



CASE STUDY

How Spectra Helps CERN Advance the Boundaries of Human Knowledge

CERN relies on Spectra Logic® tape technology to safeguard advanced particle physics data from Large Hadron Collider experiments and more.

THE CHALLENGE

CERN, the European Organization for Nuclear Research, **runs the world's largest and most powerful particle accelerator, the Large Hadron Collider (LHC)** — a facility that produces more than 220 PB of experimental data annually and 30-40 PB monthly.

Collisions in the LHC generate sub-atomic particles. Electronic circuits record the passage of each particle through a detector as a series of electronic signals, and send the data to the CERN Data Centre for digital reconstruction. The digitized summary is recorded as a “collision event.”

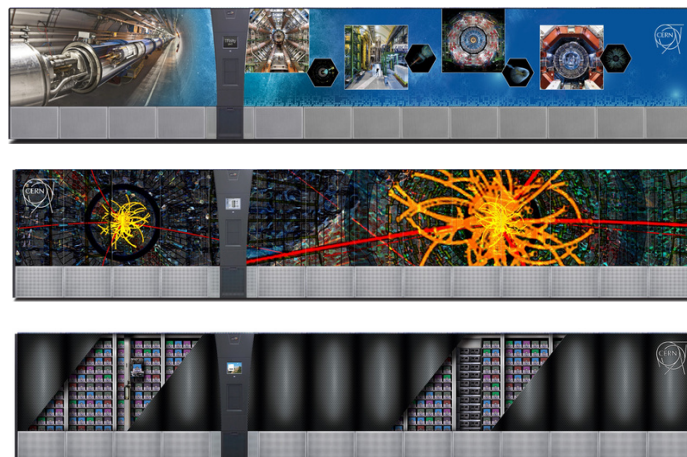
For an institution that pushes the boundaries of physics, **the ability to store, protect, and access data over decades** is not just an IT requirement — it's a foundational pillar of scientific research.

To diversify its tape libraries and prepare for growing performance and scalability demands, CERN needed a reliable future-ready archive.



In June 2020, CERN's new Tape Archive entered production after migrating 83 petabytes of ATLAS data from the legacy CASTOR system.

THE TAPE LIBRARIES



CERN's Spectra Logic tape libraries feature custom graphic wraps to reinforce the mission and goals of the organization.

THE ENVIRONMENT SNAPSHOT

- 3x 14-frame Spectra TFinity® tape libraries
- 60 LTO-9 tape drives and 10 LTO-8 drives
- Spectra BlueScale® encryption software
- LumOS tape library management software
- CERN Tape Archive (CTA) software
- IBM Spectrum Protect backup software



THE SOLUTION

Extensive consolidation of the data storage infrastructure culminated in 2020 when the new CERN Tape Archive software (CTA) entered production. During Runs 1 and 2 of the LHC, the software system used to manage the archival storage of physics data was CASTOR, the CERN Advanced Storage manager, which was conceived as a system to manage both disk and tape storage.

CTA is an evolution of the CASTOR system that removes the necessity to maintain a second disk-management system because it's tightly integrated with CERN's existing disk solution EOS.

CTA is a high-performance archival storage system developed at CERN for LHC physics data. CTA replaced CASTOR as the CERN archival solution for LHC Run 3 and beyond.

CERN installed Spectra TFinity tape libraries in the CERN Data Centre to archive the vast amounts of data expected to be produced by the detectors in the LHC experiments and elsewhere in the accelerator complex.

The tapes are stored in tape libraries, where they are retrieved by robotic arms. CERN's TFinity libraries leverage the open format LTO (Linear Tape-Open) tape technology.

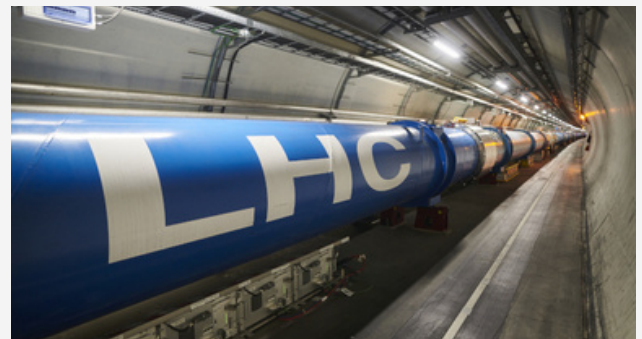
Engineered for **superior reliability, performance, and flexibility**, the TFinity libraries offer data encryption and a suite of features that allow users to actively check data, ensuring tapes are usable and verifying the integrity of data written.



Our Spectra TFinity tape systems help us **address an unprecedented multi-petabyte data challenge** by ensuring data is preserved and accessible in the long term.

Vladimír Bahyl
Senior Data Storage Engineer
CERN

ABOUT CERN



The Large Hadron Collider. Image: Hertzog, Samuel Joseph: CERN

The European Organization for Nuclear Research, known as CERN, was established in 1954. Physicists and engineers at CERN use the world's largest and most complex scientific instruments to **study the basic constituents of matter — fundamental particles.**

Their goal is to advance the boundaries of human knowledge by delving into the smallest building blocks of our universe.