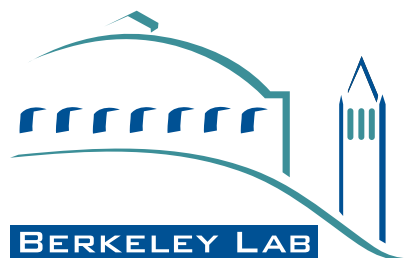


# “radiopurity.org”

## A Community Assays Database



Jodi Cooley

*Southern Methodist University*

James Loach

*Shanghai Jiaotong University*

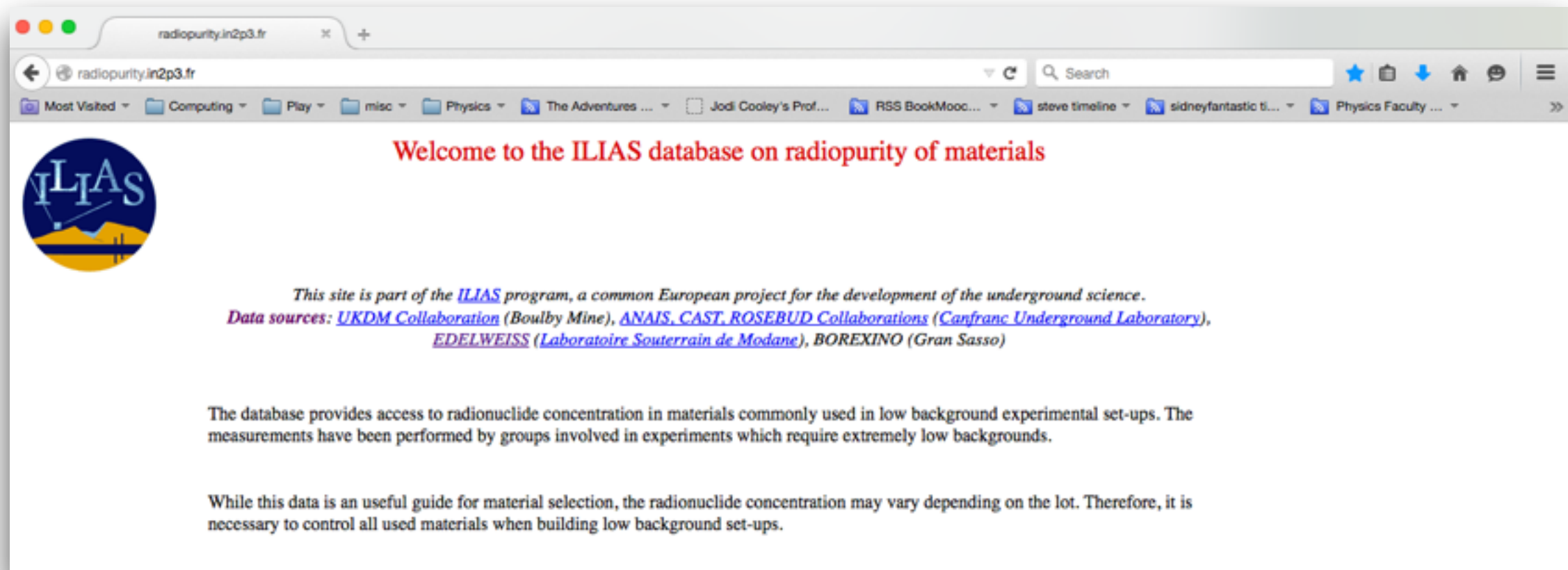
Alan Poon

*Lawrence Berkeley National Laboratory*

# Long Standing Need

We are not the first to consider this problem.

*The ILIAS database has served the community well  
but it is no longer actively maintained.*



# History of the Project

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## 2010: Discussions at LRT 2010 in Sudbury, Canada

- A proposal for a materials assay database for the low-background physics community (Loach)
- Prototype application for the LBNL LBG

## 2012: Formation of an International Collaboration

- AARM collaboration (funded by NSF) became interested in supporting this work
- SMU (Cooley with undergraduates Adler, Bruemmer & Wise) became actively involved.
- Input from an international advisory board.
- Contributions from international collaborators (Cox, KIT; and others)
- Complete revision of data specification and software

## 2013: Launch of "radiopurity.org" at LRT 2013 in Gran Sasso, Italy



- Launch included ~300 assays; historical data from ILIAS, EXO and XENON100

## 2014: Sustained Usage

- We now have ~ 1000 assays, primarily historical.
- Database is being used by SuperCDMS and DarkSide.
- In the process of adding features to the software for easier distributed use.

