

# Bibliographic Databases in Support of NSDD Evaluations

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Presentation for the ICTP-IAEA Workshop on Nuclear  
Structure and Decay Data: Theory and Evaluation

20 February - 4 March 2006

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# **Bibliographic Databases in Support of NSDD Evaluations**

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- Nuclear Science References (NSR)
- Authors' Bibliographies

# Nuclear Science References (NSR)

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- Formerly Nuclear Structure References
  - Name change in 1995 to reflect extended coverage
- Primary effort centered at the NNDC
  - Also contributions from Russian groups covering secondary sources such as conferences and reports
  - As of 2006, personnel at the IAEA nuclear data section are preparing keywords for some European journals on a trial basis
- Over 80 journals are checked
  - Several journals completely indexed in NSR
    - Journals completely devoted to nuclear physics such as European Journal of Physics A, Nuclear Physics A, or Physical Review C.
- Relevant information from laboratory reports, conference proceedings, theses, *etc.* also indexed

# Nuclear Science References (NSR) - 2

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- Reference oriented bibliography
- Over 180,000 entries
  - About 4500 entries added yearly
- “Complete” for primary nuclear structure references from 1967 on
  - Entries go back to 1910



# Nuclear Science References (NSR) - 3

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- HTML-formatted retrievals have links to other sources
  - Digital Object Identifiers (doi) for several journals
    - 88033 as of January 27, 2006
  - Evaluated Nuclear Structure Data File (ENSDF)
    - 235 as of January 27, 2006
  - Experimental Unevaluated Nuclear Data Library (XUNDL)
    - 1396 as of January 27, 2006

# Nuclear Science References (NSR) - 4

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- One issue of the Nuclear Data Sheets devoted to Recent References each year until 2004
- Access *via* the Web
  - NNDC and IAEA-NDS (Vienna) and mirror NDS sites
  - Also available from others (e.g., LBNL and PNPI)

# Nuclear Science References (NSR) - 5

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- Update Frequency
  - Master database updated as references are scanned or modified.
  - NNDC Web site updated weekly
  - Weekly updates sent to the IAEA Nuclear Data Section
  - Monthly mass-chain-specific updates to the responsible evaluation centers
  - Monthly updates in the exchange format also sent to LBNL, PNPI, Sarov, and others

# Nuclear Science References (NSR) - 6

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- Examples
  1. Starting a new mass chain evaluation
    - NSR (<http://www.nndc.bnl.gov/nsr/>)
    - NSR for Evaluators (<http://www.nndc.bnl.gov/nndc/evalcorner/nsr4eval.html>)
  2. Starting an evaluation of a nuclide
  3. As an aid in reviewing an ENSDF evaluation
  4. Searches by publication year and first author
  5. Checking keynumber lists
    - May be used with output from the program ENSDAT (Evaluated Nuclear Structure Drawings and Tables)
  6. Others



# Nuclear Science References (NSR) – 6: Example 1

## NSR Indexed Search

[NSR Home](#) [Indexed Search](#) [Text Search](#) [Keynumber Search](#) [Help](#)

### Initialization Parameters

Publication year range: 1910 to 2005  
Primary only:  Require measured quantity:   
Output year order: Descending  
Output format: Normal  
 Search all entries  Search entries added since 6 / 16 / 1995 / (month/day/year)

### Search parameters

Nuclide    
AND  
   
AND

# Nuclear Science References (NSR) – 6: Example 1 (cont.)

## NSR Query Results

Publication year range : 1910 to 2005  
Primary and secondary references.  
Search entries added since 6/16/1995.

Output year order : Descending  
Format : Normal

NSR database version of Feb 25, 2005.

