McMaster University: Center report

October 2021 to October 2022

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USNDP-2022: November 7-8, 2022

NNDC-BNL

Nuclear Structure and Decay Data
ENSDF, XUNDL, NSR, Topical Evaluations

Publications: October 2021-October 2022

ENSDF:

A=149: B. Singh, J. Chen**, NDS (in press).**

A=231: B. Singh**,** J. Tuli, E. Browne **(in press).**

A=31: J. Chen**,** B. Singh**, NDS 184, 29-405 (Sept-Oct 2022).**

A=147: N. Nica**,** B. Singh**, NDS 181, 1-474 (March-April 2022).**

A=64: B. Singh**,** J. Chen**, NDS 178, 41-537 (Dec 2021).**

A=194: J. Chen**,** B. Singh**, NDS 177, 1-508 (Nov 2021).**

Topical:

Atlas of Nuclear Isomers: Second Edition: S. Garg, B. Maheshwari, B. Singh, Y. Sun, A. Goel, A.K. Jain, **ADNDT** (**in press**): **2623 isomers** of half-lives of **≥10 ns**; **~3300 references** from **1913-2022**

Systematic trends of 0^+_2, 1^-_1, 3^-_1 and 2^+_1 excited states in even-even nuclei, B. Pritychenko**,** B. Singh**,** M. Verpelli**, Nucl. Phys. A 1027, 122511 (2022).**

ENSDF work: submitted: October 2021-Oct 2022

A=165: B. Singh**,** J. Chen: submitted October 2022.

A=44: J. Chen, B. Singh: submitted Sept 2022: in review.

A=224: B. Singh, S. Singh: submitted: March 2022: in ENSDF database.

A=77: B. Singh: submitted Jan 2022: post-review stage

Individual Nuclide updates for ENSDF: new nuclides, nuclides far off the stability line where excited-state data become available:

46 nuclides: in ENSDF database

ENSDF work: A chains in pipeline

Mass chains at **post-review:** revisions and updates for new papers in progress.

A=130: S. Pascu, B. Singh, A. Rodionov, G. Shulyak: submitted Sept 2018.

A=172: B. Singh, T. Kibedi: submitted May 2017.

A=57: A. Negret**,** B. Singh, R.B. Firestone: submitted April 2017.

A=76: B. Singh**,** A.R. Farhan, J. Chen: submitted April 2016.

A=71: B. Singh, J. Chen**:** submitted Sept 30, 2021**.**

A=77: B. Singh: submitted Jan 2022**.**

ENSDF work: on-going and planned

A=226 (with S. Singh, S. Kumar, India): planned submission Feb 2023.

A=62 (with X. Huang, China): planned submission March 2023.

A=222 (IAEA-ICTP-2022 workshop): planned submission May 2023: coordinator for this mass-chain work.

Planned submissions in 2023-2024

A=33, 80, 151 (with J. Chen, MSU)

A=132 (with A**.** Rodionov, PNPI**).**

A=58 (with C. Nesaraja, ORNL**).**

A=229 (with J. Tuli, LBNL**).**

Update of individual nuclides to continue, as considered relevant.

ENSDF review work: one A-chain received for review: October 2022.

XUNDL compilations: October 2021-October 2022

ENSDF-related papers:

60 new and 62 updated datasets from 68 papers, including 28 papers for PRC-Data checking; for the latter, reports were also prepared, in addition to compilation of datasets.

IAEA-ICTP, Trieste workshop (October 3-14, 2022): coordinating compilation work: 7 current papers among 13 participants.

Mass measurement papers from Nov 28, 2020 to Nov 06, 2022:

36 papers: 200 data points: compiled and compared with data in AME2020. Data file sent to Michael Smith (ORNL) Nov 06, 2022 for making it available on his webpage: www.nuclearmasses.org.

Compilation for XUNDL and mass papers will continue.

NSR-Keyword abstracts for PRC October 2021 to October 2022

PRC: July 2021 to Feb 2022 + July-Sept 2022 (partial): 11 issues.

Feb 2022 - present: training of new compiler (Dr. Dymtro Symochko) for NSR keywording of PRC articles.

Universe journal**:** scanned 69 issues from 2015 to October 2022: ~30 articles sent to NNDC: keywords in progress

Total number of articles consulted: 772

Keyword abstracts prepared: 604.

All keyworded files run through NSRPREP code, prior to sending to NNDC, to resolve formatting errors.

After keywording another ~100 papers, NSR work will almost stop.

Topical compilations/evaluations

Log ft review: S. Turkat, K. Zuber (Dresden), X. Mougeot (Saclay), B. Singh: data tables and draft of a paper have been prepared, going through final checks. Expected submission of paper **Nov-Dec 2022**.

Beta-delayed neutron emitters: update of IAEA-NDS BDN reference database in progress for $Z \leq 28$ emitters from 2015-onwards, and for $Z>28$ from 2021 onwards**.** Expected completion: **June 2023.**

r_0 radius parameters for even-even α decays: S. Singh, S. Kumar, B. Singh, J. Chen: update of 2020 r_0 data file in progress to include Q(α) values from AME2020, new papers since 2020, and use of new code **ALPHA-HF** written by Jun Chen for a better handling of asymmetric and large uncertainties for half-lives and alpha-branching ratios Expected completion: **Feb 2023.**

B(E2) for first 2+ and 4+ states in e-e nuclei: B. Pritychenko, B. Singh: ongoing

Topical compilations/evaluations (contd.)

Gamma-transition strengths for M1, E2, E1, M2, and higher multipolarities: J. Chen, B. Singh: update of P. Endt's evaluations in ADNDT about 40 years ago: **on-going**.

New work planned:

High-spin, multi-qp dipole bands with dominant M1 transitions: S. Singh. S. Kumar, B. Singh, A.K. Jain: update of ADNDT 74, 283 (2000) paper on MR (shears) bands.

Nuclear Isomers: 0.1-10 ns: B. Singh, S. Garg, B. Maheshwari, Y. Sun, A.K. Jain: about 2K levels.

Proton radioactivity: compilation and evaluation of one- and two-proton emitters. Update of Alejandro Sonzogni's publication: NDS 95, 1-48 (2002):

B. Singh, A.A. Sonzogni; with possible participation of a nuclear theorist Prof. P. Arumugam and his Ph. D. student at the IIT, Roorkee, India: about 80 nuclei.

Acknowledgements

Grateful to NNDC, BNL for **0.67 FTE** financial support October 2021 to October 2022 for **ENSDF (0.33), XUNDL (0.14)** and **NSR (0.20)** work.

Thank you