

**Title:** Accelerating Discovery: Mapping the Future of AI-Enhanced Theoretical Physics

**Speakers:** Axton Pitt

**Collection/Series:** Theory + AI Symposium

**Date:** April 08, 2025 - 1:30 PM

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**Abstract:**

This talk explores how artificial intelligence could transform theoretical physics over the next 25 years by addressing the crucial challenge of navigating an increasingly complex scientific literature landscape. We introduce Litmaps, a platform leveraging AI and visualization techniques to accelerate literature discovery and insights.

We illustrate Litmaps' current capabilities in rapidly identifying relevant connections and advancing theoretical research. We also outline critical engineering challenges, including open access to historical literature, data standardization, and managing uncertainty in AI models.

Finally, we highlight the importance of collaboration among physicists, AI researchers, engineers, and entrepreneurs, to realise the AI-enhanced future of theoretical physics research.

# Accelerating Discovery: Mapping the Future of AI-Enhanced Theoretical Physics

*Theory + AI Symposium*  
Perimeter Institute



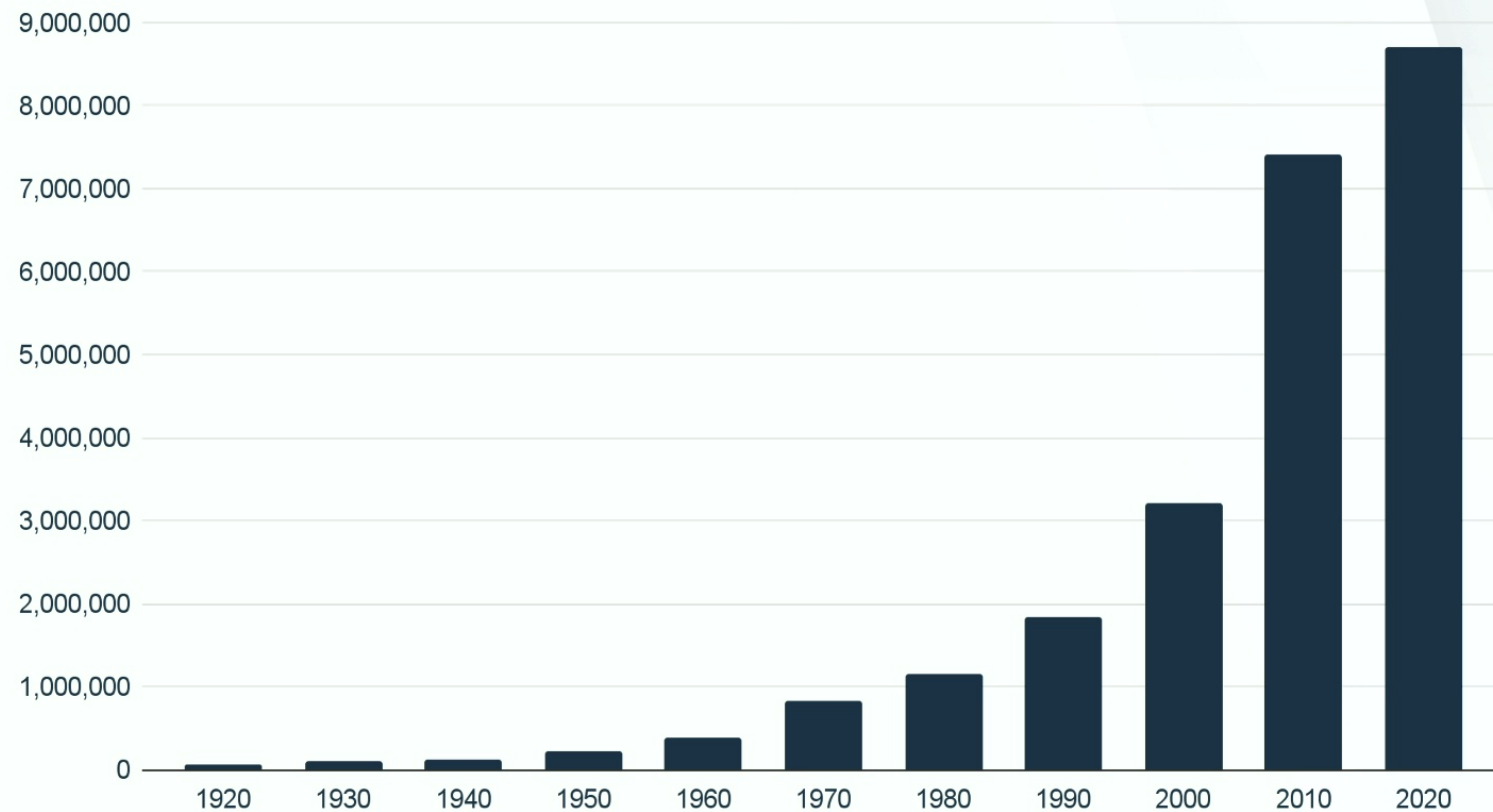
Axton Pitt  
Co-founder and CEO



**In 25 years, AI may solve complex physics problems — but can we point it to the right questions?**



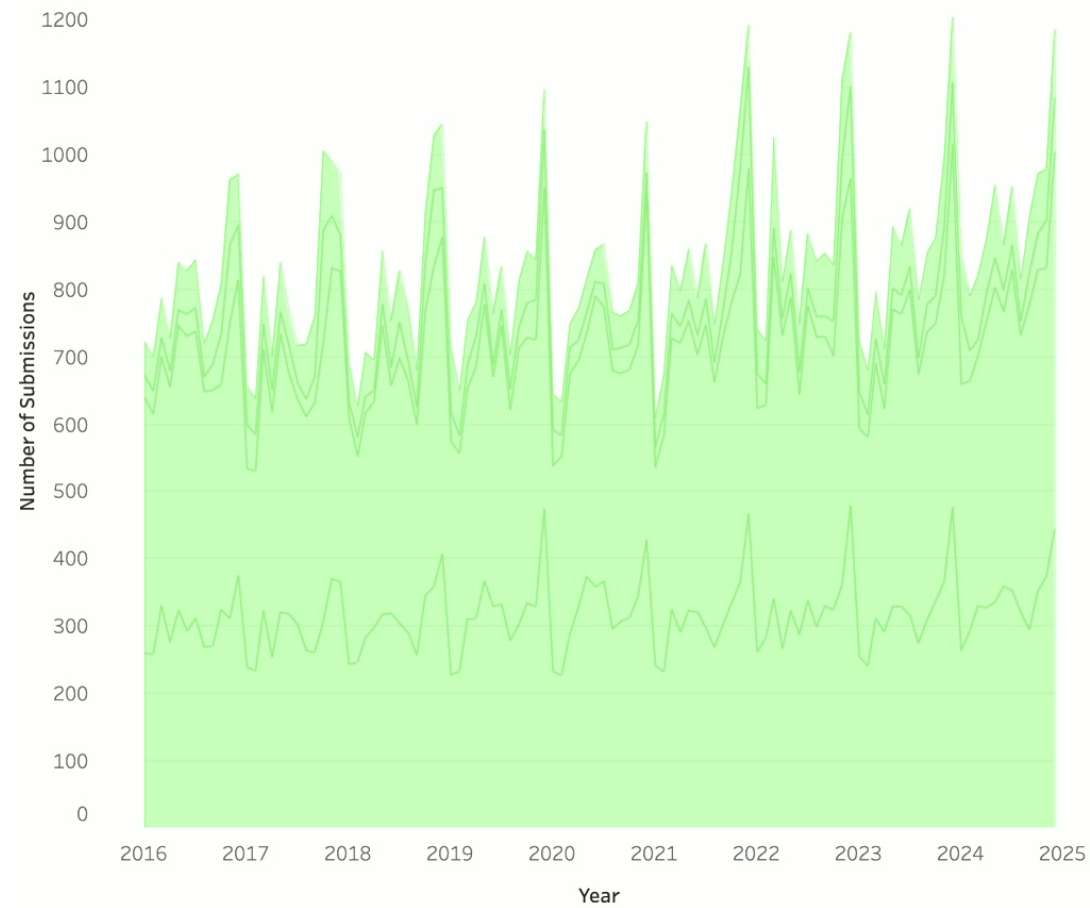
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# Literature Discovery



**Bottleneck: Inefficient discovery and synthesis processes — humans can't scale rapidly.**

peroxiredoxin



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### [HTML] Overview on **peroxiredoxin**

SG Rhee - Molecules and cells, 2016 - Elsevier

Peroxiredoxins (Prxs) are a very large and highly conserved family of peroxidases that reduce peroxides, with a conserved cysteine residue, designated the "peroxidatic" Cys (C P ) ...

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... A new family of proteins with an antioxidative function, now designated as **peroxiredoxin** (Prx), ... Genetic mapping of six mouse **peroxiredoxin** genes and fourteen **peroxiredoxin** related ...