Indexed quantity search: Nuclide=A=48

Found 643 matches. Showing 1 to 100. [[Next](#)]

[Back to query form](#)

### 2005EN01

Phys.Rev. C 71, 014306 (2005)

J.Enders, P. von Neumann-Cosel, C.Rangacharyulu, A.Richter

*Parameter-free description of orbital magnetic dipole strength*

NUCLEAR STRUCTURE 46,48Ti, 50Cr, 56Fe, 66Zn, 92Zr, 94Mo, 108,112,114Cd, 122,124,126,130Te, 134,136Ba, 142Ce, 144,146,148,150Nd, 148,150,152,154Sm, 154,156,158,160Gd, 160,162,164Dy, 166,168,170Er, 172,174,176Yb, 176,178,180Hf, 182,184,186W, 190,192Os, 194,196Pt, 232Th, 236,238U; analyzed scissors mode excitation energies, deformation parameters, magnetic dipole strength distributions. Sum-rule approach.

doi: [10.11103/PhysRevC.71.014306](https://doi.org/10.11103/PhysRevC.71.014306)

### 2005SU01

Nucl.Phys. B(Proc. Supp.) S138, 227 (2005)

# Nuclear Science References (NSR) – 6: Example 1 (cont.)

## NSR Indexed Search

[NSR Home](#) [Indexed Search](#) [Text Search](#) [Keynumber Search](#) [Combine/View Lists](#) [Help](#)

### Initialization Parameters

Publication year range:  to   
 Primary only.  Require measured quantity:   
Output year order:    
Output format:    
 Search all entries  Search entries added since  /  /   (month/day/year)

### Search parameters

AND  
     
AND



# Nuclear Science References (NSR) – 6: Example 1 (cont.)

## NSR Query Results

Publication year range : 1910 to 2005  
Primary and secondary references.  
Search entries added since 6/16/1995.

Output year order : Descending  
Format : Normal

NSR database version of Feb 25, 2005.

Indexed quantity search:  $A(\text{range})=48$

Found 217 matches. Showing 1 to 100. [[Next](#)]

[Back to query form](#)

### 2005KI02

At.Data Nucl.Data Tables 89, 77 (2005)

T. Kibedi, R. H. Spear

*Electric monopole transitions between  $0^+$  states for nuclei throughout the periodic table*

COMPILATION A=4-250; compiled, analyzed  $0^+ \rightarrow 0^+$  transition energies,  $T_{1/2}$ , ICC, electric monopole transition strengths.

doi: [10.1016/j.adt.2004.11.002](https://doi.org/10.1016/j.adt.2004.11.002)

### 2004ANI4

At.Data Nucl.Data Tables 87, 185 (2004)

I. Angeli





# Nuclear Science References (NSR) – 6: Example 1 (cont.)

**View and Combine Previous Retrievals**

[NSR Home](#) [Indexed Search](#) [Text Search](#) [Keynumber Search](#) [Combine/View Lists](#) [Help](#)

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**Combine lists:**    2    OR    3    Combine

**Output format:** Normal    **Output year order:** Descending

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**Current lists:**

List #	Search/Initialization strings	Number found
1	Indexed quantity search: Nuclide=A=48 YLO:1910; YHI:2005; PRIM:no; EXPR:no; Cutoff:None	2973 <a href="#">View</a>
2	Indexed quantity search: Nuclide=A=48 YLO:1910; YHI:2005; PRIM:no; EXPR:no; Cutoff:6/16/1995	643 <a href="#">View</a>
3	Indexed quantity search: A(range)=48 YLO:1910; YHI:2005; PRIM:no; EXPR:no; Cutoff:6/16/1995	217 <a href="#">View</a>

[Clear Lists](#)

# Nuclear Science References (NSR) – 6: Example 1 (cont.)

## NSR Query Results

Output year order : Descending  
Format : Normal

NSR database version of Feb 25, 2005.

