

Web Application for the Dual Readout Calorimeter Database

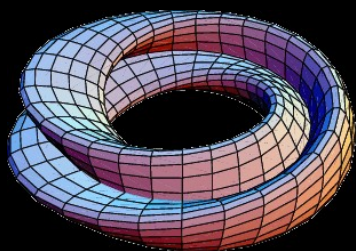


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Contents

- Motivation
- Structured Query Language (SQL)
- Dual Readout Calorimeter Database
- The Web Application
 - JavaServer Pages (JSP)
 - JavaScript (JS)
 - Example
- Future Work

Motivation: Dual Readout Calorimeter Project

- International collaboration trying to improve the models used for a *dual readout calorimeter*
 - A *dual readout calorimeter* measures the energy resolution of Cherenkov and scintillation light
- *Current goal:* find the right materials for the calorimeter so the results from the *Geant4* simulations can be as accurate as possible
- The data is organized into a *database* and be easily found and displayed via a Web application

Structured Query Language (SQL)

- SQL is a computer declarative language that accesses and modifies a database using a set of statements
- There are three kinds of SQL statements, but this database uses *prepared statements* to insert, update, retrieve, delete, and find specific pieces of data

Example prepared statement:

```
INSERT INTO tags (name,value,iid) VALUES (?,?/?)
```

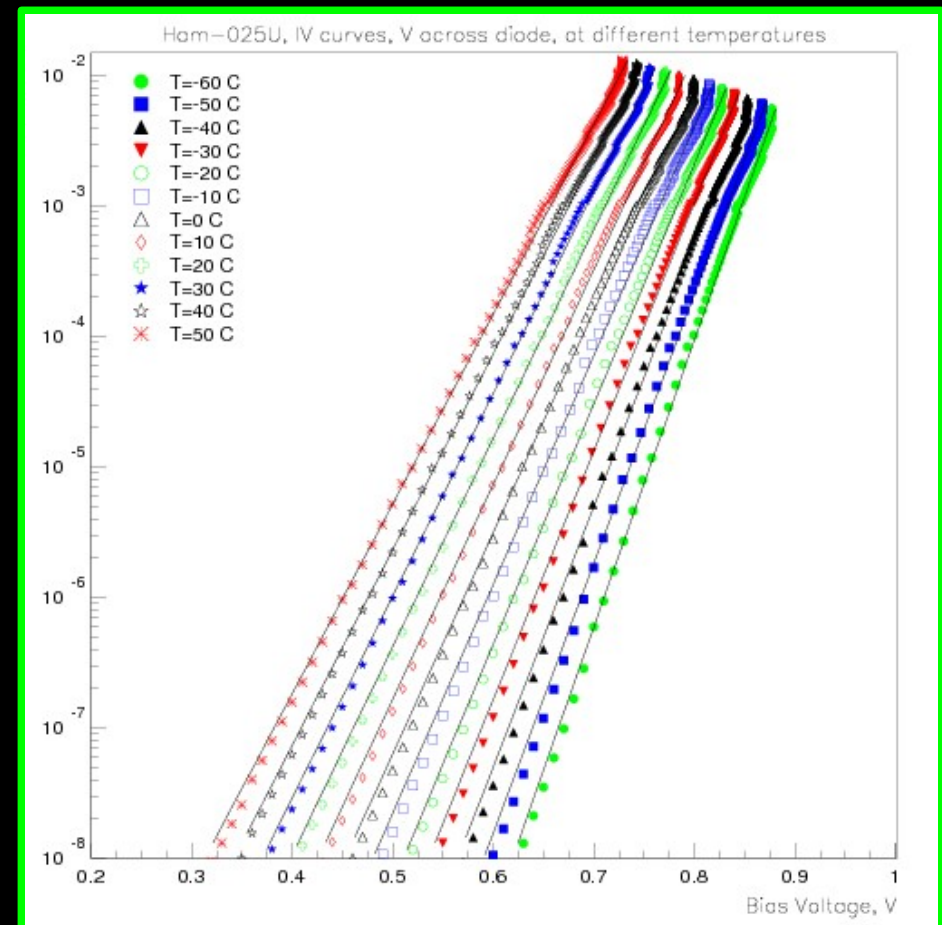
Dual Readout Calorimeter Database

- All of the data in the database is stored in a series of tables
- Every plot can be identified by an *ID* number, *category*, tag *names*, and tag *values*