# Design Principles

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A permanent solution that is a pleasure to use.

Open, light-weight software

We chose **CouchDB**, a modern NoSQL database with **compelling features**

Flexible data

Data format should be **inclusive** and data should be **portable**

Flexible usage

**Distributed usage** by community, institutions, experiments and individuals

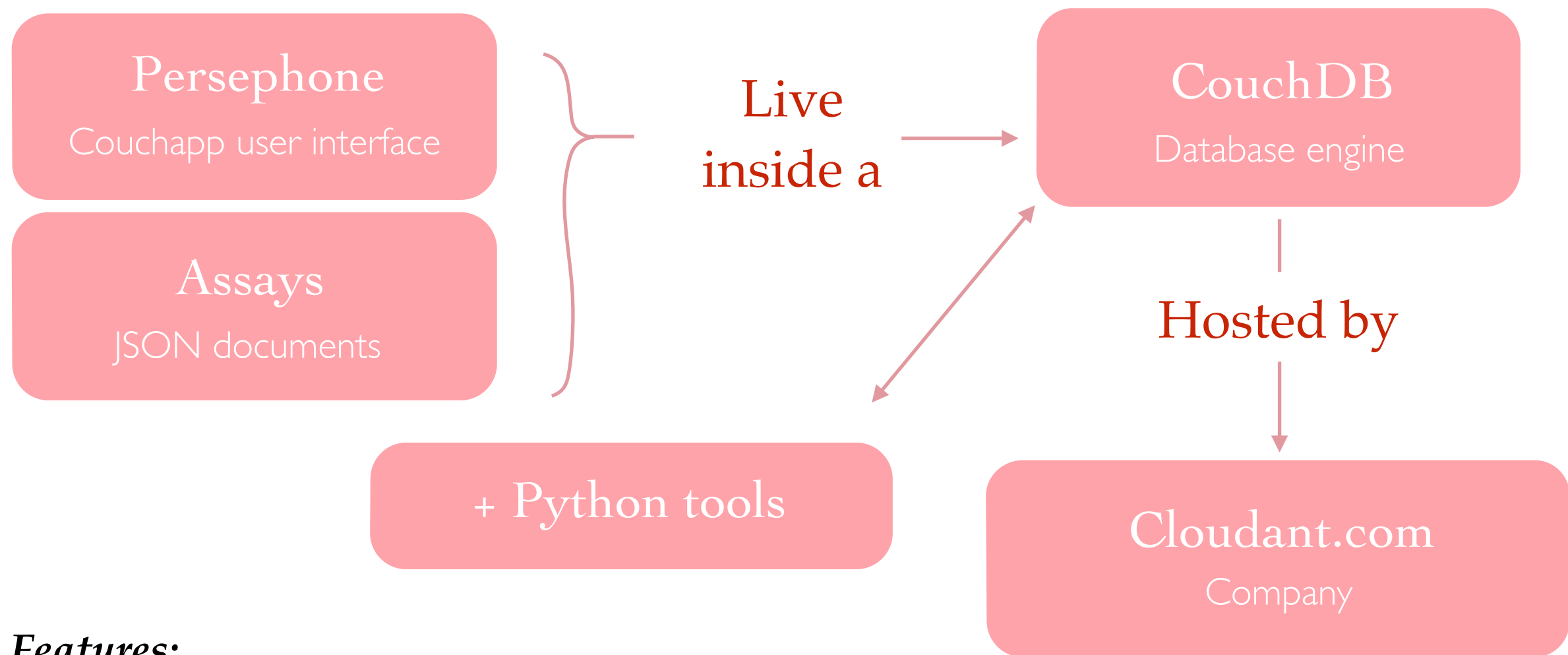
# CouchDB

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A modern distributed database system.

- open source top-level Apache project
- Runs as an easily-installed server that communicates via HTTP
- Built for web / mobile applications and distributed data storage
- Stores in JSON (JavaScript Object Notation) documents
- Schema-less (NoSQL)

# The Software



## **Features:**

- Comprehensive, flexible structure
- Complex search queries
- Easy download of data to JSON, XML, CVS, etc.
- Submission of data via HTML form or python (or any language supporting HTTP)
- Query of database by any language supporting HTTP
- Admin/user permission structure

# Data Format

## Sample

The thing that is being counted

Name Description Source  
Owner ID

## Data source

Where the data came from

Who entered it

Reference Data entry person  
Notes

## Measurement

The measurement and its results

Institution Technique Date  
Requestor Practitioner Description

Results

Isotope	Value	Error	Unit
Isotope	Limit	c.l.	Unit
Isotope	Range	c.l.	Unit
...			

