

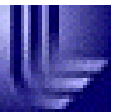
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# Proposal for High Energy Nuclear Database

Joint LBNL/LLNL Proposal  
August 25, 2004

Principal Investigators: David Brown (LLNL)  
Ramona Vogt (LBNL)

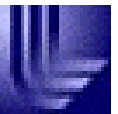
Co-Investigators: Nu Xu (LBNL)  
Ron Soltz (LBNL)  
Jason Pruet (LLNL)  
Scott McKinley (LLNL)



# Outline

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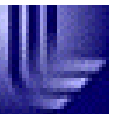
- David Brown (10 min.):
  - Background
  - Enabling technologies
  - Timeline
  - Resource requirements
- Ramona Vogt (10 min.):
  - Evaluation and topical reviews
  - Case Study: *D* meson production



# Background and Impact

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- Large amount of data begs for organization
  - AGS to CERN-LHC data on proton-proton to lead-lead collisions (and other systems as needed)
  - 109+ RHIC experimental publications with tables
- Would simplify cross-experiment comparisons, better theory benchmarking
- Centralization will enable the development of systematics
  - First step in characterizing the plasma
  - Cost (in time & \$\$) to assemble data limits researchers
- Emerging applications for High Energy Nuclear Data: pRad, NASA, HI ICF, MINOS, NLC

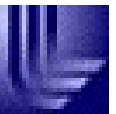


# Cost to community if no database

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## *Data can be lost*

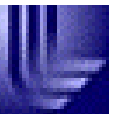
- Can't rely on experiments to save data:
  - Many RHIC experiments post data on web (e.g. PHENIX)
  - Competing formats
  - What happens when experiment ends?
- Can't rely on community to save data:
  - Manpower and \$\$ limited



