Modern Multiformat Legacy Tape Reader

“There is New Value in Old Data!”

Designing Storage Architectures for Digital Collections

Library of Congress

March 24 & 25, 2025

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U.S. DEPARTMENT OF ENERGY AWARDEE™

SBIR Grant Award: DE-SC0021879

Irreproducible Data is being Lost on Deteriorating Legacy Tapes

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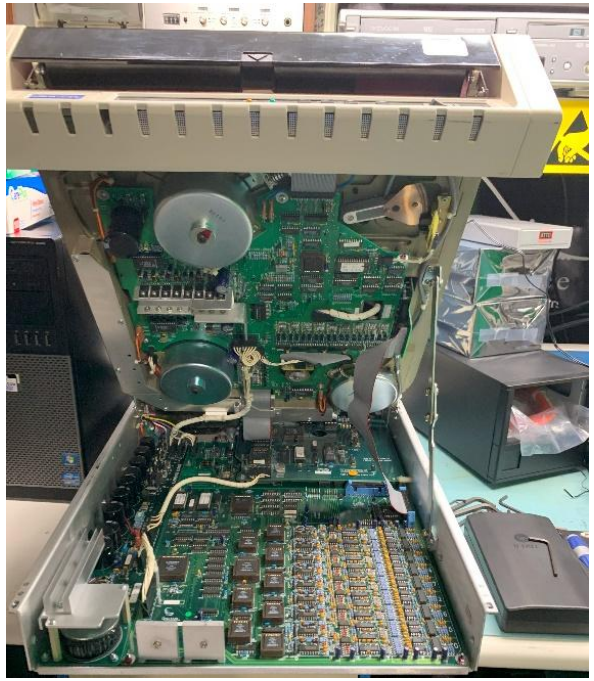
Current "State-of-the-Art" Recovery of Legacy Tapes Requires Finding and Refurbishing Vintage Drives



Data migration companies for legacy tapes are working museums!

KATALYST DATA MANAGEMENT

Even a perfectly refurbished 1970s tape drive only has 1970s' capabilities!

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If the Data hasn't been Recovered in the Last 60 Years, Why is it Useful Now?

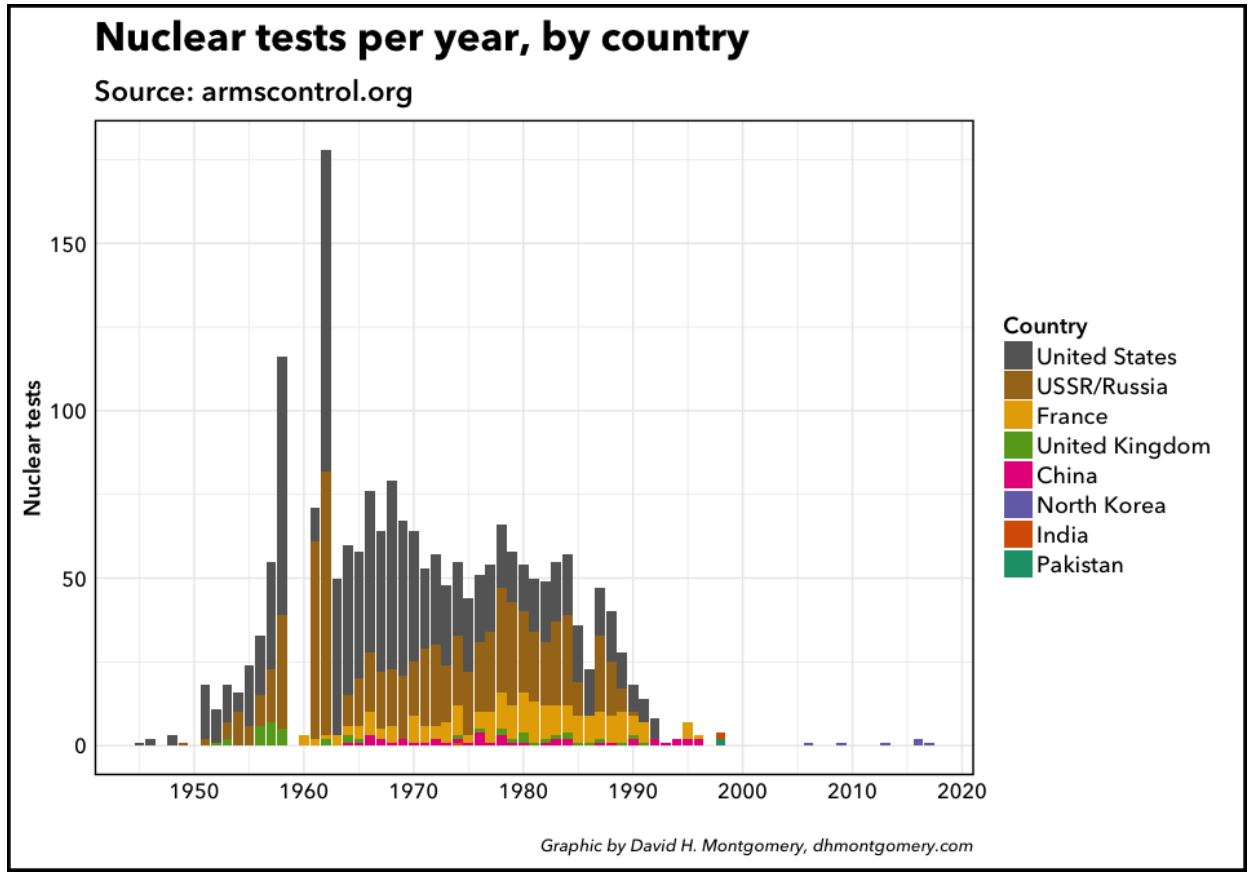
AI Agents and ML Models need massive amounts of unique training data!

