CASE STUDY

How Leibniz IPHT Built a Unified Archive that Fuels Scientific Discovery

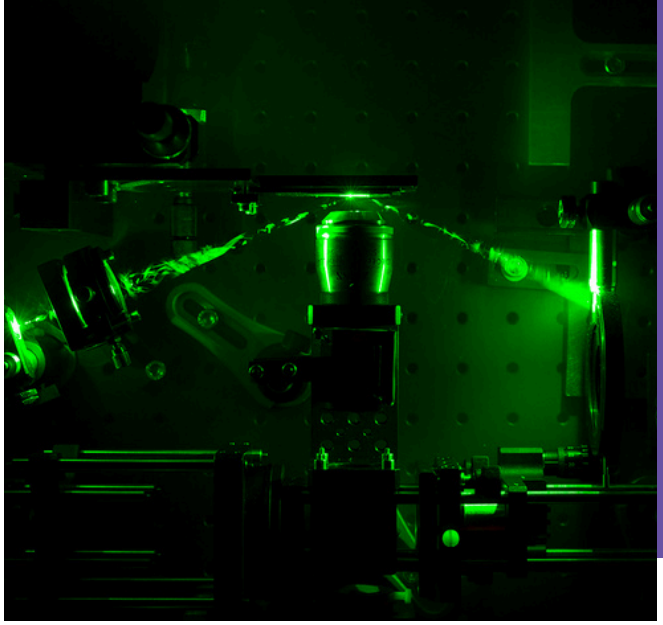


Image: Leibniz IPHT

Leibniz IPHT needed a resilient, scalable, Amazon S3-compatible archive to pioneer groundbreaking research. Here's how the institute exceeded those requirements with Spectra.

THE CHALLENGE

Faced with growing data volumes and a disaggregated, siloed storage strategy, **Leibniz IPHT required a centralized backup and archive** to safeguard petabytes of photonics research. The solution needed to be geo-redundant, provide air-gapped protection, preserve data for decades, and support robust access requirements.

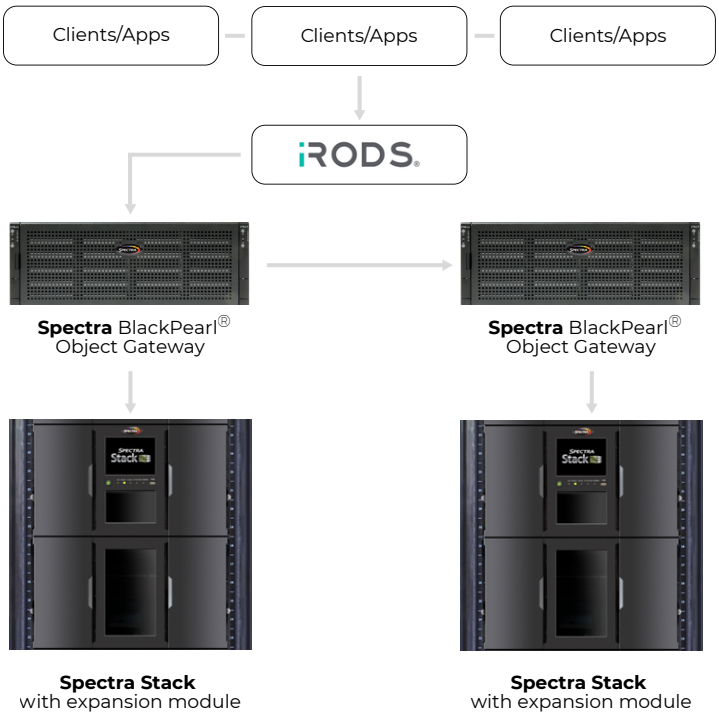
THE SOLUTION

Leibniz IPHT issued a tender prioritizing reliability, scalability, and Amazon S3 compatibility. **Spectra met these stringent requirements with a dual-system solution** that includes BlackPearl Object Gateway®, Spectra Stack tape libraries, and LTO-9 drives and media. Data is enriched using iRODS data management software, then stored on BlackPearl disk for six months before being offloaded to tape for long-term retention.

