# Use of USNDP Databases

U.S. Nuclear Data Program

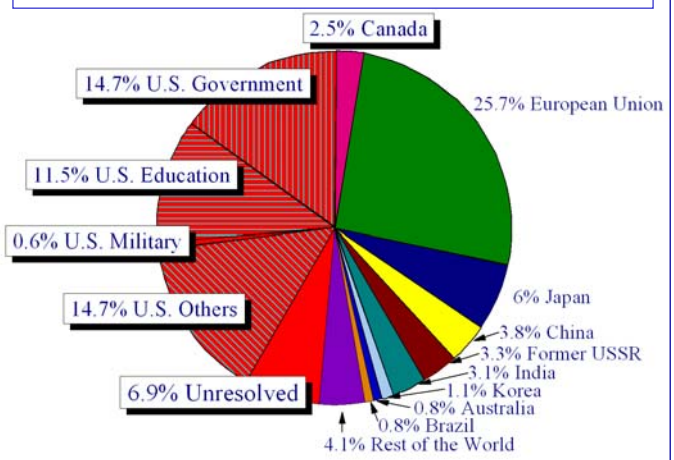
March 2005

- The USNDP offers access to nuclear structure, nuclear reaction and bibliography databases, as well as to a variety of calculation tools, publications and codes.
- USNDP web sites are found in BNL, LANL, LBNL, also in ANL, LLNL, ORNL and TUNL. The number of retrievals from these sites have increased steadily with time.

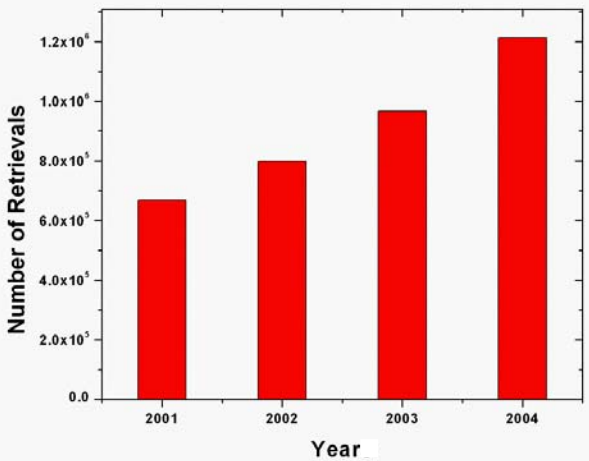
## Example: National Nuclear Data Center Web Services (*www.nndc.bnl.gov*)

- The NNDC began offering remote electronic access to its databases in 1986, showing since then an exponential growth in the number of database retrievals.
- The current web service was launched in April 2004, using 4 dual-processor servers and modern programming technologies. This upgrade brought considerable increase in retrievals. Among NNDC products, NuDat registered the largest increase, a factor of 3 relative to 2003. As an example, NuDat is analyzed to some depth on next 3 pages.

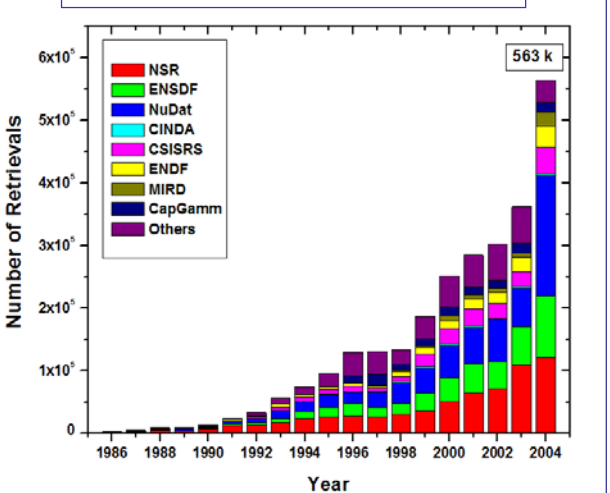
Geographical distribution of NNDC retrievals