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ZA Wood, LB Poole, PA Karplus - Science, 2003 - science.org

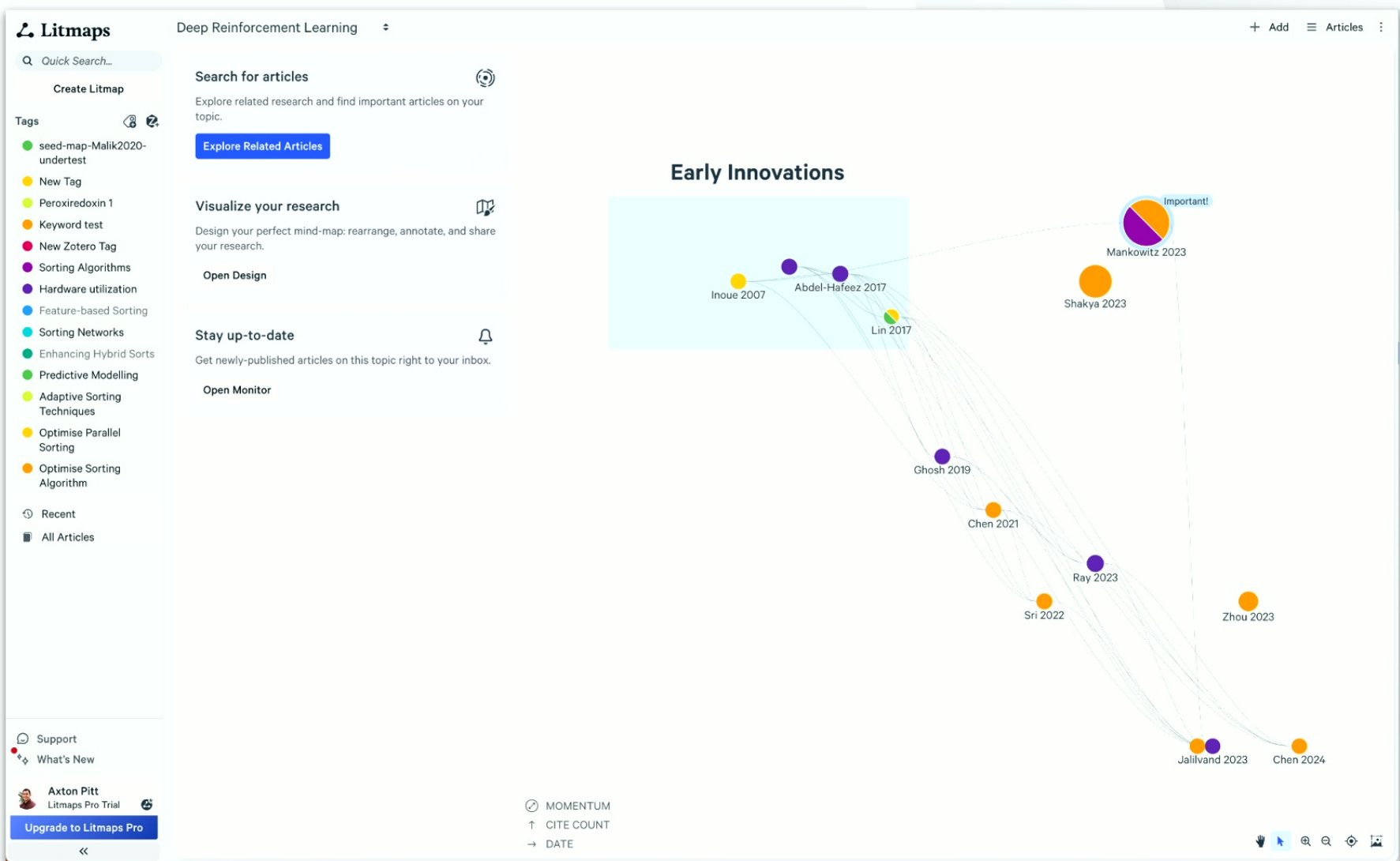
Eukaryotic 2-Cys peroxiredoxins (2-Cys Prxs) not only act as antioxidants, but also appear to regulate hydrogen peroxide-mediated signal transduction. We show that bacterial 2-Cys ...