Plot ID: 206

Category: SiPM

<u>Tag Name:</u>	<u>Value</u>
Detector	Ham-025U_4
Date	110103
Property	IV_forw_diode
Scale	log



DR Image Web Application

- Allows a user to *find and display plots from the database*, just by interacting with a Web page
- Originally, this application only allowed the user to select a plot based on an ID number

Project goal: allow the user to select a plot by category, tags, and values

Categories:

- Crystals
- SiPM
- Crystals_2011

Tag names:

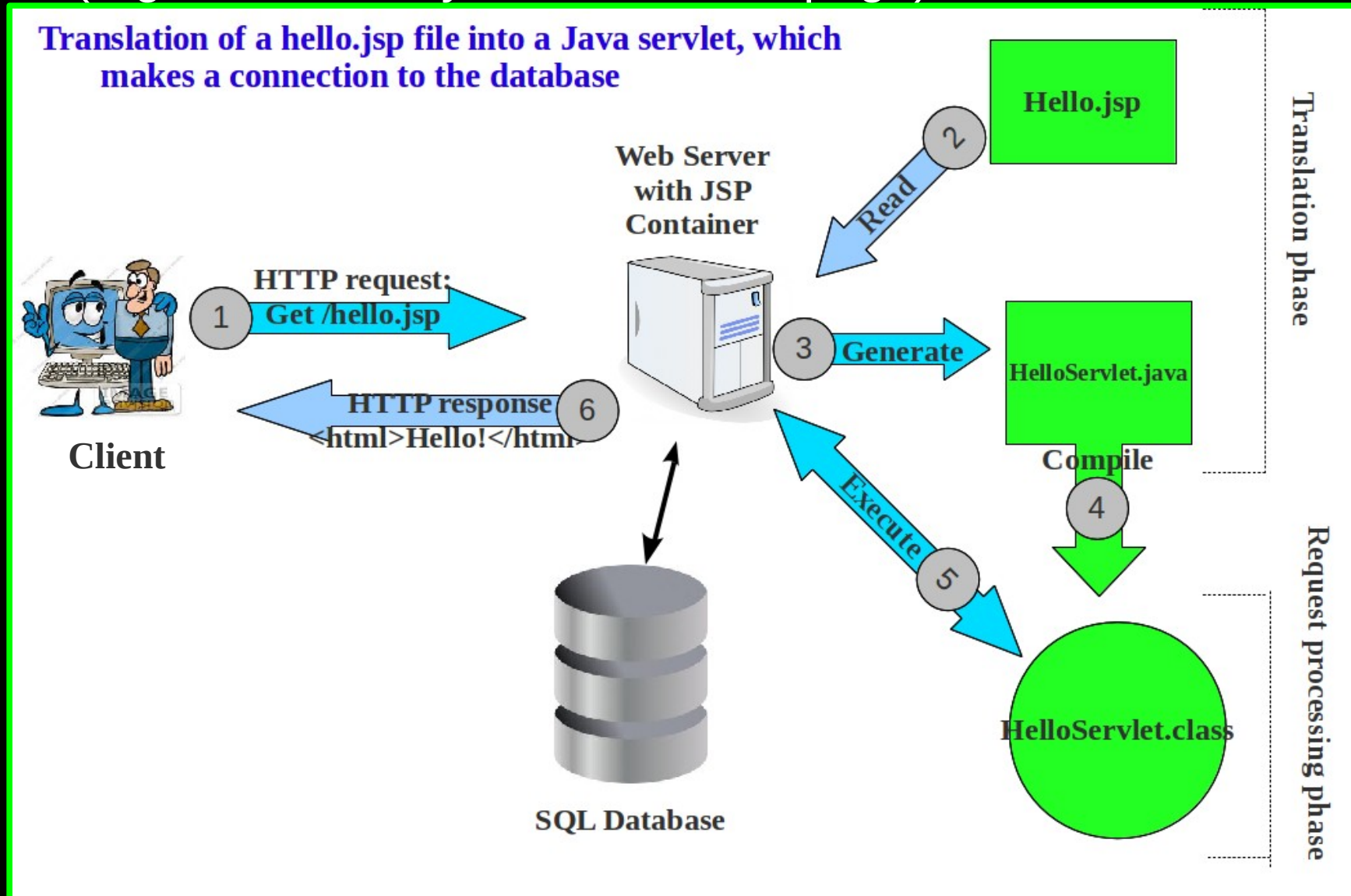
- Detector
- Mode
- Crystal_type
- Sample
- Date
- Method
- Property
- Scale
- Compare