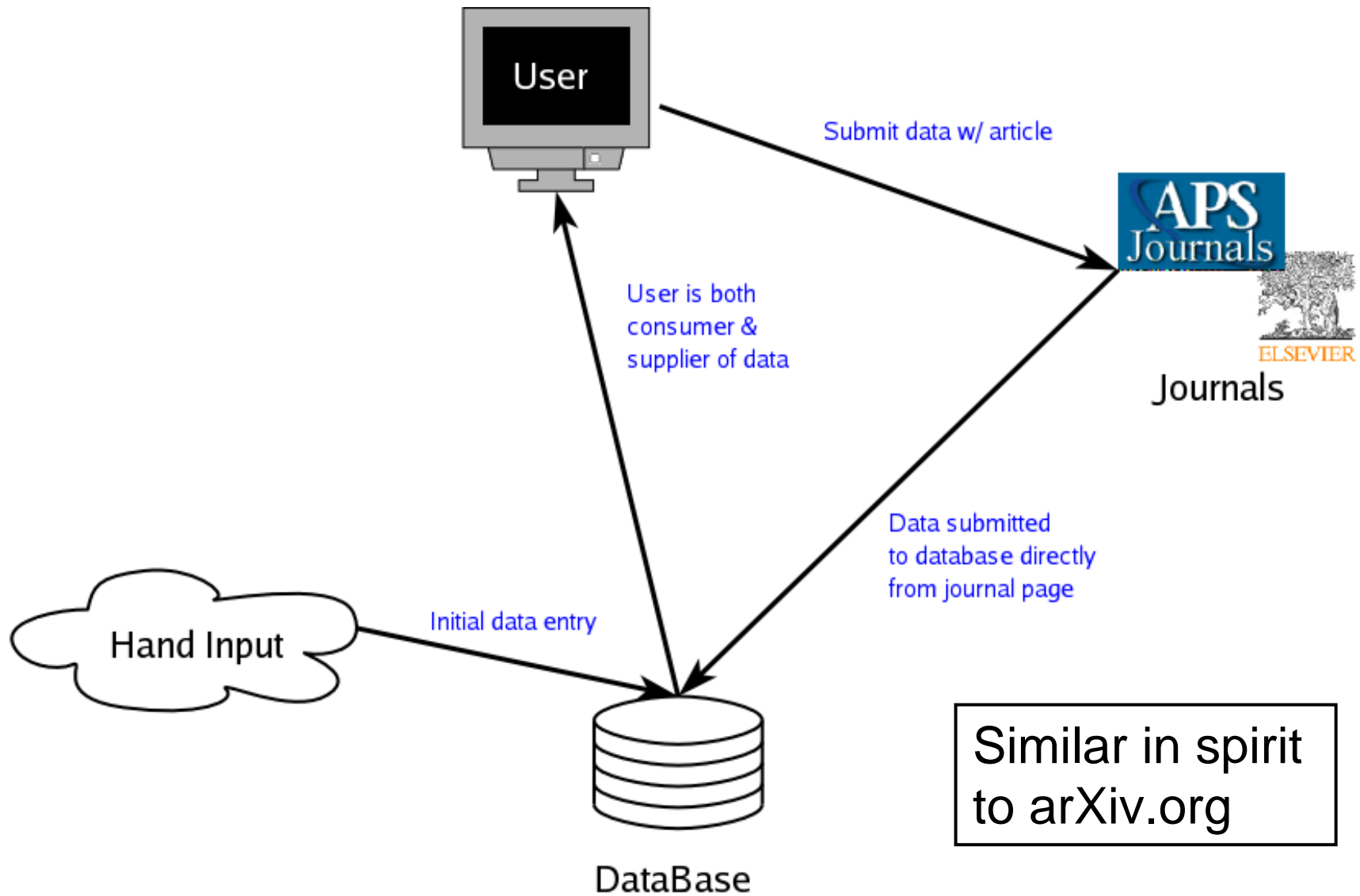
# What Type of Data

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- Measured data
  - Cross sections, particle yields, single spectra
  - Multi-particle spectra, flow, correlations
  - Whatever data is needed to characterize a high-energy heavy-ion reaction
- Evaluated data
  - Product of topical reviews
  - Crucial for applications
- Data must be cross-linked with experimental descriptions, theoretical calculation

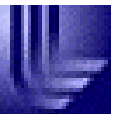
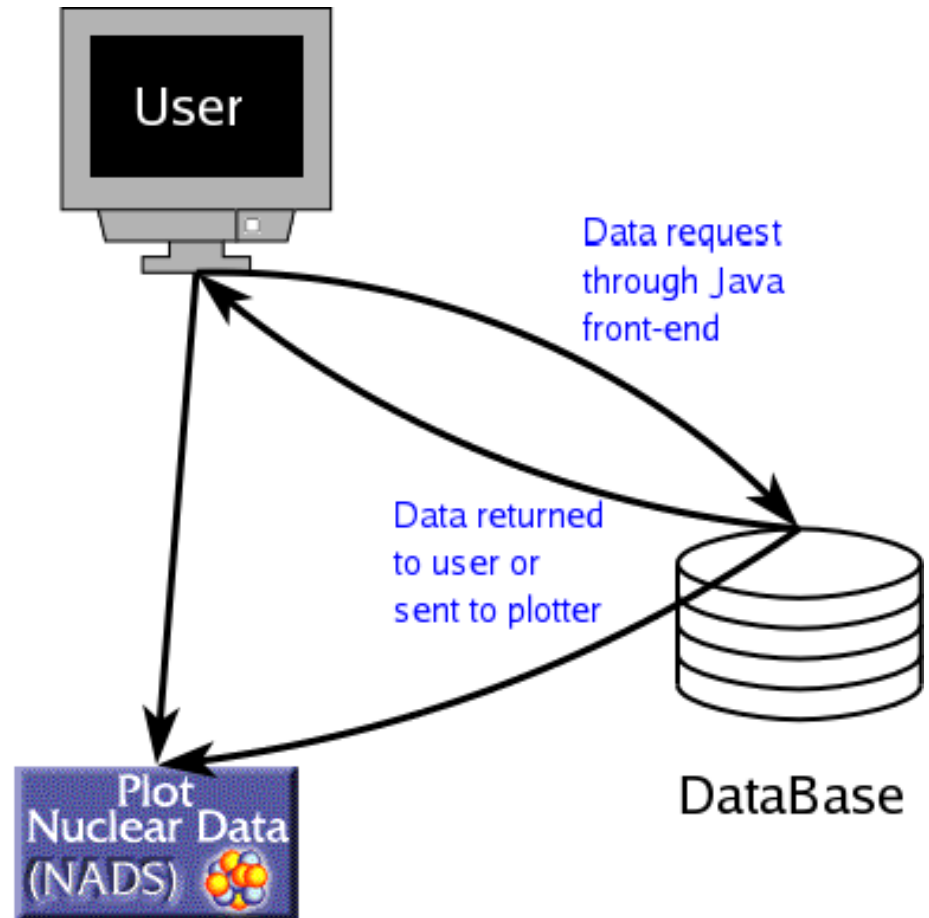