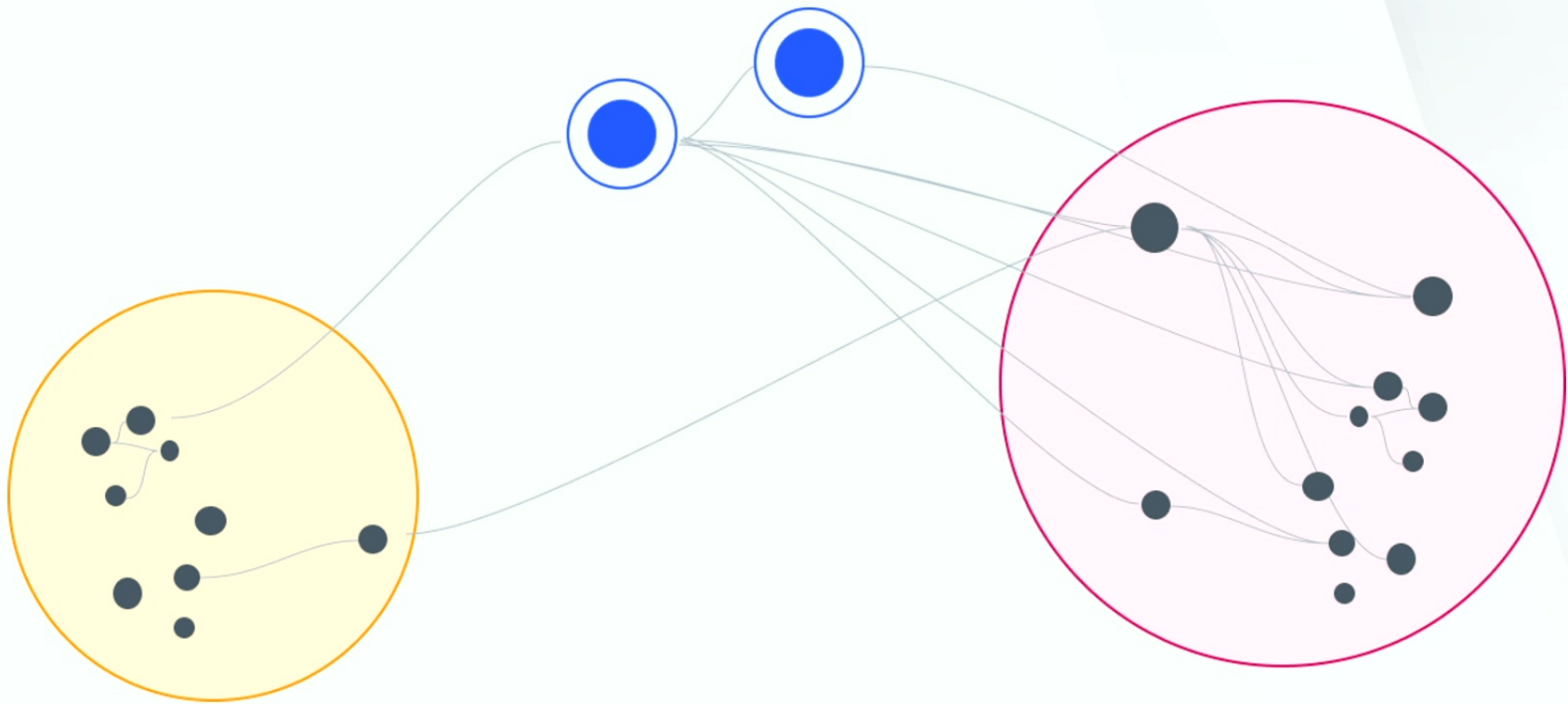
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Full View









# Challenges

- **Open Access to full text literature beyond recent years**
- **Extracting data from PDFs**
- **Standardization and interoperability of literature databases**
- **Handling inconsistencies in literature-based AI models outputs**
- **Building user interfaces help humans get the most out of AI breakthroughs**



# The Next 25 Years

- 
- A large, solid blue arrow pointing from left to right, spanning most of the width of the slide. It contains two bulleted lists of text.
- Personalized Recommendations
  - AI-generated summaries of research gaps
  - Partnering with AI Agents
  - Structured Literature History



# Collaboration Required!

- Physicists to define key questions and validate quality.
- AI researchers and engineers to build robust, interpretable models.
- Entrepreneurs and toolmakers (like Litmaps) to deliver scalable infrastructure and user interfaces.



# Litmaps Today

- **100,000+ of researchers using our product monthly**
- **Integrations with other tools in the ecosystem (e.g. Zotero, PaperPile, and arXiv)**
- **Emerging capabilities (e.g., embedding-based semantic search, network analysis).**
- **Large Language Model insights beginning to be integrated, and results cross-referenced with Litmaps corpus**



**Thank you!**