Big Bang investigators want new atom smasher

(AP) -- Scientists behind the European particle collider aimed at uncovering the secrets of the universe pushed Monday to build an even bigger machine - with money and partners from around the world.

Instead of whirling atoms in giant rings, as existing colliders in Switzerland and the United States do, scientists want a new-generation machine that will shoot them straight.

Depending on who wants to host it - and how much they are willing to pay - the next-generation collider could potentially be built anywhere in the world. Japan, Russia, the U.S. and Switzerland are all potential hosts, although scientists from China, India, Canada and elsewhere also will be associated with it, said Barry Barish, director of one of the proposed new collider projects.

Scientists gathered in Paris on Monday were encouraged by the results of the $10 billion Large Hadron Collider run by CERN, a particle physics laboratory outside Geneva. A smaller collider called Tevatron is run by Fermilab near Chicago. Both are highly complex machines that took years to bring to fruition.

Rolf Heuer, head of CERN, said at a press conference in Paris that he is "pretty happy" about what scientists have so far discovered from the LHC about how the universe was created.

The machine is "opening a new era of research."

But he said there will be a need for a new linear collider. It is the "interplay and combination of results" between the two different types of atom smashers that allows high-energy physics to advance, he said.

More than 1,000 physicists have gathered in Paris to hear the latest results of the LHC - and the preparations for its successor - at the International Conference on High Energy Physics, which runs through July 28.

The experiments are more about shaping our understanding of how the universe was created than immediate improvements to technology in our daily lives.

Scientists are attempting to simulate the moments after the Big Bang nearly 14 billion years ago, which they theorize was the creation of the universe.

Plans for the next step include a euro10 billion ($12.85 billion), 50-kilometer (31-mile) tunnel called the International Linear Collider, and the Compact Linear Collider, or CLIC, which has not yet been priced.

"Both are now really international cooperations, collaborations," said Heuer.

He said plans for the ILC, which first originated in a Hamburg laboratory, is more technologically advanced, but CLIC, which started at CERN, aims at higher-energy experiments.

The choice will be determined by the discoveries of the LHC, he said.

Barish, director of the proposed ILC, told The Associated Press that scientists could have the technology ready to go ahead with his project in 2012.

"If we are going to build an ambitious machine, then it's got to be a global machine," said Barish, a professor at the California Institute of Technology.

Jean-Pierre Delahaye, CLIC study leader at CERN who is also involved with the ILC, said the conceptual design of CLIC should be ready next year, when scientists will have a better idea of how much it costs.

He said CLIC could be five to ten times more powerful than the ILC - depending on how much funding is available.

"When we go up in energy we get closer to the Big Bang moment," he told the AP.

French President Nicolas Sarkozy, speaking at the conference on Monday, said that despite budget pressures, France has continued investing in science. But he noted that investments of the scale being discussed in Paris "can't be made by a single country, not even by a small group of countries."

The LHC was launched with great fanfare in September 2008, but days later was sidetracked by overheating that set off a chain of problems. CERN had to undertake a $40 million program of repairs and improvements before restarting the machine in November. Since then the collider has reported a series of successes.

With the LHC "we made a machine which allowed us to make a big leap in understanding, a sort of enlightener, and now we study and detail things and that's the linear collider," Guy Wormser, a leading particle physicist and one of the conference organizers told the AP.

"It's the future of our discipline."

Instead of crashing protons together, the new international collider will accelerate electrons and positrons, their antimatter equivalent, he said.

In March, the Large Hadron Collider produced its first bang, the most potent force on the tiny atomic level that humans have ever created.

Two beams of protons were sent hurtling in opposite directions toward each other in a 17-mile (27-kilometer) tunnel below the Swiss-French border - the coldest place in the universe at slightly above absolute zero.

CERN, or the European Organization for Nuclear Research, used powerful superconducting magnets to force the two beams to cross; two of the protons collided, producing 7 trillion electron volts.

Heuer said that CERN's experiments so far have "done an incredible job," locating the particles scientists already knew existed. Now their job is to find new ones.

The colliders also may help scientists see dark matter, the strange stuff that makes up more of the universe than normal matter but has not been seen on Earth.

"Your work represents the oldest dream of man since he tried to understand and transform what goes on around him," Sarkozy said. "Why is there something rather than nothing?"

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