(scraping the web for training data just uses what everyone else is using)

Training on domain-specific legacy data differentiates your AI/ML

Sovereign AI: LLMs trained on a country's history and language

DOE-Funded Development to Access Irreproducible Scientific Data



Number of nuclear tests per year by country from 1945 to 2017. This figure is based on publicly available data at: http://dhmontgomery.com/2018/02/nuclear-tests/

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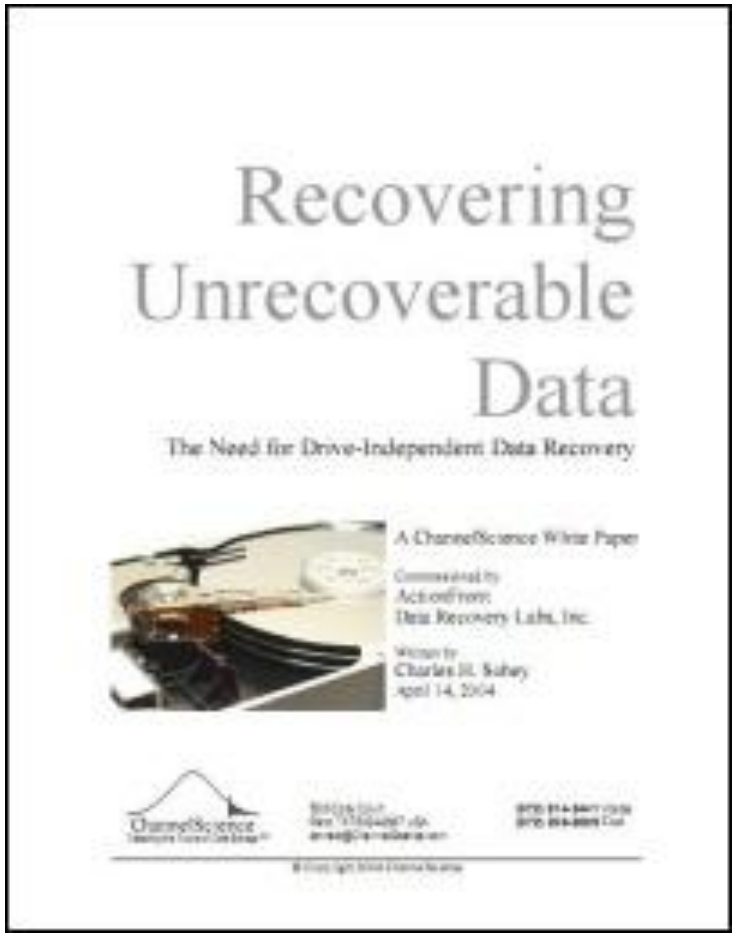
ChannelScience's multi-format tape reader technology is a 4-time SBIR award winner from the DOE National Nuclear Security Administration!