Retrievals from USNDP Web sites




Retrievals from NNDC Web site




## NNDC Web Users

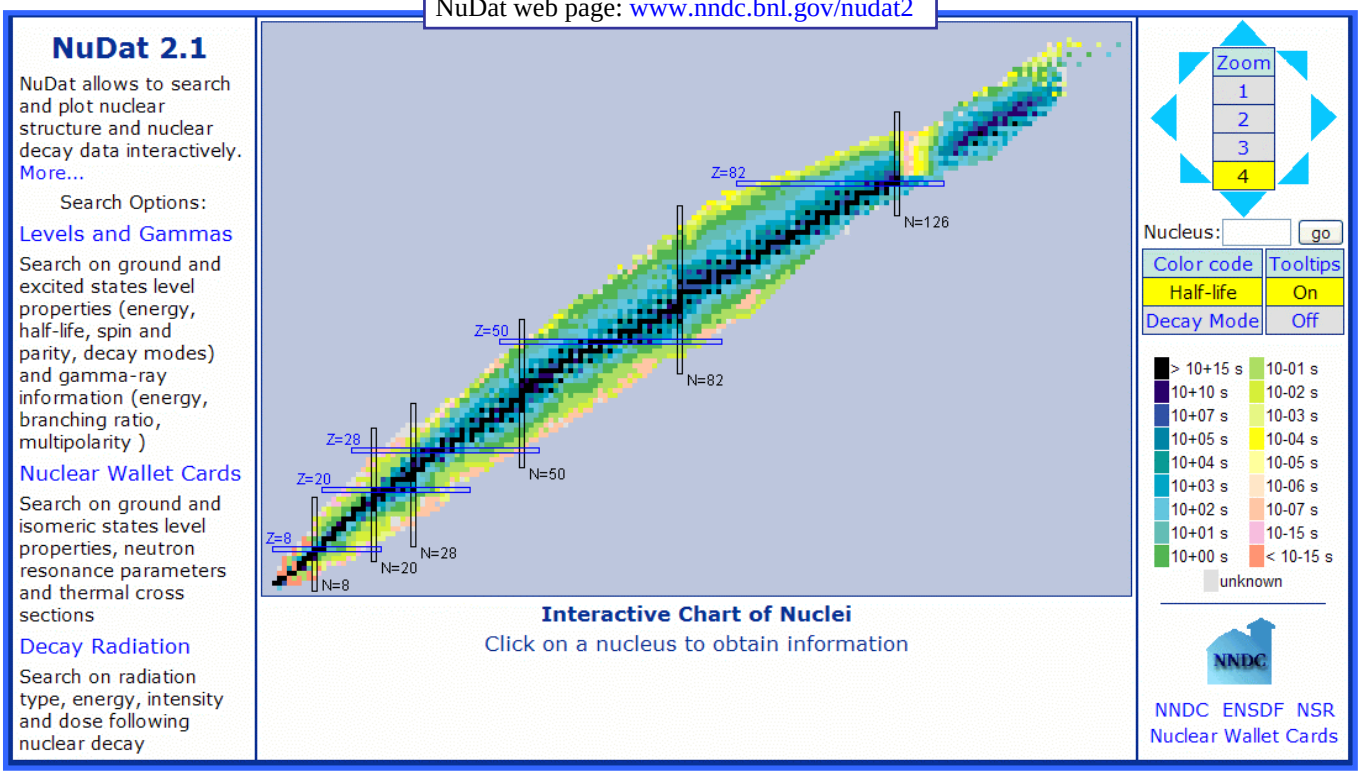
- Large organizations as well as small single-user organizations (11,100 in total) accessed the NNDC web site during 2004.
- U.S. and Canada users accounted for 45 % of all retrievals.
- 110 US government organizations and 240 U.S. Universities consulted the NNDC in 2004.

# NuDat 2

In any organization where nuclear science and technology work is performed, the two most often consulted references are the Table of Isotopes and a Chart of Nuclides.

The goal of NuDat is to provide interactive Internet access to similar material, with the additional requirements that the table of isotopes and the chart are integrated, and the data are up to date and searchable.

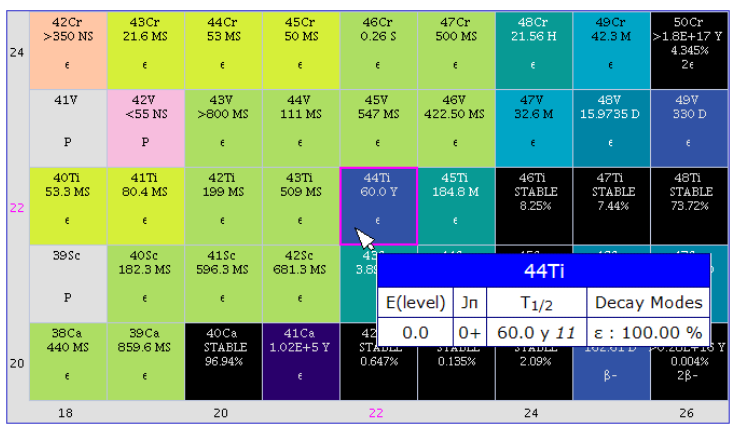
NuDat web page: www.nndc.bnl.gov/nudat2




## Interactive Chart of Nuclei

- 2923 known nuclei in the N-Z plane
- Four zoom options
- Color coded according to Half-life or Decay Mode
- Pop-up boxes (tool tips) with nuclear information
- Links to levels tables, schemes and decay information

