Filaments of matter. Simulation of the early universe is supported by new observation.

CREDITS: (LEFT TO RIGHT) TOM THEUNS/MAX PLANCK INSTITUTE FOR ASTROPHYSICS; E. B. FOMALONT, B. J. GELDZAHLER, C. F. BRADSHAW, NRAO/AUI/NSF

dark matter, with just a sprinkling of normal matter, clumped into blobs along narrow filaments. Later, these galactic building blocks streamed along filaments into connecting nodes, where clusters and superclusters of galaxies formed. According to astronomer Palle Møller of the European Southern Observatory (ESO) in Garching, Germany, the new observations "lend further strong support" to this picture.

Møller and his team found the primordial filament by making precise measurements of remote blobs of glowing hydrogen gas, using ESO's Very Large Telescope in Chile. The hydrogen clouds are named Lyman-α Emitting Galaxy-Building Objects, or LEGOs, not only for the children's building blocks but also for the radiation the objects emit. Lyman-α radiation is redshifted at very great distances; the redshift is caused by the expansion of the universe and is a measure of distance and look-back time. The newly observed filament has a redshift of just above 3, corresponding to 85% of the current age of the universe. Møller says this is the first convincing observation of a cosmic filament in the very early universe. His team will publish its results later this year in *Astronomy & Astrophysics*.

The objects that make up the filament are less massive and more representative of the primordial matter in the universe than the larger hydrogen clouds that have been observed previously, says Simon White of the Max Planck Institute for Astrophysics in Garching, a theorist who studies structure formation in the early universe. And because these smaller clouds are much more common, they can be used to trace the large-scale structure of the early universe. "This filament is a first example," White says. "The network predicted by our simulations may at last be visible." **–GOVERT SCHILLING**

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ASTRONOMY

The Most Powerful Action Flick Ever

A neutron star has the lead role in a first-of-its-kind movie. An international team this week released unique footage of Scorpius X-1 gobbling gas from a companion star and then spitting out blobs like so many watermelon seeds. The new flick should help astronomers understand the narrow jets formed by neutron stars and black holes in our galaxy and beyond.

The jets have turned up everywhere in the past decade, from nearby neutron stars to black holes in distant galaxies. Seen up close, the seemingly smooth jets break up into a series of blobs that race down the length of the jet at nearly the speed of light. Astronomers believe that the star or black hole launches the blobs when it vents accumulated hot gas. If they are right, a burst of x-rays from near the star should precede each new blob in the same way a flash of light from a gun barrel signals the approach of a bullet.

But testing the idea is difficult. Blobs cool rapidly and become invisible to x-ray telescopes; it takes many optical and radio telescopes working together around the globe to follow them down the jet. Coordinating such an operation is a logistical and political nightmare that had prevented any team from watching the birth and evolution of a single blob—until now.

For 56 hours in June 1999, Scorpius X-1 was continuously observed by a worldwide network of radio telescopes, called the Very Long Baseline Array (VLBA), and by additional radio telescopes in Australia, China, Japan, and South Africa. Two optical observatories and the orbiting Rossi X-ray Timing Explorer also provided continuous monitoring.

The stellar movie (below)—described in a paper published in the 20 May issue of *Astrophysical Journal Letters* and viewable at www.aoc.nrao.edu/pr/scox1/scox1.movie.html—reveals the predicted x-ray flash, followed by two pairs of blobs exploding in opposite directions at 95% of the speed of light. After a few hours, the blobs catch up with cooler material left over from previous eruptions. Soon another blob takes off. "This is the first time anyone has ever watched the whole cycle," says lead author Ed Fomalont, an astronomer at the National Radio Astronomy Observatory in Socorro, New Mexico.

"This is what the VLBA was set up to do, and by combining it with x-ray and optical observations they have pushed it to the max," says astrophysicist Roger Blandford of the California Institute of Technology in Pasadena. The next step is to figure out what causes the explosions.

–MARK SINCELL

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