# Submitting Data



# Interface and Backend Technologies

- Java applet interface
- Similar to NNDC's EXFOR and ENDF/B retrievals
- Data returned through applet or to NADS
- Separate data server allows for batch retrievals



# Model user interface (NNDC)

The screenshot shows a Mozilla browser window displaying the NNDC website. The browser's address bar shows the URL <http://www.nndc.bnl.gov/exfor/index.html>. The website header features the IAEA-NDS logo on the left, the title "Experimental Nuclear Reaction Data (EXFOR / CSISRS)" in the center, and the NNDC logo on the right. Below the title, it states "Database Version of July 20, 2004" and provides a brief description of the EXFOR library. The main content area is titled "Standard Request" and includes a search form with various criteria and options. The search form has "Submit" and "Reset" buttons. The criteria include Target, Reaction, Product, Quantity, Energy from (with a "to" field and "eV" unit), Author(s), Publication year, Last modified, and Accession #. The "Options" section includes checkboxes for "Exclude superseded data" and "No reaction combinations (ratios, etc.)", and a "Sort by:" section with radio buttons for "Reaction" and "Accession#". A "Note" section explains the search criteria logic. At the bottom, contact information for the Database Manager (Victoria McLane) and Web and Database Programming (Viktor Zerkin) is provided.

Experimental Nuclear Reaction Data (EXFOR / CSISRS)

Database Version of July 20, 2004

The EXFOR library contains an extensive compilation of experimental nuclear reaction data. Neutron reactions have been compiled systematically since the discovery of the neutron, while charged particle and photon reactions have been covered less extensively. The library contains data from more than 14,000 experiments.

**Standard Request** (example): Requests: [Extended](#) [Advanced](#)

Submit Reset

Target

Reaction

Product

Quantity

Energy from  to  eV

Author(s)

Publication year

Last modified

Accession #

Submit Reset

**Options**

Exclude superseded data

No reaction combinations (ratios, etc.)

Sort by:

Reaction

Accession#

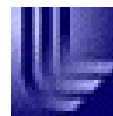
**Note:**

- all criteria are optional (selected by checking )
- selected criteria are combined for search with logical AND
- criteria separated in a field by ";" are combined with logical OR
- wildcards and intervals are available

Database Manager: Victoria McLane, NNDC, Brookhaven National Laboratory ([vmc\\_lane@bnl.gov](mailto:vmc_lane@bnl.gov))

Web and Database Programming: Viktor Zerkin, NDS, International Atomic Energy Agency ([V.Zerkin@iaea.org](mailto:V.Zerkin@iaea.org))

Done





# Data stored in XML format

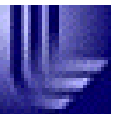
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- **Key Features:**

- Self describing
- Open, standard, license-free, platform-neutral
- Transformable (see next page)
- Unicode support
- Human readable
- Hierarchical structure

- **Lots of Freeware:**

- Editors
- Checkers
- Converters
- Storing
- Publishing
- Parsing (C/C++, Java, Python)