List combine: 2 OR 3

Found 849 matches. Showing 1 to 100. [\[Next\]](#)

[Back to query form](#)

### 2005EN01

Phys.Rev. C 71, 014306 (2005)

J.Enders, P.von Neumann-Cosel, C.Rangacharyulu, A.Richter

*Parameter-free description of orbital magnetic dipole strength*

NUCLEAR STRUCTURE 46,48Ti, 50Cr, 56Fe, 66Zn, 92Zr, 94Mo, 108,112,114Cd, 122,124,126,130Te, 134,136Ba, 142Ce, 144,146,148,150Nd, 148,150,152,154Sm, 154,156,158,160Gd, 160,162,164Dy, 166,168,170Er, 172,174,176Yb, 176,178,180Hf, 182,184,186W, 190,192Os, 194,196Pt, 232Th, 236,238U, analyzed scissors mode excitation energies, deformation parameters, magnetic dipole strength distributions. Sum-rule approach.

doi: [10.1103/PhysRevC.71.014306](https://doi.org/10.1103/PhysRevC.71.014306)

### 2005K102

At.Data Nucl.Data Tables 89, 77 (2005)

T.Kibedi, R.H.Spear

*Electric monopole transitions between  $0^+$  states for nuclei throughout the periodic table*

COMPILATION A=4-250; compiled, analyzed  $0^+ \rightarrow 0^+$  transition energies,  $T_{1/2}$ , ICC, electric monopole transition strengths.

doi: [10.1016/j.adt.2004.11.002](https://doi.org/10.1016/j.adt.2004.11.002)



# Nuclear Science References (NSR) – 6: Example 1 (cont.)

## Nuclear Science References (NSR) for Evaluators



To NNDC

NSR for Evaluators provides a simplified interface to NSR with an ASCII text output that has no restrictions as to the number of NSR entries retrieved. For the full NSR interface, please go to <http://www.nndc.bnl.gov/nsr/>.

**Nuclide:**  Enter a nuclide in the form AAAZZ where AAA is the atomic mass and ZZ is the chemical symbol (Use the last two digits of the atomic number for Z>110), "Z=" followed by the atomic number, or "A=" followed by the atomic mass. Examples: 45SC, 235U, 239PU, 28011, Z=20, or A=100.

**Search entries added since:**    \*Year and month must be specified.

**Output year order:**

To: NSDD Evaluators' Corner  
Nuclear Science References

*Database Manager: David Winchell, NNDC, Brookhaven National Laboratory (nsr@bnl.gov)  
Web and Programming: Thomas W. Burrows (nndctb@bnl.gov) and David Winchell (nsr@bnl.gov), NNDC, Brookhaven National Laboratory  
Data Source: NSR is compiled at the National Nuclear Data Center (<http://www.nndc.bnl.gov/>)*



Brookhaven Science Associates  
U.S. Department of Energy



# Nuclear Science References (NSR) – 6: Example 1 (cont.)

\*\*\* Nuclear Science References Retrieval \*\*\*

Query: M:A=48

Year range: 1910 to 2005

Entries added since 19950616

Primary and secondary references

NSR database version of Feb 25, 2005

643 matching entries found

2005En01

Phys.Rev. C 71, 014306 (2005)

J.Enders, P.von Neumann-Cosel, C.Rangacharyulu, A.Richter

Parameter-free description of orbital magnetic dipole strength

NUCLEAR STRUCTURE 46,48Ti,50Cr,56Fe,66Zn,92Zr,94Mo,108,112,114Cd,122,  
124,126,130Te,134,136Ba,142Ce,144,146,148,150Nd,148,150,152,154Sm,  
154,156,158,160Gd,160,162,164Dy,166,168,170Er,172,174,176Yb,176,178,  
180Hf,182,184,186W,190,192Os,194,196Pt,232Th,236,238U; analyzed  
scissors mode excitation energies, deformation parameters, magnetic  
dipole strength distributions. Sum-rule approach.

2005Su01

Nucl.Phys. B(Proc.Supp.) S138, 227 (2005)

J.Suhonen, M.Kortelainen

Analysis of the  $2\nu$  beta beta decay and  $\mu\text{on}$  capture reactions for  
the mass  $A = 46$  and  $A = 48$  nuclei using the nuclear shell model

RADIOACTIVITY 46,48Ca(2beta-); calculated  $2\nu 2\text{beta}$ -decay matrix  
elements,  $T^{-1/2}$ .