## General

Group Specification

+ user-defined fields



# User Interface

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www.radiopurity.org



	Search	Submit	Edit	Settings	About	Login	
<input type="text" value="e.g. all"/>							<input type="button" value="P"/> <input type="button" value="➤"/>

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Generously hosted by Cloudant

# User Interface

(pf? polyimide kapton -ptfe -raw) AND grouping:EXO

Search Submit Edit Settings About Login						
(pf? polyimide kapton -ptfe -raw) AND grouping:EXO						
Total result: 10						
Grouping	Name	Isotope	Amount	Isotope	Amount	
▶ EXO (2008)	Polyimide substrate, Espanex flat cable, Nippon...	Th	450 ppt	U	900 ppt	...
▶ EXO (2008)	PFA, Saint Gobain supplied DuPont 450-HPB	Th	65 ppt	U	75 ppt	...
▶ EXO (2008)	PFA, Saint Gobain DuPont 440-HP	Th	13.3 ppt	U	3 ppt	...
▶ EXO (2008)	Polyimide substrate, Espanex flat cable, Nippon...	Th	1600 ppt	U	1500 ppt	...
▶ EXO (2008)	Polyimide tape, Stanford stock room	Th	5400 ppt	U	5800 ppt	...
▶ EXO (2008)	Copper coating, Espanex flat cable, Nippon Ste...	Th	3 ppt	U	19 ppt	...
▶ EXO (2008)	Sheldal superinsulation, DuPont Kapton alumini...	Th	1540 ppt	U	2500 ppt	...
▶ EXO (2008)	Polyimide substrate, Espanex flat cable, Nippon...	Th	50 ppt	U	450 ppt	...
▶ EXO (2008)	Polyimide substrate, Espanex flat cable, Nippon...	Th	317 ppt	U	3880 ppt	...
▶ EXO (2008)	Sheldal superinsulation, DuPont Kapton alumini...	Th	1640 ppt	U	6100 ppt	...

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↻

>

Total result: 10

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▼ EXO (2008)	PFA, Saint Gobain supplied DuPont 450-HPB	Th	65 ppt	U	75 ppt	<div> <div></div> <div></div> <div></div> </div>
	<div> <div>Sample</div> <div>Description</div> <div>ID</div> <div>Measurement</div> <div>Results</div> <div>Technique</div> <div>Description</div> <div>Data</div> <div>Reference</div> <div>Data entry</div> </div> <div> <div>           Saint Gobain supplied DuPont 450-HPB PFA. Material finished using supplier's default procedures.            Table 3. #47            K            740    (77)   ppb            Th            65    (6.5)   ppt            U            &lt; 75   (95%)   ppt            NAA            For each of K, Th, and U, natural terrestrial abundance ratios were used to covert from isotopic to total elemental abundances.            D.S.Leonard et al., Nucl. Instr. and Meth. A 591 (2008) (<a href="http://dx.doi.org/10.1016/j.nima.2008.03.001">http://dx.doi.org/10.1016/j.nima.2008.03.001</a>)            Matthew Bruemmer / James Loach mbruemmer@smu.edu / james.loach@gmail.com on 2013-01-30 spec v2.01         </div> </div>					
▶ EXO (2008)	PFA, Saint Gobain DuPont 440-HP	Th	13.3 ppt	U	3 ppt	...
▶ EXO (2008)	Polyimide substrate, Espanex flat cable, Nippon...	Th	1600 ppt	U	1500 ppt	...

# Further Information

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## Code repository / mailing lists

<https://github.com/nepahwin/persephone>

[radiopurity@googlegroups.com](mailto:radiopurity@googlegroups.com)

[info@radiopurity.org](mailto:info@radiopurity.org)

## Publication

J. C. Loach, J. Cooley, G.A. Cox, A.V. Poon, et.al, *A material database for the low-background physics community*, AIP Conference Proceedings 1549, **8** (2013).

# We want your data!

And we want you to use  
our database in your collaboration

[info@radiopurity.org](mailto:info@radiopurity.org)



# Thank you!