxy clusters provide an important constraint for theories of galactic

evolution, but they are extremely difficult to detect. The new observations focused on areas around known radio galaxies (galaxies with particularly strong radio emission). Radio galaxies are excellent tracers for early galaxy formation, as they are found in high-density regions of the early universe that evolve into present-day clusters.

The tactics paid off. The 20 galaxies that

were discovered belong to a group that measures approximately 10 million light-years across. This "proto-cluster" confirms that large-scale structures had already formed when the universe was about a tenth of its present age.

Reference

2002 *Astrophys. J.* **569** L11-L14.

New study takes a dim view of quasars

Some of the universe's most luminous objects might not be as bright as they seem. A recent study suggests that around a third of high-redshift quasars may have their emission magnified by a factor of 10 or more through gravitational lensing by galaxies along the line of sight.

Quasars release huge amounts of energy, outshining galaxies of hundreds of billions of stars, from a space the size of our solar system. They are thought to be powered by the accretion of gas onto supermassive black

holes in their centre. Extremely bright quasars have recently been found with redshifts of up to 6.28. As luminosity is proportional to mass, some of these bright quasars are expected to house black holes with masses more than a few billion times greater than the sun's.

The number of these enormous black holes, so soon after the Big Bang, poses a problem for models of structure formation. If gravitational lensing does amplify the emission of distant quasars to such an extent, some of

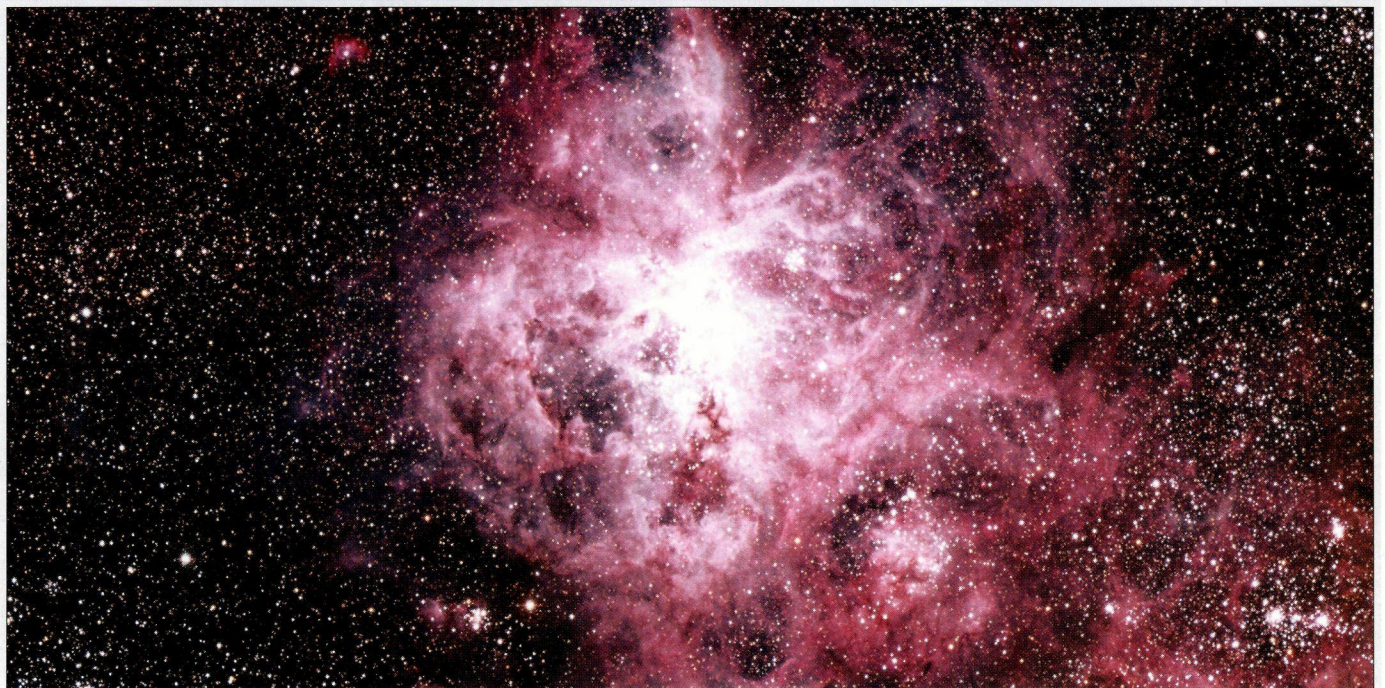
these problems would be allayed.