# XML Feature: Stylesheets

Address D:\My Documents\EndML\end94\za000001\elastic\integrated.xml

**Data**

Mass: 1.00867 amu

Date: May 29, 1976

Interpolation: Linear/Linear

Half-Life: 660 s

Temperature: 2.58600E-8 keV

Energy (Q Value): 0

x	y
1.0000000E-10	6.59564E+02
1.2596100E-10	5.87874E+02
1.5866170E-10	5.24021E+02
1.9985190E-10	4.67155E+02
2.5173550E-10	4.16516E+02
3.1708850E-10	3.71431E+02
3.9940790E-10	3.31297E+02
5.0309810E-10	2.95580E+02
6.3370740E-10	2.63803E+02
7.9822420E-10	2.35543E+02
1.0054512E-09	2.10422E+02
1.2664764E-09	1.88105E+02
1.5952663E-09	1.68295E+02
2.0094134E-09	1.50726E+02
2.5310772E-09	1.35164E+02
3.1881702E-09	1.21400E+02
4.0158511E-09	1.09248E+02
5.0584062E-09	9.85437E+01
7.1986870E-09	8.46517E+01
1.0109321E-08	7.37390E+01
1.4386713E-08	6.45819E+01
2.0203671E-08	5.75683E+01
2.8752121E-08	5.18693E+01
4.0377423E-08	4.76719E+01
6.4063520E-08	4.35926E+01
1.0164429E-07	4.09229E+01
2.0313806E-07	3.86200E+01
5.1137053E-07	3.72275E+01
3.6612382E-06	3.64373E+01

integrated.xml (D:\My Documents\EndML\end94\za000001\elastic) - GVIM

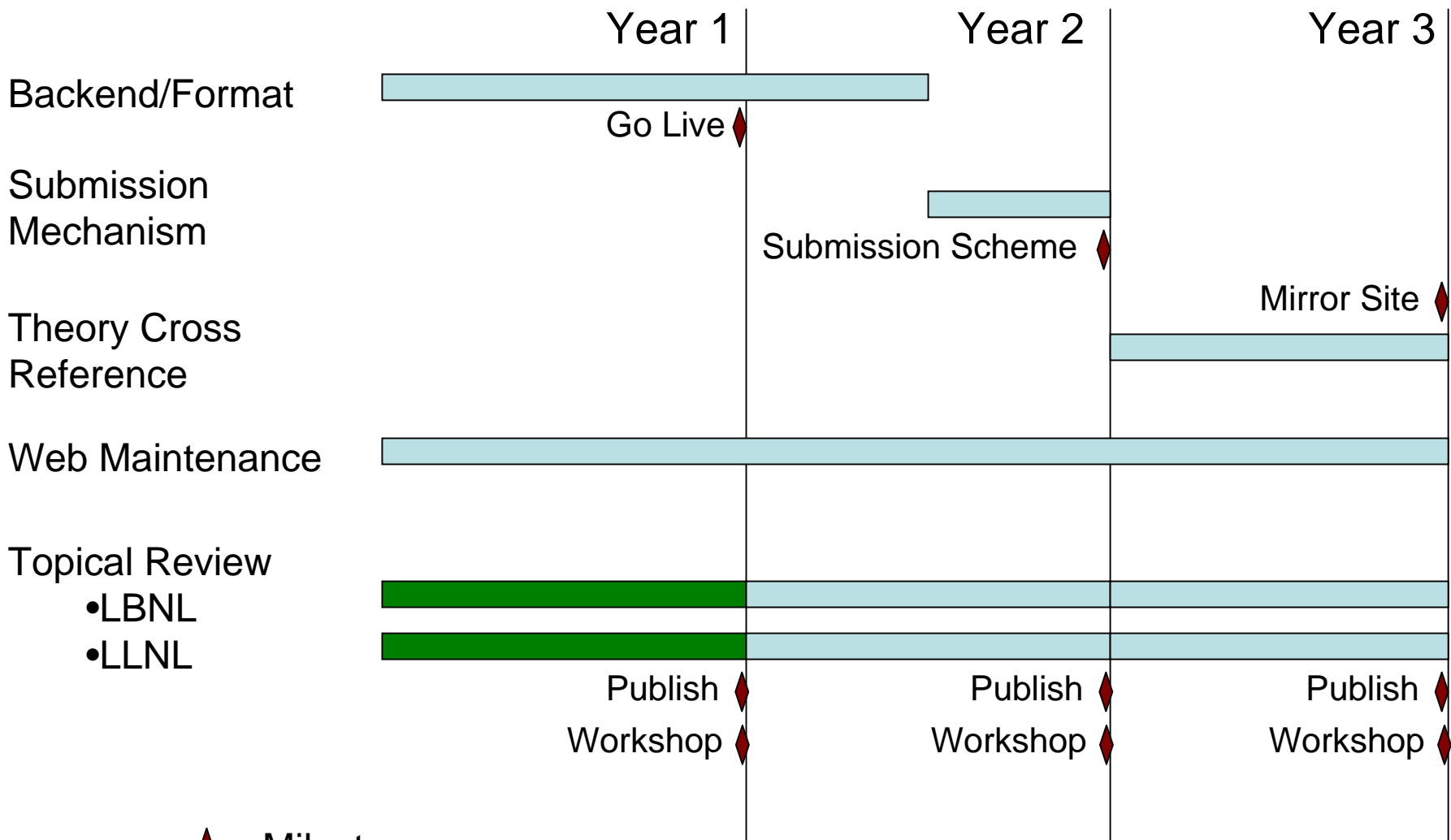
File Edit Tools Syntax Buffers Window Help

