

You are traveling through another dimension...

CERN is restarting its Large Hadron Collider (after a two-year massive upgrade) to start working on amazing experiments to reveal the identity of “dark matter” and to search for tiny black holes that could be gateways to parallel universes or alternate dimensions. Yes, modern physics and math actually indicate parallel universes are pretty likely — the big question is how to prove it.

The new, improved Large Hadron Collider (LHC) — humankind’s most powerful particle accelerator — begins firing proton beams again this month at almost twice the energy of its previous run. And [CERN](#) (the European Organization for Nuclear Research) expects to have the beams colliding at those energies by mid-May.

Besides the proton power, imagine the technical power needed to capture and crunch data at the world’s leading particle physics laboratory — probing the fundamental structure of the universe using the most complex scientific instruments and generating a phenomenal volume of data in the process!

How will CERN harness all that data?



The Large Hadron Collider at CERN is undergoing an upgrade to enable it to utilize energies twice as powerful as those used to reveal the Higgs Boson

Thankfully, CERN openlab has entered a three-year partnership with Seagate and is using [Seagate's Kinetic Open Storage Platform](#) to more efficiently handle CERN's colossal – and growing – data needs. The partnership will help CERN better manage the hundreds of petabytes of data that its Large Hadron Collider has generated to date, as well as the additional 2-to-3 petabytes of information it produces every month.

Seagate — *harnessing the power of data to solve the world's (and the universe's) toughest problems!*

“CERN creates a truly astonishing amount of data on a daily basis, and finding secure and efficient ways to store that information is one of the most important challenges we face,” said Alberto Di Meglio, head of CERN openlab. “We are excited to collaborate with Seagate on understanding how the Kinetic storage architecture could potentially contribute to the CERN infrastructure and aid the very demanding Large Hadron Collider program by reducing complexity and operational costs in our storage systems.”

How will we know if Dark Matter exists?

How will the LHC “discover” dark matter particles?

If dark matter does exist, it was produced at the time of the Big Bang (like all other matter). For scientists to figure out what kind of matter was produced at the big bang, they try to create conditions like that of the Big Bang. The closest we can get to replicating those conditions is at the point where protons collide inside the LHC. And the faster they can make protons collide, the closer they are to mimicking the temperature of the Big Bang.

Why does the LHC need so much more energy for its new set of experiments?

“It all comes down to $E = mc^2$,” said physicist Josh Thompson, speaking with the [Swiss Broadcasting Corporation](#) last year. The “E” in Einstein’s equation, of course, stands for “Energy” — the LHC has previously run at 8 TeV (tera electron Volts). After this upgrade, the LHC’s “E” will be 62 percent greater at 13 TeV. “When we get more ‘E’ we can hopefully get more ‘m’ [mass] stuff coming out,” continued Thompson, pointing out that the increased energy will allow not only more mass but also heavier particles — the kind of particles that may prove the existence of dark matter.

Astrophysicists tell us that the matter we can detect — galaxies, stars, planets, comets, people, cosmic dust — comprise only 5% of the universe. The other 95% consists of dark energy (about 70%) and dark matter. We know essentially nothing about dark matter, except that physics and math indicate it must exist — just as scientists thought the Higgs boson particle must exist, though it hadn't been detected before 2012.

“Dark matter is a real problem in physics today. It's one of the big puzzles,” CERN physicist Dave Charlton told the Swiss Broadcasting Corporation [this month](#). “We don't understand what 95% of the universe is made of. We know from astronomical observations that there is dark matter in the universe — probably five times as much as the normal everyday matter that we can see. So what is it? We don't know. One very good possibility is the theory of supersymmetry, which predicts that dark matter is due to particles that we should be able to produce at the LHC.”

Can we find a gateway to a parallel universe?

Another major project for the particle-smashing LHC is to search for tiny black holes, which might be gateways to parallel universes and new dimensions. The existence of multiple universes is a possibility that's been well established by much observational and mathematical data of modern cosmology and particle physics. There are numerous theoretical models for multiple universes that can be supported by current data, but none are yet proven.

A paper published in *Physics Letters B* by scientists at the University of Waterloo in Canada — Ahmed Farag Ali, Mir Faizal, and Mohammed M. Khalil — proposes a way to prove that tiny black holes connect our universe to other universes. CERN intends to test this hypothesis. The LHC has previously been used to look for tiny black holes, but hasn't yet succeeded. The paper's authors suggested a possible explanation for the absence of black holes at the LHC. They've designed revised LHC experiments they hope will confirm their hypotheses — in the authors' own words, their paper demonstrates “it is possible for black holes in six (and higher) dimensions to be produced at energy scales that will be accessible in the near future.”

If they succeed, these tests could confirm a reality far different from the one most of us are aware of — but familiar in some ways to fans of Star Trek and Isaac Asimov.

It could also confirm another well-established (but not yet widely accepted) theory about our very origins: that the universe did not in fact start with a single big bang, but that each universe is only part of an infinitely large multiverse with no beginning or end.

About the Seagate Kinetic Open Storage platform

The Seagate Kinetic Open Storage platform [restructures the traditional storage server architecture](#) from the bottom up, connecting object-oriented applications directly to the storage device. By cutting out the many layers of storage server hardware and file system software used in traditional stacks, Seagate Kinetic significantly cuts costs (by up to 40 percent) while also improving performance.

The first intelligent, device-based storage platform, Seagate's Kinetic Open Storage enables independent software vendors and cloud service providers to optimize scale-out file and object based storage with lower total cost of ownership.

Visit our [Kinetic Open Storage Platform](#) and Cloud Storage center to learn more.

About the Large Hadron Collider

The CHF6.5-billion Large Hadron Collider (LHC), conceived in the early 1980s, is the most powerful particle accelerator ever built. It sits in a 27 km-long circular tunnel, 100 meters below the ground at the European Organisation for Nuclear Research (CERN) on the French-Swiss border, north of Geneva.

In the giant subterranean collider, high-energy protons in two counter-rotating beams are smashed together hundreds of times a second in search of exotic particles at four points around the machine. Traveling near the speed of light, they are guided by thousands of superconducting magnets. The debris is then tracked on huge detectors. The LHC is planned to run over the next 20 years with several stops planned for upgrades and maintenance work.

About CERN

CERN, the European Organization for Nuclear Research, is the world's leading laboratory for particle physics. It has its headquarters in Geneva. At CERN, physicists and engineers are probing the fundamental structure of the universe. They use the world's largest and most complex scientific instruments to study the basic constituents of matter — the fundamental particles.

CERN openlab, which is now entering its fifth three-year phase, is a unique public-private partnership between CERN and leading ICT companies. Its mission is to accelerate the development of innovative new solutions to be used by the worldwide LHC community. CERN openlab provides companies with a framework to test and validate cutting-edge information technologies and services in partnership with CERN.