THE RESULT

Leibniz IPHT benefits from a centralized storage system that all departments trust to store research data for years. System administrators have visibility into datasets, fostering improved collaboration. The institute can now **adhere to the European Union's FAIR data principles**, strengthening its position for grant opportunities.

THE SYSTEM



THE ENVIRONMENT SNAPSHOT

- 2x Spectra BlackPearl® Object Gateway
- 2x Spectra Stack tape libraries
  - LTO-9 media and drives
- iRODS data management software

THE STORY

“Basically, photonics is shooting lasers at stuff and seeing what happens,” jokes Julian Hniopek, Head of Staff for IT & Research Data Infrastructure at the Leibniz Institute of Photonic Technology (Leibniz IPHT) in Jena, Germany.

More formally, photonics is the science of generating, controlling, and detecting photons — the fundamental particles of light.

At Leibniz IPHT, researchers explore photonics across a wide range of fields, from biomedical microscopy to nanoplasmonics. This work advances medical diagnostics, enables alternative energy innovations, and unlocks new ways of understanding our planet and the broader universe.

ABOUT LEIBNIZ IPHT

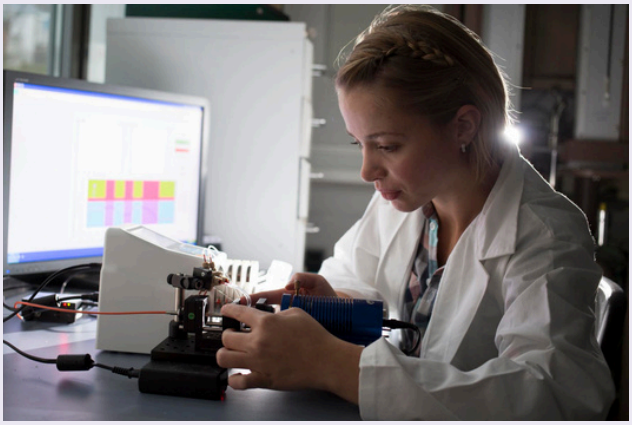


Image: Leibniz IPHT

Leibniz IPHT researches biophotonic methods and technologies that push the boundaries of resolution, sensitivity, specificity, speed, accuracy, and automation.

Much of this research depends on highly sensitive instruments (think: high-tech spectrometers and super-resolution microscopes) capable of generating terabytes each day and hundreds of terabytes annually.

Hniopek and his team are responsible for ensuring these rapidly growing volumes are securely stored, efficiently managed, and reliably protected.

In recent years, this task has become increasingly complex.

Historically, researchers at Leibniz IPHT often filtered their experimental outputs, preserving only the datasets they deemed most valuable.

Over the past decade, however, a growing cohort of scientific organizations have prioritized the FAIR data principles, which dictate that **publicly funded research data should be findable, accessible, interoperable, and reusable.** Since their formal specification in 2016, these principles have gained significant traction, with many funding bodies now requiring FAIR compliance as a condition of eligibility alongside long-term retention mandates that can span decades.

Here’s how Hniopek successfully implemented a centralized, tape-based storage system that protects critical Leibniz IPHT data while aligning with archival best practices.

UNIFYING A DISAGGREGATE STORAGE ENVIRONMENT

Prior to Spectra, the Leibniz IPHT storage environment was comprised of siloed strategies, disaggregate hardware and software systems, and department-variable policies.

With lack of a centralized storage or archive solution, researchers didn't have a safe, geo-redundant, air-gapped method to store vital scientific data long term. Some researchers even resorted to using mediums such as personal hard drives to back up their data.

For Hniopek, the path forward was clear: Leibniz IPHT needed a unified storage system that complied with FAIR principles. The search for a storage provider was on.