NUCLEAR REACTIONS 46,48Ti( $\mu$ -,nu),E not given; calculated ordinary

$\mu\text{on}$  capture rates



# Nuclear Science References (NSR) – 6: Example 2

**NSR Indexed Search**

[NSR Home](#) [Indexed Search](#) [Text Search](#) [Keynumber Search](#) [Help](#)

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### Initialization Parameters

Publication year range:  to   
Primary only:  Require measured quantity:   
Output year order:   
Output format:   
 Search all entries  Search entries added since  /  /  (month/day/year)

---

### Search parameters

**AND**  
   
**AND**



# Nuclear Science References (NSR) – 6: Example 2 (cont.)

## NSR Query Results

Publication year range : 1910 to 2005  
Primary and secondary references.  
Search entries added since 6/16/1995.

Output year order : Descending  
Format : Normal

NSR database version of Feb 25, 2005.

Indexed quantity search: Nuclide=48cr

Found 122 matches. Showing 1 to 100. [[Next](#)]

[Back to query form](#)

### 2004AL23

Chinese Physics 13, 1230 (2004)

F.H.Al-Khadair, G.-L.Long

*Isospin and F-spin symmetry structure in low-lying levels of  $^{48, 50}\text{Cr}$  isotopes*

NUCLEAR STRUCTURE  $^{48,50}\text{Cr}$ ; calculated levels, J,  $\pi$ ,  $\delta$ , B(E2), B(M1); deduced mixed symmetry states. Interacting boson model with isospin, comparison with data.

### 2004AN25

Yad.Fiz. 67, 1861 (2004); Phys.Atomic Nuclei 67, 1834 (2004)

F. Andreozzi, N.Lo Iudice, A.Porrino

*An Importance Sampling Algorithm for Diagonalizing the Nuclear Shell-Model Hamiltonian*

# Nuclear Science References (NSR) – 6: Example 3

## NSR Indexed Search

[NSR Home](#) [Indexed Search](#) [Text Search](#) [Keynumber Search](#) [Combine/View Lists](#) [Help](#)

### Initialization Parameters

Publication year range: 1910 to 2005  
Primary only:  Require measured quantity:   
Output year order: Descending  
Output format: Normal  
 Search all entries  Search entries added since 6 / 16 / 1995 (month/day/year)

### Search parameters

Nuclide    
AND  
   
AND

# Nuclear Science References (NSR) – 6: Example 3 (cont.)

NSR Indexed Search

[NSR Home](#) | [Indexed Search](#) | [Text Search](#) | [Keynumber Search](#) | [Combine/View Lists](#) | [Help](#)

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### Initialization Parameters

Publication year range:  to   
 Primary only  Require measured quantity:   
Output year order:    
Output format:    
 Search all entries  Search entries added since  /  /   (month/day/year)

---

### Search parameters

Nuclide     
AND  
     
AND





# Nuclear Science References (NSR) – 6: Example 3 (cont.)

## View and Combine Previous Retrievals

[NSR Home](#) [Indexed Search](#) [Text Search](#) [Keynumber Search](#) [Combine/View Lists](#) [Help](#)

Combine lists:

2  AND NOT  3

Output format:

Current lists:

List #	Search/Initialization strings	Number found
1	Indexed quantity search: Nuclide=48cr YLO:1910; YHI:2005; PRIM:no; EXPR:no; Cutoff:6/16/1995	122 <input type="button" value="View"/>
2	Indexed quantity search: Nuclide=A=48 YLO:1910; YHI:2005; PRIM:no; EXPR:no; Cutoff:6/16/1995	643 <input type="button" value="View"/>
3	Indexed quantity search: Nuclide=A=48 YLO:1910; YHI:2005; PRIM:no; EXPR:no; Cutoff:8/1/2004	33 <input type="button" value="View"/>

# Nuclear Science References (NSR) – 6: Example 3 (cont.)

## NSR Query Results

Output year order : Descending  
Format : Normal

NSR database version of Feb 25, 2005.