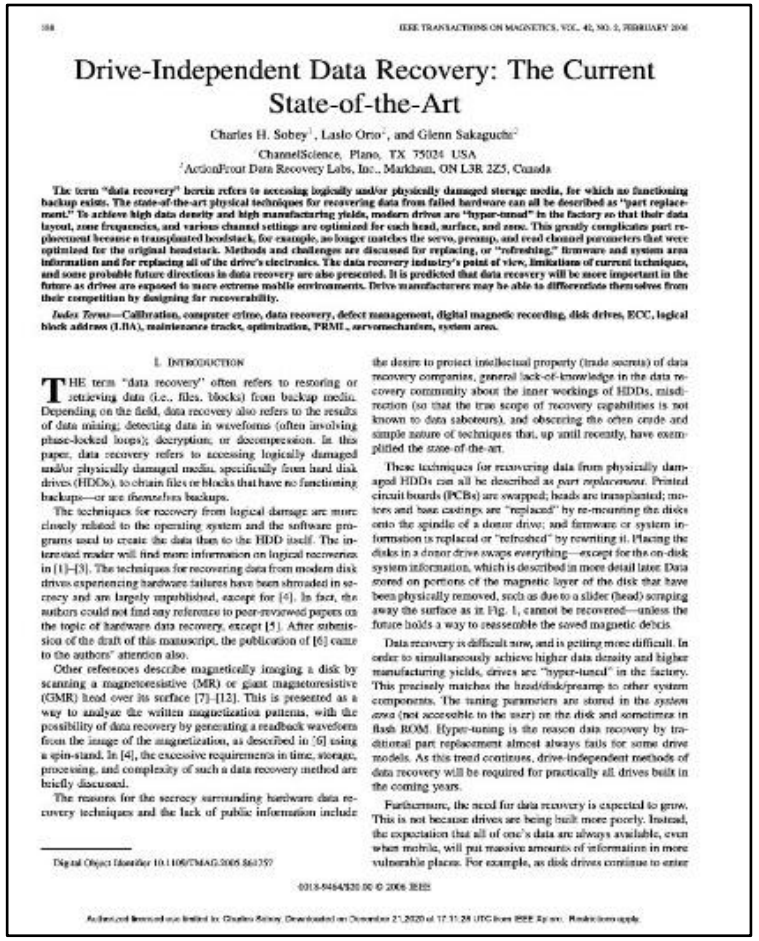
SBIR Grant Award: DE-SC0021879

We are building the best tape reader ever created for legacy formats

Our tape reader must be better than the original equipment, because the tapes are in deteriorated condition

ChannelScience Literally Wrote the Papers on How to Recover Unrecoverable Data





For more information see FujiFilm Interview of Chuck Sobey (includes additional links)

http://www.channelscience.com/files/Drive-Independent_Data_Recovery.pdf

http://www.channelscience.com/files/Drive%20Independent%20Data%20Recovery%20Sobey%20Orto%20Sakaguchi%20TMRC%202005%20D5%20PREPRINT.pdf

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ChannelScience's Breakthrough Technology
Project Landau

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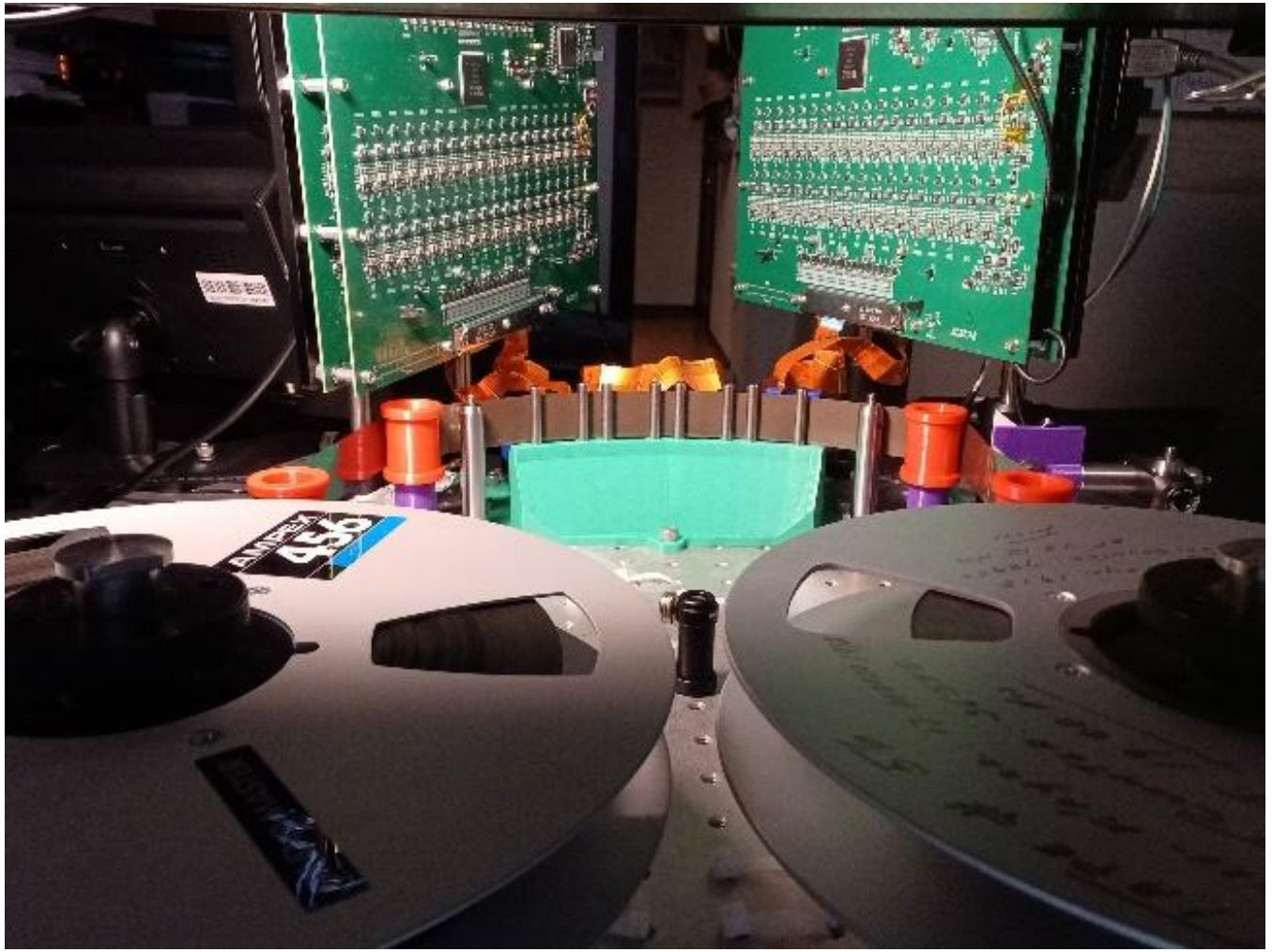