Tag Values:

- Ham-025U_4
- Transmission
- Emission
- Excitation
- BSO
- F10
- F19
- Full_fit
- Linear_fit
- IV_forw_diode
- Lin
- Log
- Vs_sample_10
- Vs_undoped

JavaServer Pages (JSP)

- **JSP**: a combination of **Java** (processes the information) and **HTML** (organizes the layout of the Web page)



JavaScript (JS)

JSP: useful for collecting user data, but not very user-interactive

- **JS:** run on the client's side and allows for more user interaction than JSP

JSP:

- User input
- Text fields
- Check boxes
- Database connection

JS:

- User interaction
- Tooltips
- Image pop-ups
- Dynamic tables
- Image zooming

DR ImageDB Home Page

DRImageWebApp

[HOME](#) [Select Plot](#) [Show Tags](#) [Upload Images](#) [Delete Plots](#) [Login](#) [Site Map](#)  

DR ImageDB Home Page

This page is the DR (Dual Readout) ImageDB starting page. It allows to access the image library created for the Dual Readout Calorimeter project at Fermilab. Currently there are: **376** images stored in the database. The maximum ID is **376**.



From here, you can:

- [Show Categories, Tags, & Values for the DB](#)
This will display a list of categories for the database, followed by a table of all tags and their associated values.
- [Select Plot by Categories, Tags, & Values](#)
This allows the user to find specific plots, based on one or more categories, tags, and values. Every plot will display in a separate window.
- [Display a table of all plots for this category:](#)



Example

DRImageWebApp

[HOME](#)[Select Plot](#)[Show Tags](#)[Upload Images](#)[Delete Plots](#)[Login](#)[Site Map](#)

Select Category

- ☐ Geant 4 simulation of dual readout calorimeter
- ☒ Crystals
- ☐ SiPM
- ☐ Crystals_2011

Number of plots: 376

- Category: Crystals

Example

DRImageWebApp

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Select Category

- ☐ Geant 4 simulation of dual readout calorimeter
☒ Crystals
☐ SiPM
☐ Crystals_2011

Number of plots: 376

Select Tag

AND or OR?:	Choose Tag(s):
<input checked="" type="radio"/> AND	<input checked="" type="checkbox"/> Compare
<input type="radio"/> OR	<input checked="" type="checkbox"/> Crystal_type
	<input type="checkbox"/> Mode
	<input type="checkbox"/> Sample
	<input type="button" value="(Un)Check All"/>

Number of plots: 251

- Category: Crystals
- Tags: Compare AND
Crystal_type

Example

DRImageWebApp

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Select Category

- ☐ Geant 4 simulation of dual readout calorimeter
☒ Crystals
☐ SiPM
☐ Crystals_2011