List combine: 2 AND NOT 3

Found 610 matches. Showing 1 to 100. [[Next](#)]

[Back to query form](#)

### 2004AG02

Phys.Rev. C 69, 034602 (2004)

M. Aggarwal

*Hot rotating fp shell nuclei near proton drip*

NUCLEAR STRUCTURE 44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60Fe; calculated proton separation energies, level density and deformation parameters vs temperature. 46,50,54,58Fe; calculated rotational bands energy vs spin, related features. Determination of particle stability discussed.

doi: [10.1103/PhysRevC.69.034602](https://doi.org/10.1103/PhysRevC.69.034602)

### 2004BA16

Int.J.Mod.Phys. E13, 337 (2004)

A. Baran, P. Mierzynski

*Nuclear periphery in Mean-Field models*

# Nuclear Science References (NSR) – 6: Example 4

NSR Indexed Search

[NSR Home](#) [Indexed Search](#) [Text Search](#) [Keynumber Search](#) [Help](#)

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### Initialization Parameters

Publication year range:  to   
Primary only:  Require measured quantity:   
Output year order:    
Output format:    
 Search all entries  Search entries added since  /  /   (month/day/year)

---

### Search parameters

AND  
     
AND



# Nuclear Science References (NSR) – 6: Example 4 (cont.)

## NSR Query Results

Publication year range : 2002 to 2004  
Primary and secondary references.

Output year order : Ascending  
Format : Normal

NSR database version of Feb 25, 2005.

Indexed quantity search: FirstAuthor=Audi

Found 4 matches.

[Back to query form](#)

### 2002AUZZ

Priv. Comm. (2002)

G. Audi

### 2003AU02

Nucl.Phys. A729, 3 (2003)

G. Audi, O. Bersillon, J. Blachot, A.H.Wapstra

*The NUBASE evaluation of nuclear and decay properties*

COMPILATION A=1-293; compiled, evaluated ground- and isomeric-states mass excess, J,  $\pi$ , decay properties.

doi: [10.1016/j.nucphysa.2003.11.001](https://doi.org/10.1016/j.nucphysa.2003.11.001)



# Nuclear Science References (NSR) – 6: Example 5

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## Keynumbers output by ENSDAT

1940WA01  
1942SM01  
1945HI04  
1956TE26  
1956VA06  
1957VA08  
1958KN36  
1959AL95



# Nuclear Science References (NSR) – 6: Example 5 (cont.)

## Retrieve Using Keynumber or Keynumber List

[NSR Home](#) [Indexed Search](#) [Text Search](#) [Keynumber Search](#) [Help](#)

Keynumber:  Output format:

Keynumber list:

1940MA01
1942SM01
1945HI04
1956TE26
1956VA06
1957VA08
1958KW36
1959AL95
1959BL31

Output format:

*Note:* NSR keynumbers have the format YYYYAAANN, where YYYY is the publication year, AA is usually (but not always) the first two letters of the first author's last name, and NN is a two-digit or two-letter code assigned to the reference. Since about 1973, digits have been used for primary references and letters for secondary references.

[NSR Home](#) [Indexed Search](#) [Text Search](#) [Keynumber Search](#) [Help](#)

# Nuclear Science References (NSR) – 6: Example 5 (cont.)

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## NSR Query Results

Output year order : Ascending  
Format : Normal

NSR database version of Feb 25, 2005.

Keynumber list:

'1940WA01','1942SM01','1956TE26','1956VA06','1957VA08','1958KN36','1959AL95','1959BL31','1959PO64','1960AND7','1961DU03','1963AK02','1963AK03','1963BA2

Found 348 matches. Showing 1 to 100. [[Next](#)]

[Back to query form](#)

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**1940WA01**

Phys. Rev. 57, 163 (1940)

H. Walke

*The Radioactive Isotopes of Scandium and their Properties*

doi: [10.1103/PhysRev.57.163](https://doi.org/10.1103/PhysRev.57.163)

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**1942SM01**

Phys. Rev. 61, 578 (1942)

G.P. Smith

*Beta-Ray Spectra of Scandium*

doi: [10.1103/PhysRev.61.578](https://doi.org/10.1103/PhysRev.61.578)

# Nuclear Science References (NSR) – 6: Example 6

**Nuclear Science References  
(NSR) for Evaluators**

To NNDC

NSR for Evaluators provides a simplified interface to NSR with an ASCII text output that has no restrictions as to the number of NSR entries retrieved. For the full NSR interface, please go to <http://www.nndc.bnl.gov/nsr/>.

