

AT THE DAWN OF TIME, THERE WAS A PERFECT LIQUID

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In the timeless time after the big bang, when the universe was as new as it was empty, there were only quarks and gluons. Atoms had to yet to coalesce. But what was this proto-universe like? In the nanosecond before there was matter, what was there?

There was a perfect liquid. Experiments at the Relativistic Heavy Ion Collider (RHIC) at the Brookhaven National Laboratory have demonstrated that quarks and gluons, when freed from their workaday reality as the building blocks of nuclei, become a liquid without viscosity, a fluid that flows easier than water. RHIC proved this by accelerating gold nuclei to 99.7% the speed of light (RHIC scientists actually *believe* it was 99.9%, but can only conclusively establish the average of "closer to 99.7%," according to a spokesman—a difference of 600,000 meters per second), then smashing them together in an explosion so powerful it generated temperatures close to those of the big bang. An interpretation of the resulting atomic debris—which disappeared in less than a hundredth of a billionth of a trillionth of a second—showed the clear presence of a liquid.

To most, this was a complete surprise. After all, things that are a trillion degrees hot are normally gases or plasmas, not frictionless liquids. But not all physicists were so flabbergasted. String theorists—hitherto best known for believing in the existence of 10 dimensions—have argued in their own work that the big bang immediately gave way to a sloshy quark-gluon soup. The Brookhaven data tenuously confirms their expectations.

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02.6 A HEAD FOR NUMBERS

Socrates supposedly showed that an uneducated slave-boy could intuitively grasp the Pythagorean Theorem. Similarly, Harvard psychologists demonstrated that pre-schoolers have an innate understanding of basic math. Children shown two different sets of blue dots, which were then hidden, followed by a set of red dots, were asked which group—as a whole—was bigger. They answered correctly two-thirds of the time. Since the task required abstract addition, it suggests humans are hard-wired for math.