Number of plots: 376

Select Tag

AND or OR?:	Choose Tag(s):
<input checked="" type="radio"/> AND <input type="radio"/> OR	<input checked="" type="checkbox"/> Compare <input checked="" type="checkbox"/> Crystal_type <input type="checkbox"/> Mode <input type="checkbox"/> Sample (Un)Check All

Number of plots: 251

Select Value

AND or OR?:	Choose Value(s):				
<input checked="" type="radio"/> AND <input type="radio"/> OR	<table border="1"><thead><tr><th>compare</th><th>crystal_type</th></tr></thead><tbody><tr><td><input type="checkbox"/> multiple_measurements <input type="checkbox"/> two_sides <input checked="" type="checkbox"/> vs_sample_10 <input type="checkbox"/> vs_undoped</td><td><input checked="" type="checkbox"/> BSO <input type="checkbox"/> PbF_2</td></tr></tbody></table> (Un)Check All	compare	crystal_type	<input type="checkbox"/> multiple_measurements <input type="checkbox"/> two_sides <input checked="" type="checkbox"/> vs_sample_10 <input type="checkbox"/> vs_undoped	<input checked="" type="checkbox"/> BSO <input type="checkbox"/> PbF_2
compare	crystal_type				
<input type="checkbox"/> multiple_measurements <input type="checkbox"/> two_sides <input checked="" type="checkbox"/> vs_sample_10 <input type="checkbox"/> vs_undoped	<input checked="" type="checkbox"/> BSO <input type="checkbox"/> PbF_2				

Number of plots: 65

- Category: Crystals
- Tags: Compare AND Crystal_type
- Values: vs_sample_10 AND BSO

Example (cont)

DRImageWebApp

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Number of plots: 5

History

Category(s): Crystals

Tags: compare AND crystal_type

Values: vs_sample_10 AND BSO



Show entries

Search all columns:

Plot ID ▲	Compare ▼	Crystal_type ▼	Mode ▼	Sample ▼	Check Plots ▼
58	vs_sample_10	BSO	transmission	BSO10_A	<input type="checkbox"/> 58
59	vs_sample_10	BSO	transmission	BSO6_A	<input type="checkbox"/> 59
60	vs_sample_10	BSO	transmission	BSO7_A	<input type="checkbox"/> 60
61	vs_sample_10	BSO	transmission	BSO8_A	<input type="checkbox"/> 61
62	vs_sample_10	BSO	transmission	BSO9_A	<input type="checkbox"/> 62
	<input type="text" value="compare"/>	<input type="text" value="crystal_type"/>	<input type="text" value="mode"/>	<input type="text" value="sample"/>	<input type="button" value="Submit"/> <input type="button" value="(Un)Check All"/>

Showing 1 to 5 of 5 entries

Example (cont)

DRImageWebApp

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Number of plots: 5

History					
Categorie(s): Crystals					
Tags: compare AND crystal_type					
Values: vs_sample_10 AND BSO					



Show 10 entries

Search all columns: BSO6_A

Plot ID ^	Compare ^	Crystal_type ^	Mode ^	Sample ^	Check Plots ^
59	vs_sample_10	BSO	transmission	BSO6_A	<input type="checkbox"/> 59
	<input type="text" value="compare"/>	<input type="text" value="crystal_type"/>	<input type="text" value="mode"/>	<input type="text" value="sample"/>	<input type="button" value="Submit"/> <input type="button" value="(Un)Check All"/>

Showing 1 to 1 of 1 entries (filtered from 5 total entries)

[First](#) [Previous](#) [1](#) [Next](#) [Last](#)

Search all columns:
BSO6_A

Example (cont)

DRImageWebApp

[HOME](#) [Select Plot](#) [Show Tags](#) [Upload Images](#) [Delete Plots](#) [Login](#) [Site Map](#)



Number of plots: 5

History					
Categorie(s): Crystals					
Tags: compare AND crystal_type					
Values: vs_sample_10 AND BSO					