NuDat tool tips, dynamic transfer of information



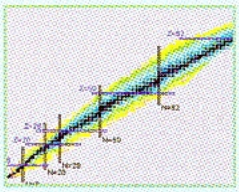

NuDat has been available electronically since 1986. In the first version, a Telnet connection allowed remote users to reach the NNDC server. The first Web version appeared in 1994. NuDat 2.0 was released in April 2004; the current version, 2.1, became public in December 2004.

# NuDat in the Press

Physics Today

WEB WATCH

http://www.nndc.bnl.gov/nudat2



Thanks to **NuDat 2.0**, you can do online searches of the databases held at Brookhaven National Laboratory's National Nuclear Data Center. The software's principal interface is an interactive chart of the nuclides. Clicking on a nuclide brings up information about its nuclear levels, half-life, spin-parity, and so on.

34 November 2004 Physics Today

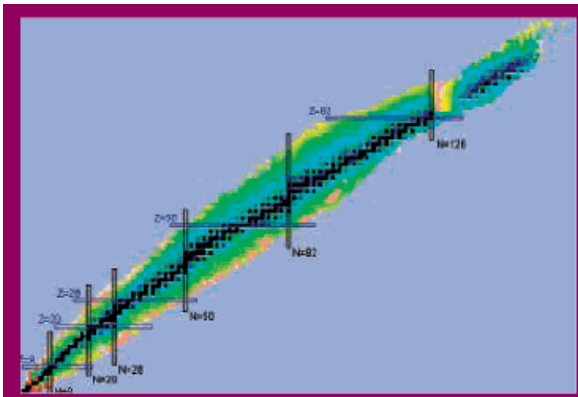
NuDat was recently featured in the Web Watch and NetWatch sections of *Physics Today* and *Science*, respectively.

*Physics Today* is a monthly publication from the American Institute of Physics. *Science*, one of the most highly cited scientific journals, is published weekly by the American Association for the Advancement of Science

Science

NETWATCH

edited by Mitch Leslie



DATABASE

## Atomic Alter Egos

Breaking up is easy to do for unstable isotopes such as uranium-235 and nitrogen-17. Everyone from nuclear engineers to health physicists can corral basic data about these fleeting isotopes and their more stable counterparts at NuDat from Brookhaven National Laboratory in Upton, New York. For nearly 3000 isotopes, the site records properties such as spin-parity, half-life, mass, and type of radioactive decay. To learn more about a particular breakdown, try the Decay Radiation function, which supplies values such as energy release and radiation dose. The chart above plots the different isotopes by their number of neutrons and protons.

www.nndc.bnl.gov

www.sciencemag.org SCIENCE VOL 307 14 JANUARY 2005

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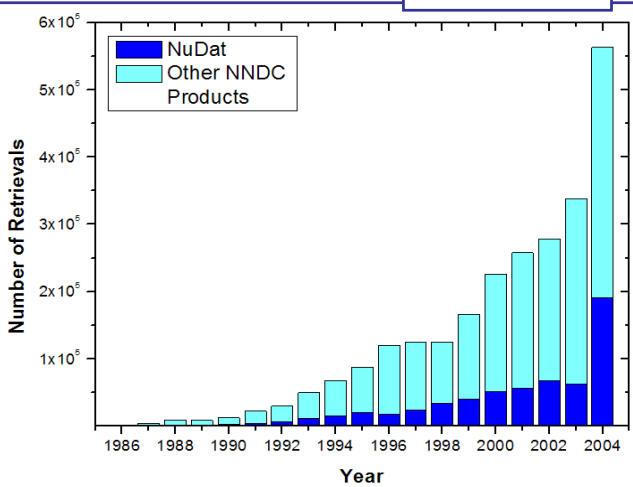
# Retrieval Statistics

Since first offered in 1986, the number of remote electronic retrievals from NNDC databases have grown exponentially.

NNDC retrievals




The use of graphical interfaces in NuDat 2 received a positive user response, and as a result, the number of database retrievals increased by factor of 3. During 2004, NuDat represented about 34 % of all NNDC retrievals.