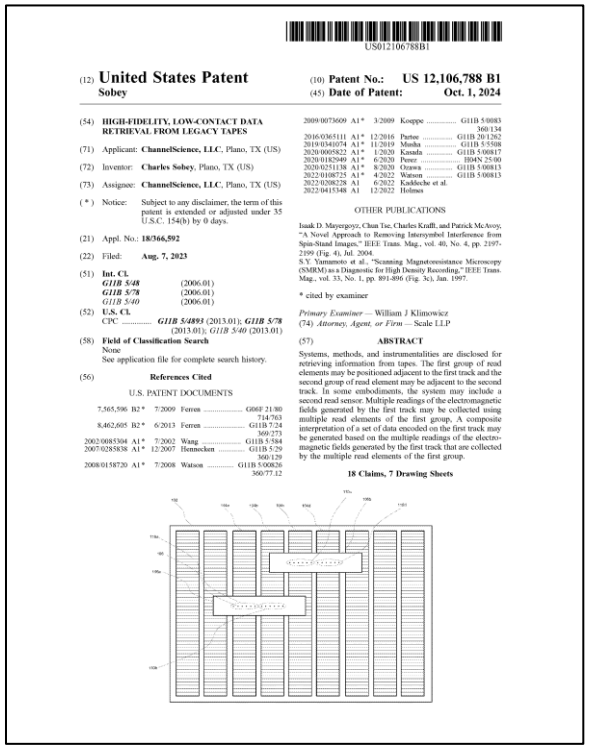

US0012106788B1

(12) **United States Patent**
Sobey

(10) **Patent No.: US 12,106,788 B1**
(45) **Date of Patent: Oct. 1, 2024**

(54) **HIGH-FIDELITY, LOW-CONTACT DATA RETRIEVAL FROM LEGACY TAPES**

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(72) Inventor: **Charles Sobey**, Plano, TX (US)
(73) Assignee: **ChannelScience, LLC**, Plano, TX (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **18/366,592**

(22) Filed: **Aug. 7, 2023**

(51) **Int. Cl.**
G11B 5/48 (2006.01)
G11B 5/78 (2006.01)
G11B 5/40 (2006.01)

(52) **U.S. Cl.**
CPC ***G11B 5/4893*** (2013.01); ***G11B 5/78*** (2013.01); *G11B 5/40* (2013.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

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S.Y. Yamamoto et al., "Scanning Magnetoresistance Microscopy (SMRM) as a Diagnostic for High Density Recording," IEEE Trans. Mag., vol. 33, No. 1, pp. 891-896 (Fig. 3c), Jan. 1997.