Show entries

Search all columns:

Plot ID	Compare	Crystal_type	Mode	Sample	Check Plots
62	vs_sample_10	BSO	transmission	BSO9_A	<input type="checkbox"/> 62
61	vs_sample_10	BSO	transmission	BSO8_A	<input type="checkbox"/> 61
60	vs_sample_10	BSO	transmission	BSO7_A	<input type="checkbox"/> 60
59	vs_sample_10	BSO	transmission	BSO6_A	<input type="checkbox"/> 59
58	vs_sample_10	BSO	transmission	BSO10_A	<input type="checkbox"/> 58
<input type="text" value="compare"/> <input type="text" value="crystal_type"/> <input type="text" value="mode"/> <input type="text" value="sample"/>					<input type="button" value="Submit"/> <input type="button" value="(Un)Check All"/>

Showing 1 to 5 of 5 entries

Sort by (multiple) columns:
sort by sample in ascending order



Example (cont)

[HOME](#) [Select Plot](#) [Show Tags](#) [Upload Images](#) [Delete Plots](#) [Login](#) [Site Map](#)



Number of plots: 5

History
Categorie(s): Crystals
Tags: compare AND crystal_type
Values: vs_sample_10 AND BSO



Show 10 entries

Search all columns:

Plot ID	Compare	Crystal_type	Mode	Sample	Check Plots
62	vs sample 10	BSO	transmission	BSO9_A	<input checked="" type="checkbox"/> 62
61				BSO8_A	<input type="checkbox"/> 61
60				BSO7_A	<input type="checkbox"/> 60
59				BSO6_A	<input type="checkbox"/> 59
58				BSO10_A	<input type="checkbox"/> 58
				<input type="text" value="sample"/>	<input type="button" value="Submit"/> <input type="button" value="(Un)Check All"/>

Showing

Hover over plot ID number for a preview of the image

© 2008

Today's date is: Wed Aug 03 10:02:35 CDT 2011

<http://g4validation.fnal.gov:8080/DRImageWebApp/RetrieveGif?tid=62>

Final Examples

View individual plots with table of tags & values

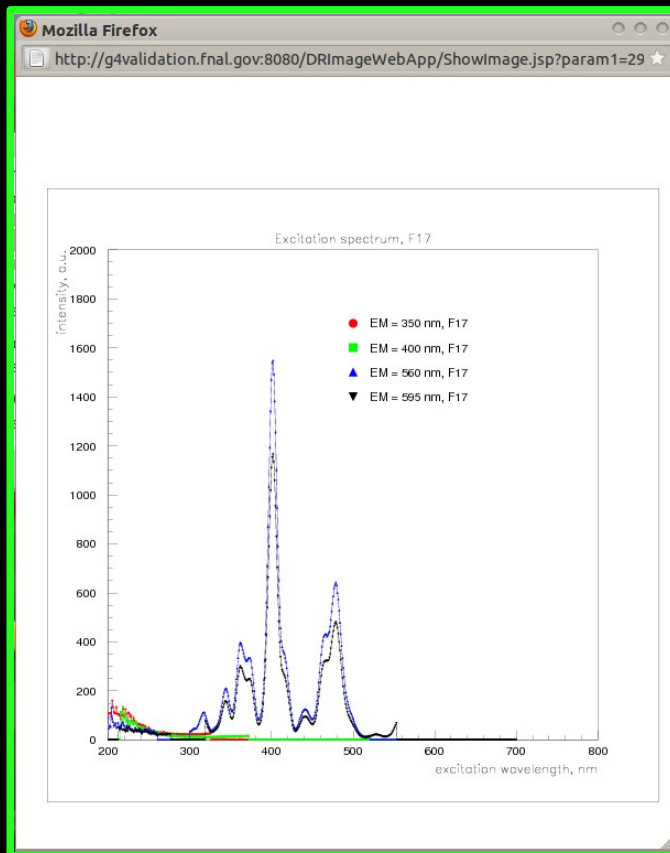
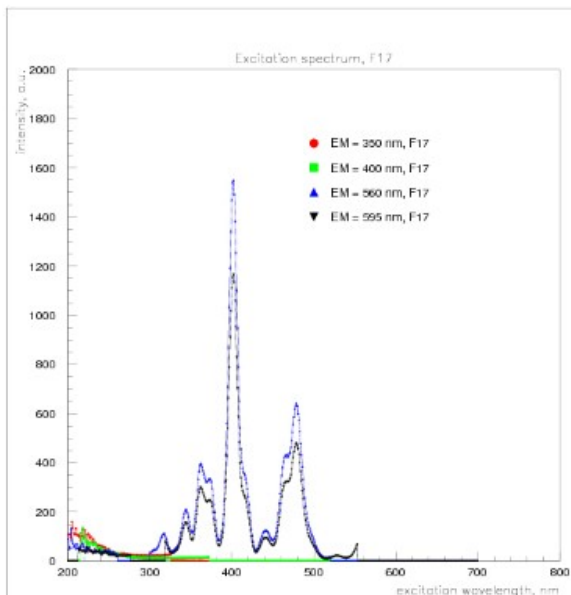
PLOT ID: 297