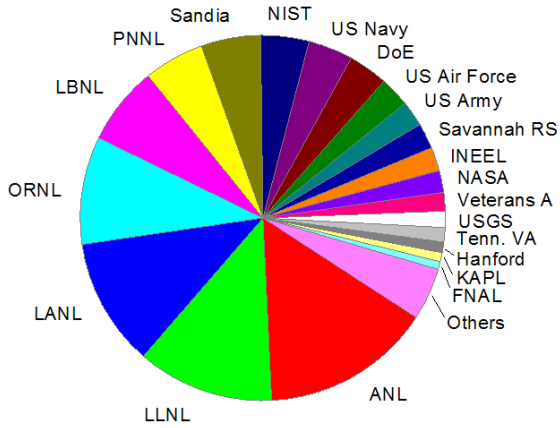
# NuDat User Distributions

Most of NuDat users come from industrialized countries, with the USA and Canada accounting for 55.5 % of the total.

The NuDat user's community is large and diverse, from low-energy nuclear physics laboratories to organizations such as CERN and Fermi Lab, including many universities and government agencies.

The user distribution is obtained from the addresses of the computers that access NuDat, excluding Internet search engines, such as Google, as well as machines that operate under the '.bnl.gov' domain.

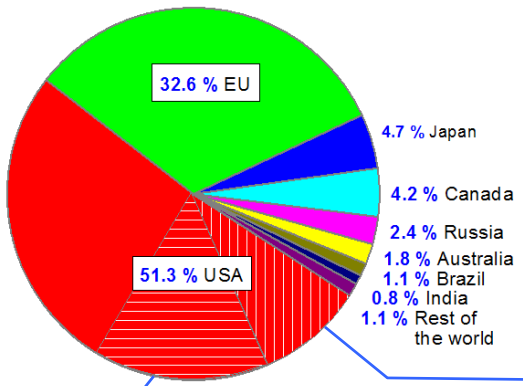
Relative distribution of US Government users




| US Government Organization | Retrievals |
|---|---|
| ANL | 1.78 % |
| LLNL | 1.43 % |
| LANL | 1.33 % |
| ORNL | 1.12 % |
| LBNL | 0.82 % |
| PNNL | 0.63 % |
| Sandia NL | 0.62 % |
| NIST | 0.51 % |
| US Navy | 0.47 % |
| DoE | 0.41 % |
| US Air Force | 0.32 % |
| US Army | 0.27 % |
| Savannah RS | 0.27 % |
| INEEL | 0.25 % |
| NASA | 0.23 % |

Retrievals by US government users account for **11.4 %** of the total.

Geographical distribution of NuDat retrievals




Nearly 170 different US universities have used NuDat, representing **15 %** of the total number of retrievals.

| US University | Retrievals |
|---|---|
| Notre Dame | 1.54 % |
| Duke | 1.46 % |
| Ohio U | 1.45 % |
| Florida State | 0.96 % |
| Yale | 0.75 % |
| Purdue | 0.55 % |
| UC Berkeley | 0.49 % |
| Michigan State | 0.47 % |
| U of Washington | 0.46 % |
| U of Tennessee | 0.33 % |
| Texas A&M | 0.44 % |
| Louisiana State | 0.32 % |
| U of Texas | 0.32 % |
| Stony Brook | 0.23 % |

The most prestigious nuclear physics research institutions worldwide consult NuDat regularly, as well as many universities with active nuclear physics and engineering programs.

| Non-US University | Retrievals |
|---|---|
| Jyvaskyla U, Finland | 0.83 % |
| Uppsala U, Sweden | 0.80 % |
| Australian National U | 0.71 % |
| Osaka U, Japan | 0.67 % |
| U Tokyo, Japan | 0.62 % |
| Darmstadt TU, Germany | 0.61 % |
| Siegen U, Germany | 0.61 % |
| Tuebingen U, Germany | 0.55 % |
| Eotvos U, Hungary | 0.54 % |
| Cologne U, Germany | 0.54 % |

| Non-US Laboratory | Retrievals |
|---|---|
| CEA, France | 1.88 % |
| RIKEN, Japan | 1.46 % |
| INFN, Italy | 1.65 % |
| GSI, Germany | 1.40 % |
| JINR, Russia | 1.09 % |
| CERN | 0.87 % |
| TRIUMF, Canada | 0.75 % |
| Saha, India | 0.51 % |
| Max Plank, Germany | 0.30 % |
| P. Scherrer, Switzerland | 0.29 % |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