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Primary Examiner — William J Klimowicz
(74) *Attorney, Agent, or Firm* — Scale LLP

(57) **ABSTRACT**

Systems, methods, and instrumentalities are disclosed for retrieving information from tapes. The first group of read elements may be positioned adjacent to the first track and the second group of read element may be adjacent to the second track. In some embodiments, the system may include a second read sensor. Multiple readings of the electromagnetic fields generated by the first track may be collected using multiple read elements of the first group. A composite interpretation of a set of data encoded on the first track may be generated based on the multiple readings of the electromagnetic fields generated by the first track that are collected by the multiple read elements of the first group.

18 Claims, 7 Drawing Sheets

US Patent 12106788,
Issued October 1, 2024;
Additional Patents Pending

SBIR Grant Award: DE-SC0021879

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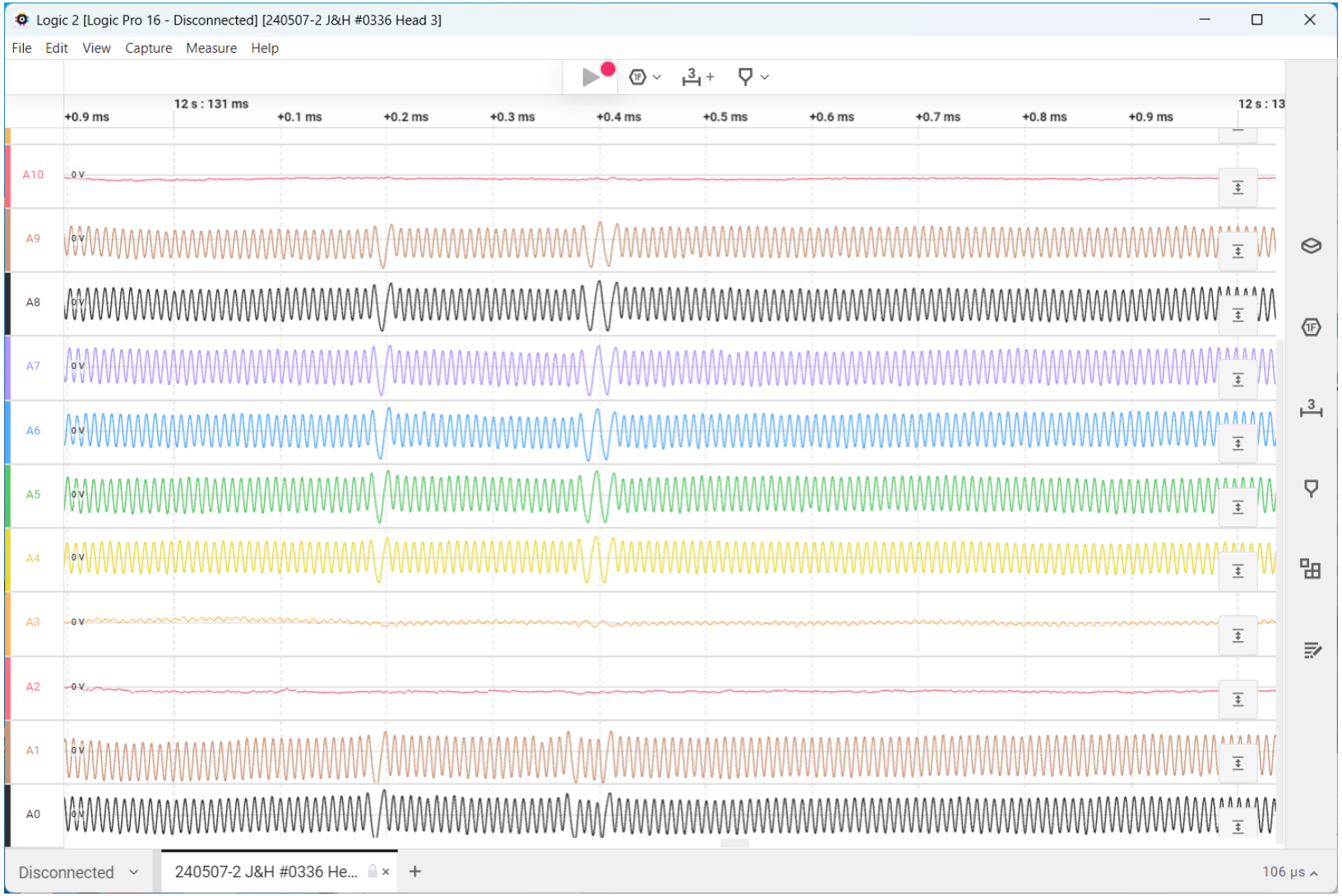
Landau Capabilities:
Multiple High SNR Reads of Each Track