**Nuclide:**  Enter a nuclide in the form AAAZZ where AAA is the atomic mass and ZZ is the chemical symbol (Use the last two digits of the atomic number for Z>110), "Z=" followed by the atomic number, or "A=" followed by the atomic mass.  
Examples: 45SC, 235U, 239PU, 28011, Z=20, or A=100.

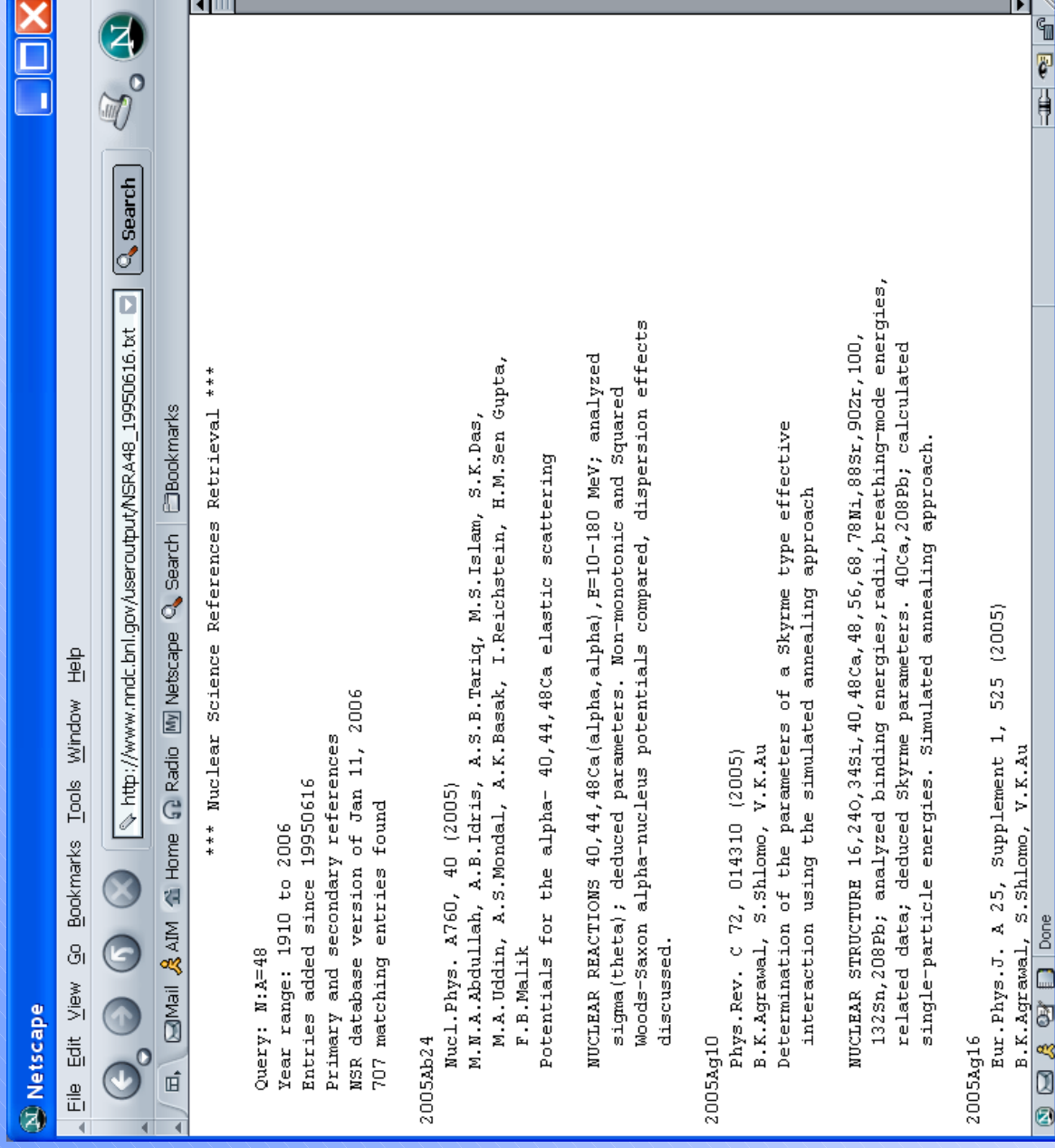
**Search entries added since:**  \*  \*  \* Year and month must be specified.

