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Starting from cold: many cryostat chambers will keep the superconducting International Linear Collider cool enough to accelerate subatomic particles.

Physicists pitch biggest accelerator

They have worked out the cost of a next-generation particle accelerator; now physicists must sell the dream machine to their governments.

At a meeting in Beijing, China, last week, a coalition of physicists set the construction price for the International Linear Collider (ILC) at about US\$6.7 billion. That does not include the 22 million hours of labour the job would require, contingency costs or inflation. But the estimate is a first step in convincing governments to build the machine, says Barry Barish, a physicist at the California Institute of Technology in Pasadena and head of the design effort.

The ILC would be the most powerful particle accelerator in the world. Using superconducting cavities, the 31-kilometre machine would collide electrons and positrons at energies of up to 500 billion electronvolts. The resulting data might help to verify theories of physics beyond the standard model, which currently dominates the field. It would also complement data from the Large Hadron Collider (LHC) at CERN, the European particle-physics laboratory near Geneva in Switzerland, which is set to begin operation later this year.

But for the ILC to get any further, it must begin to gather political support from the United States, Europe and Japan. That could be tough. The United States has been wary of such projects since cancelling the Superconducting Supercollider in 1993, Europeans are busy finishing the LHC, and the Japanese government remains to be sold on the point of the machine, according to one official at the science ministry. "We can't provide financial assistance without being convinced about the purpose," he says.

Even putting together a more detailed engineering design, the next step in the process, could be politically fraught. So far, the design work has been done voluntarily with little government money. The engineering phase will require governments to hand over substantial funding to international control, according to Burton Richter, a Nobel laureate and former director of the Stanford Linear Accelerator Center in California. And decisions will have to be made about what

components and standards to use. "Somebody's got to have the authority to say 'It's this way, not that way,'" Richter says. "That gets into some interesting politics."

Where to build the ILC would be an even larger political battle. Europe, the United States and Japan have all shown varying degrees of interest in hosting the machine. In 2004, a similar dispute stalled ITER, a \$6-billion experimental fusion reactor, for 18 months. "We hope not to end up in a situation like ITER," says Barish, although he points out that the ILC team

has yet to solicit official proposals for where to site the accelerator.

The ILC's future hinges on what the LHC finds. If the LHC produces exciting results, political support for the ILC will be strong, Richter says. "If the LHC turns out nothing, I doubt very much that the governments are going to put up the money." ■

Geoff Brumfiel, with additional reporting by Ichiko Fuyuno

"The \$6.7-billion price tag does not include the 22 million hours of labour the job would require."