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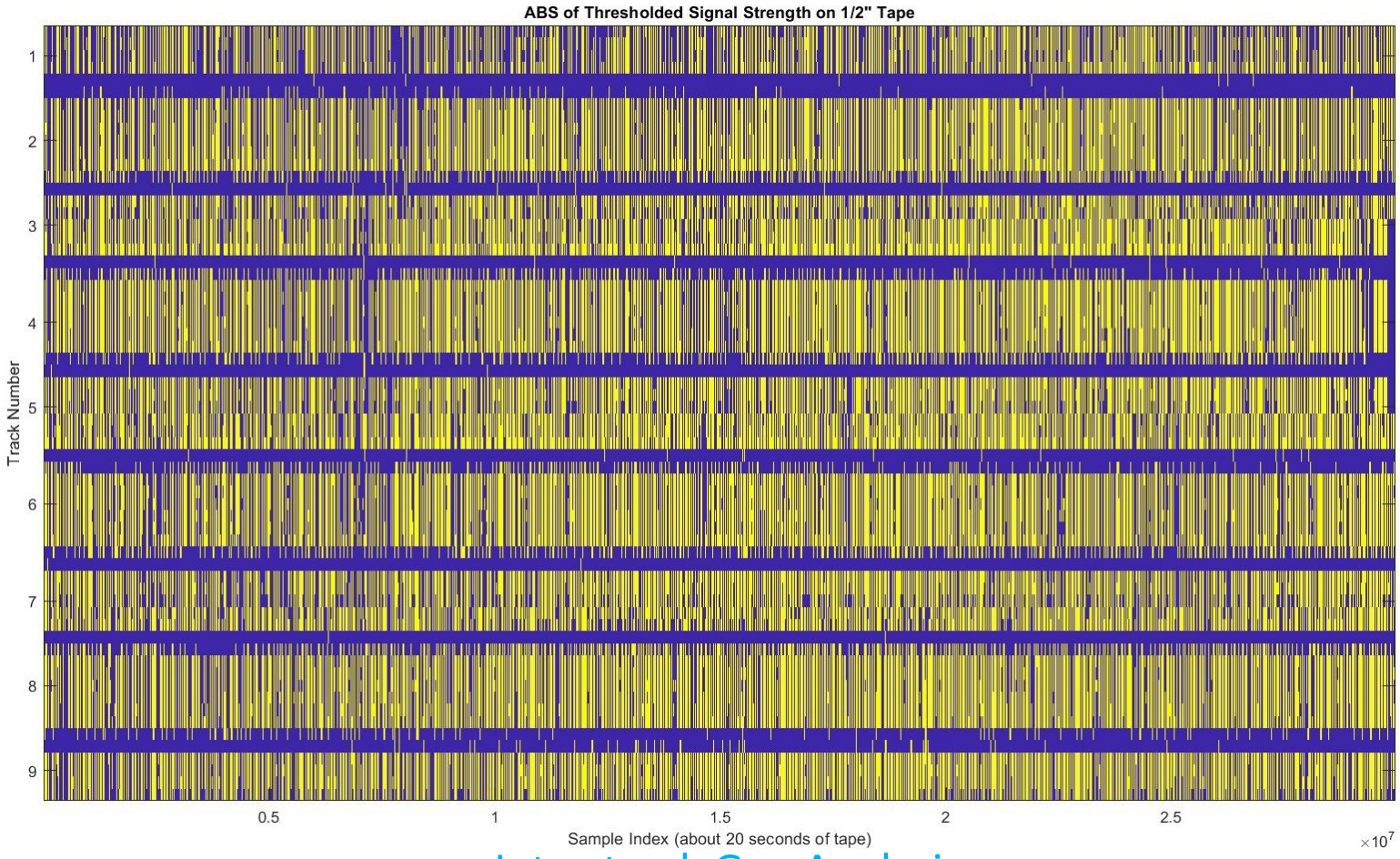
Landau Capabilities:
Readback Waveforms from Vintage ½” 9-track Tape



Inter-track Gap Analysis

Unprecedented Erasure Verification!