**Output year order:**  \*

To: NSDD Evaluators' Corner  
Nuclear Science References

*Database Manager: David Winchell, NNDC; Brookhaven National Laboratory (nsr@bnl.gov)  
Web and Programming: Thomas W. Burrows (nndctb@bnl.gov) and David Winchell (nsr@bnl.gov), NNDC, Brookhaven National Laboratory  
Data Source: NSR is compiled at the National Nuclear Data Center (<http://www.nndc.bnl.gov/>)*

# Nuclear Science References (NSR) – 6: Example 6 (cont.)



The screenshot shows a Netscape browser window with the following content:

\*\*\* Nuclear Science References Retrieval \*\*\*

Query: N:A=48  
Year range: 1910 to 2006  
Entries added since 19950616  
Primary and secondary references  
NSR database version of Jan 11, 2006  
707 matching entries found

2005Ab24  
Nucl.Phys. A760, 40 (2005)  
M.M.A.Abdullah, A.B.Idris, A.S.B.Tariq, M.S.Islam, S.K.Das,  
M.A.Uddin, A.S.Mondal, A.K.Basak, I.Reichstein, H.M.Sen Gupta,  
F.B.Malik  
Potentials for the alpha- 40,44,48Ca elastic scattering

NUCLEAR REACTIONS 40,44,48Ca(alpha,alpha), E=10-180 MeV; analyzed  
sigma(theta); deduced parameters. Non-monotonic and Squared  
Woods-Saxon alpha-nucleus potentials compared, dispersion effects  
discussed.

2005Ag10  
Phys.Rev. C 72, 014310 (2005)  
B.K.Agrawal, S.Shlomo, V.K.Au  
Determination of the parameters of a Skyrme type effective  
interaction using the simulated annealing approach

NUCLEAR STRUCTURE 16,24O,34Si,40,48Ca,48,56,68,78Ni,88Sr,90Zr,100,  
132Sn,208Pb; analyzed binding energies,radii,breathing-mode energies,  
related data; deduced Skyrme parameters. 40Ca,208Pb; calculated  
single-particle energies. Simulated annealing approach.

2005Ag16  
Eur.Phys.J. A 25, Supplement 1, 525 (2005)  
B.K.Agrawal, S.Shlomo, V.K.Au



# Nuclear Science References (NSR) - 7

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- Possible Errors in NSR
  - Check using the exchange format output option
  - Report to David Winchell (Winchell@bnl.gov) or nsr@bnl.gov.
- Keynumber Assignments
  - Check NSR using author and publication years
  - Recent secondary references (private communications, preprints, *etc.*) — Wait
  - Copy of reference required for keynumber assignment, except for major journals and conferences
  - Use a “dummy” keynumber such as 2006BUAA in your ENSDF evaluation
  - Send to Jag Tuli with submittal or update of the ENSDF evaluation along with the “dummy” keynumbers



# Nuclear Science References (NSR) - 8

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- Obscure Laboratory Reports, Limited Distribution Conference Proceedings, *etc.*
- Useful to send a copy to the NNDC for inclusion in the library and scanning for NSR.

# Authors' Bibliographies

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The bibliography of an article should always be checked for relevant references which are not in NSR.

- ❑ Private communications
- ❑ Preprints
- ❑ Obscure journal articles or laboratory reports
- ❑ Theses
- ❑ URL's