> **We knew that we wanted to implement tape**, one of the most durable storage methods available.
>
> We needed to partner with a company that had **proven experience** in this medium.
>
> **Julian Hniopek**
> Head of Staff for IT & Research Data Infrastructure
> Leibniz Institute of Photonic Technology

Hniopek issued a competitive tender outlining three non-negotiable requirements for its new infrastructure:

1. **Reliability.** Because the storage system would interface with the entire Leibniz Institute, it was vital that the solution could definitively preserve data for decades.

2. **Scalability.** In addition to physically storing rapidly expanding data volumes, the system also needed scalable software licensing models. "We couldn't be charged by gigabyte — it's just not feasible when you're dealing with terabytes to petabytes like we are," says Hniopek.

3. **Openness.** As a dynamic research organization, Leibniz researchers often use custom programs developed for highly specific needs. As such, new systems needed to be compatible with the industry-standard Amazon S3 API.

Spectra Logic met these stringent requirements. And for Hniopek, there was a bonus: Spectra delivered a single-vendor solution for the entire system.

"I'm very happy we ended up with Spectra because my team has a single point of contact to troubleshoot — I don't need to deal with like, 10 different support portals," says Hniopek.

A REDUNDANT PRIMARY & BACKUP TAPE SOLUTION

Leibniz IPHT now has a robust storage system that includes:

- 2x Spectra BlackPearl Object Gateway
- 2x Spectra Stack tape libraries
  - LTO-9 media and drives
- iRODS data management software

Together, these components form infrastructure that gives researchers confidence their data is both durable and recoverable when it matters most. iRODS makes it possible to enrich datasets with metadata, project context, and policy controls.

From there, BlackPearl Object Gateway automatically manages data placement between disk cache and object-based tape according to defined lifecycle policies. Currently, data stays on disk for six months. Then, the data is offloaded to tape for long-term retention.

> I can't emphasize how important it is for me to have **a single point of contact** for a whole software and hardware stack.
>
> **Troubleshooting with support is easy**, and I don't have to worry if these systems will be compatible in five years.
>
> **Julian Hniopek**
> Head of Staff for IT & Research Data Infrastructure
> Leibniz Institute of Photonic Technology

The primary and backup archives are housed in separate buildings, creating a geo-differentiated, air-gapped environment. This architecture strengthens disaster recovery readiness while protecting against cyber threats and accidental data loss.

"Tape was the optimal choice for our access patterns because much of our data is rarely accessed after initial use," says Hniopek. "It's also a secure archive format that requires minimal electricity — tape is the only medium that can be stored completely offline for years."

The stakes for maintaining a resilient backup system continue to rise. In some cases, funding agencies could even require grant repayment if requested data cannot be retrieved.

"For these reasons, **I need to be certain there is an air-gapped copy of our data that remains safe** — even in the event of a cyberattack or other incident," Hniopek adds.

PROMOTING INTERDEPARTMENTAL COLLABORATION

The Spectra storage architecture delivers greater efficiency and deeper insight into data and experiments across the entire Leibniz research ecosystem. With Amazon S3 compatibility, Hniopek and his team can easily integrate new applications as needed, reducing the effort required to manage growing data volumes.

Hniopek and other researchers have visibility into their archive, which unlocks new opportunities for cross-departmental collaboration. (Previously, researchers relied on emailing colleagues across departments to locate relevant datasets, a cumbersome process dependent on institutional knowledge.)

“Now, I don’t need to recall and access our data to know what we have,” says Hniopek. “We can also easily assign access permissions so other researchers can tap the data they need.”

ILLUMINATING SCIENTIFIC DISCOVERY

These capabilities are transforming how data is managed at Leibniz IPHT.

By unifying archives, streamlining data lifecycles, and bringing clarity to previously fragmented storage, **the Spectra architecture enables scientists across departments to access and use their data in new ways**, illuminating connections within vast collections.

Hniopek and his team can now easily manage growing data aligned with backup and archive best practices, paving the way for a future of discovery.

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