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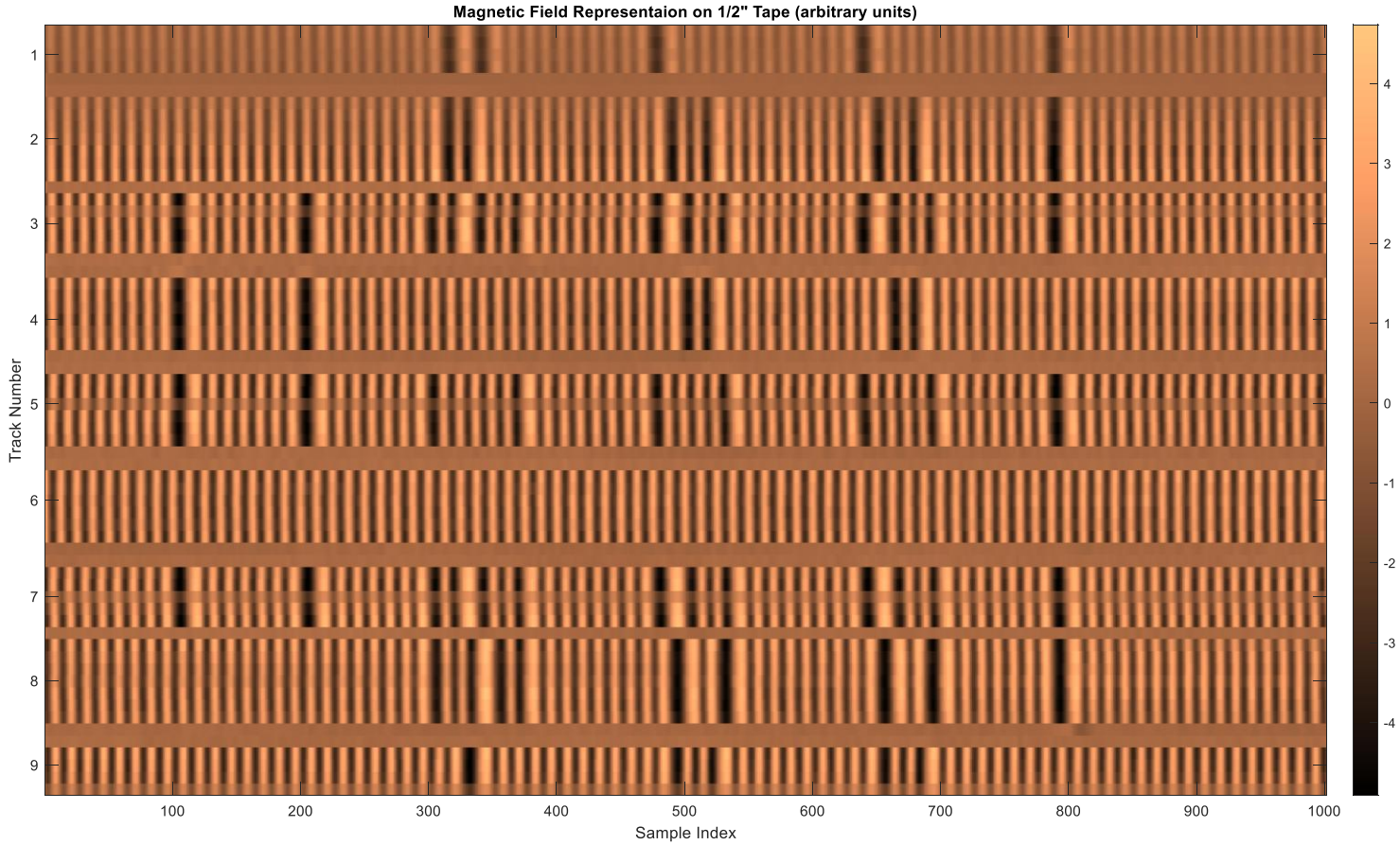
Landau Capabilities: Magnetic Force Microscope (MFM) like Resolution of Individual Magnetic Patterns



"Freeze" the Magnetic State of at-Risk Tapes

Unprecedented "Preservation Master" ("Digital Surrogate")!

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Recovery Market Opportunity >250 Different Formats

Recovery of each format requires

- Refurbished drives
- Replacement heads
- Skilled technicians and operators

OvationData

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DSA Requested Topics: TCO, Environment, Supply Chain

- Total Cost of Ownership
  - One platform to maintain
  - Amortize over multiple formats/jobs
  - Faster and more reliable recoveries
- Environmental Impact
  - Eliminate climate-controlled storage for migrated tapes
  - Utilize vintage tapes as a reliable media type in 3:2:1 preservation?
  - Recycle vintage hardware and reduce warehouse space
- Supply Chain (Shortages and Security)
  - No single-sourced component
  - Can use different generations of heads
  - Team can design around part shortages
  - Technicians and engineers work with modern technology, not 1970s tech