Gravitational lensing typically produces multiple images of a source, as well as magnifying it. These images are expected to be so close together in the sky that new observations using the Hubble Space Telescope or a large ground-based telescope will be needed to test the theory.

Reference

2002 *Nature* **417** 923-925.

Picture of the month



The Tarantula nebula, imaged at the European Southern Observatory's La Silla site. Located in the Large Magellanic Cloud, the tarantula is the largest emission nebula in the sky: extending over one-third of a degree, it has a diameter of more than 1000 light-years. (ESO.)

ALUMINUM

ANTIMONY

ARSENIC

BARIUM

BORON

BERYLLIUM

BISMUTH

CADMIUM

CALCIUM

CARBON

CERIUM

CESIUM

CHROMIUM

COBALT

COPPER

DYSPROSIUM

ERBIUM

EUROPIUM

GADOLINIUM

GALLIUM

GERMANIUM

GOLD

HAFNIUM

HOLMIUM

INDIUM

IRIDIUM

IRON

LANTHANUM

LEAD

LITHIUM

LUTETIUM

MAGNESIUM

MANGANESE

MERCURY

MOLYBDENUM

NEODYMIUM

NICKEL

NIOBIUM

OSMIUM

PALLADIUM

PHOSPHORUS

PLATINUM

POTASSIUM

PRASEODYMIUM

RHENIUM

RHODIUM

RUBIDIUM

RUTHENIUM

SAMARIUM

SCANDIUM

SELENIUM

SILICON

SILVER

SODIUM

STRONTIUM

SULFUR

TANTALUM

TELLURIUM

TERBIUM

THALLIUM

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TITANIUM

TUNGSTEN

URANIUM

VANADIUM

YTTERBIUM

YTTRIUM

ZINC

ZIRCONIUM

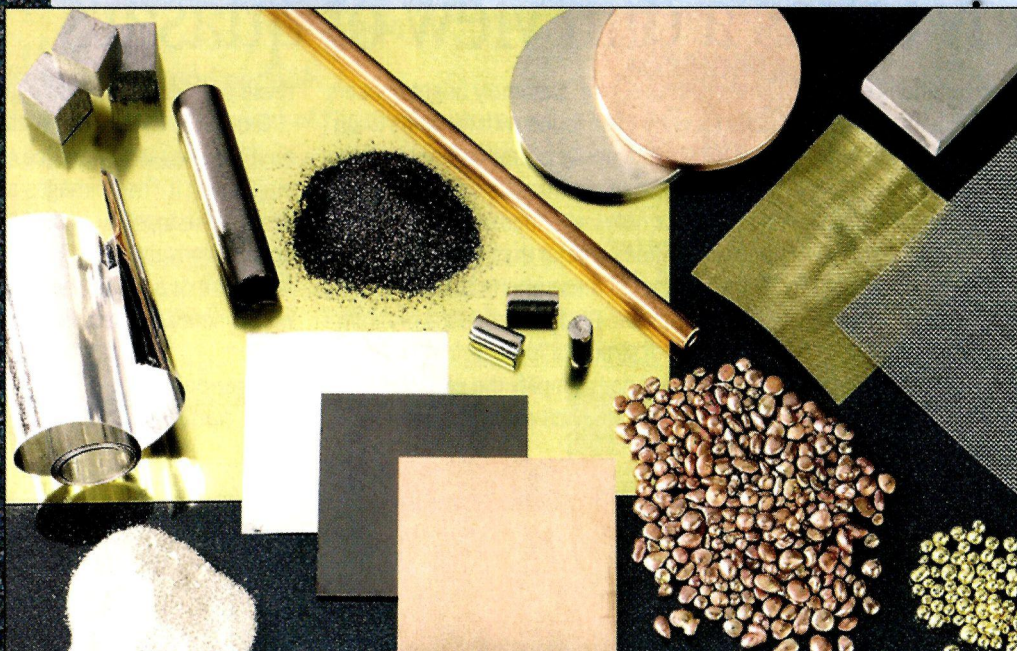
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