Category: Crystals_2011
SIC_Dec_2010

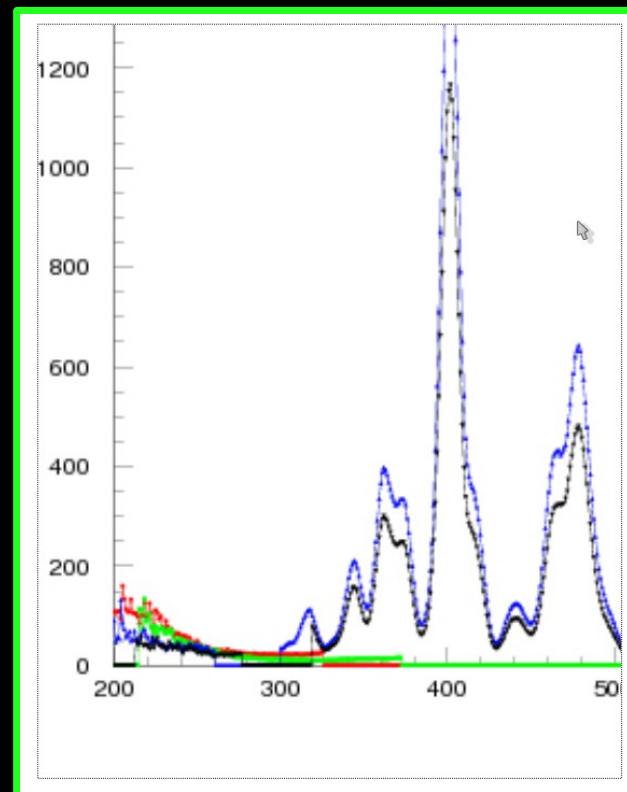
Name	Value
mode	excitation
crystal_type	PbF2
sample	F17

[Click to Enlarge](#)



Open a plot as a pop-up to view multiple plots side-by-side

Zoom & pan on an image



Conclusion & Future Work

- **The Dual Readout Calorimeter Project** is an international collaboration trying to find the best materials to use to make the DR Calorimeter as accurate as possible
- Hundreds of thousands of tests might eventually be run in Geant4, which will accumulate a great deal of data that needs to be stored

Conclusion & Future Work

- *Ultimate goal:* the database will become a **knowledge base** of information where all of the data collected over the next few years will be stored.
- If a physicist wants to use a specific type of crystal or detector, the knowledge base will know all of the information that needs to be put into a Geant4 simulation
- Additionally, the Web application is a general tool that can be used as a framework for other databases

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Questions?