Let's Expand What is POSSIBLE for Magnetic Data Preservation

Change the Economics of Legacy Data

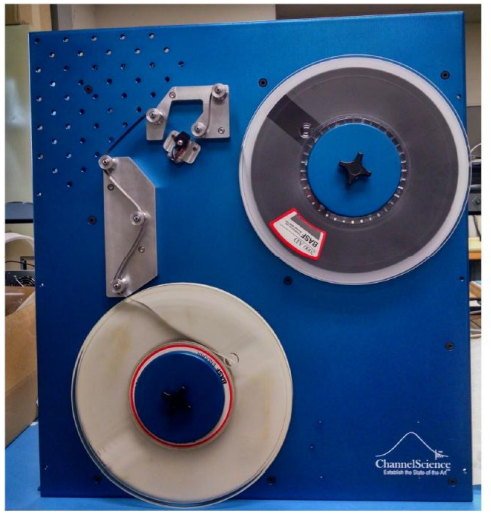
- Lower recovery/migration costs
- Monetize data (prepare it for AI/ML)
- Modern, robust hardware with AI-assist can address underserved markets worldwide
- Data management companies can differentiate with value-added migrations
- Legacy tapes might become a reliable part of a 3:2:1 preservation strategy

Create New Opportunities

- Sovereign AI (use access to capability as diplomatic tool)
- Preservation Master (Digital Surrogate / Digital Twin)
- Improve emerging long-term archival technologies (DNA, ceramic, …)
- Analog: Instrumentation, audio, helical scan video

Collaborations for Acceleration

- Fund new capabilities
- Define raw data formats and APIs
- Opensource projects for additional formats; Competitions
- Embed in university programs (University of North Texas)
- Technology licensing; Service partnerships
- User groups; Conferences like FMS – the Future of Memory and Storage



Front of drive tilted up with tape

3rd Generation Shown – We are using 5th Generation Now

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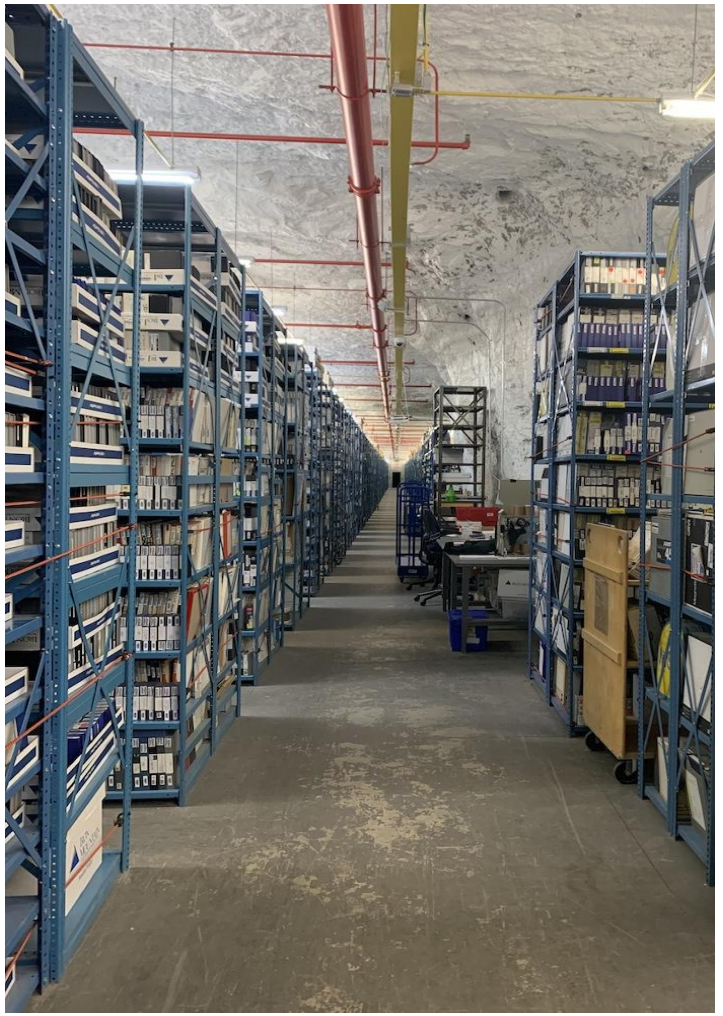
Partner with Us!

Join our Early Access Program to be the first customers in line for

- Tape Cleaners
- Preservation Master Systems
- Multi-format Legacy Tape Readers

We are looking for interesting pilot projects, open-source contributors, and partners

Please contact csobey@channelscience.com to start the conversation and to learn more



Iron Mountain

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