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  <Date>May 29, 1976</Date>
  <Interpolation>Linear/Linear</Interpolation>
  <HalfLife>660 s</HalfLife>
  <Temperature>2.58600E-8 keU</Temperature>
  <Energy>0</Energy>
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    <Point><X>1.2596100E-10 </X><Y>5.87874E+02</Y></Point>
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    <Point><X>4.0377423E-08 </X><Y>4.76719E+01</Y></Point>
    <Point><X>6.4063520E-08 </X><Y>4.35926E+01</Y></Point>
    <Point><X>1.0164429E-07 </X><Y>4.09229E+01</Y></Point>
  </Data2D>
</Data>
```

1, 1 Top

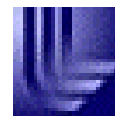


# Project Timeline



◆ = Milestones

■ = Covered by existing LDRDs

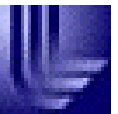


# Resource Requirements

	Year 1	Year 2	Year 3	Out Years
Backend Technology Development	0.5 FTE (LLNL)	0.25 FTE (LLNL)		
Data Collection	0.25 FTE (LBNL)	0.5 FTE (LLNL/LBNL)	0.5 FTE (LLNL/LBNL)	As needed
Theory Cross Reference Scheme			0.5 FTE (LLNL/LBNL)	Continuing
Topical Review		1.5 FTE (LLNL/LBNL)	1.5 FTE (LLNL/LBNL)	1.5 FTE (LLNL/LBNL)
Workshop	\$5K	\$5K	\$5K	\$5K
Website Maintenance	0.1 FTE	0.1 FTE	0.1 FTE	0.1 FTE

## Related Funding (Year 1):

- LBNL *D* Meson LDRD pays 100% of an FTE for R. Vogt
- LLNL MIPP LDRD pays 50% of an FTE for D. Brown



# LBNL and LLNL Strengths

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Hard probe expert  
Widely known in field



Two particle correlation expert  
Transport theory  
Nuclear data evaluator

HBT Expert  
LLNL's PHENIX Grp. leader  
Convenor Hadronic Physics  
Working Grp.



Soft hadron expert  
LBNL's Soft hadron Grp.  
leader  
Serves on several STAR  
committees

XML, Java  
NADS Developer



High energy nuclear  
astrophysics  
XML, Java  
ENDL Maintainer

