



# NJOY – Current Status and Future Plans

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# Abstract

We provide an overview of the NJOY Nuclear Data Processing Code System, including recent history, current status and future upgrade plans.

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# Outline

- Introduction & NJOY Review
- Current Status
- Future Upgrade Plans
- Concluding Remarks

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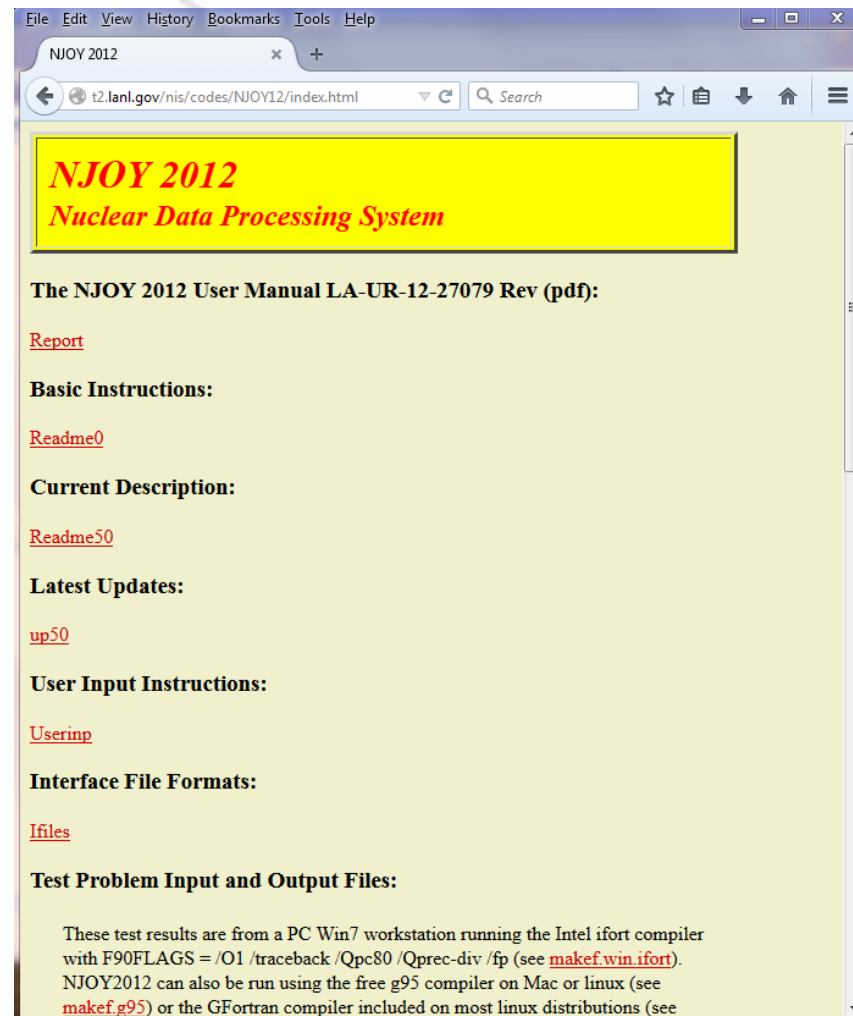
# Introduction & NJOY Review

- The NJOY Nuclear Data Processing System has been publically available for almost 40 years.
  - Primary developer was Bob MacFarlane.
  - Retired in 2006 but has remained active in NJOY development.
- The most widely distributed version of the code was NJOY99; the current public version is **NJOY2012**.
  - Updates are posted to a LANL website and the source code is updated by end-users.
    - Also allows end-users to include local patches.
- Unofficial updates and pre-release candidate updates are available from the NEA at <http://www.nea.fr/html/dbprog/njoy-links.html>.

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# Introduction & NJOY Review

- The most recent version of the code is NJOY2012.
  - Available directly from LANL (for a fee, ☹), per LANL Theoretical Division management decree.
    - See contact information at <http://t2.lanl.gov/nis/transfer.html>
- LANL's NJOY2012 web page ...
  - <http://t2.lanl.gov/nis/codes/NJOY12/index.html>
  - Can find links to
    - The NJOY2012 manual.
    - Latest update file, currently up50.
    - Sample test job i/o files.



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# **NJOY2012 – Current Status**

- NJOY2012 was released in December, 2012
- An initial set of update patches was released in the summer of 2013 (creating NJOY2012.8).
- The latest set of update patches was released in the Spring of 2015 (creating NJOY2012.50).
- New patches are nearing completion and will be released in coordination with a new clean code version, NJOY2016.
  - The latest patches have been shared with selected experienced users, and are available upon request.

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# NJOY2016

- An open source code release, 😊.
  - **DOE/NNSA approval has been received.**
- Re-package all public and local updates into a new, clean, source code release.
- Need to finish re-writing the current manual.
  - 800+ pages and not simply a global “2012” to “2016” change.
- Will use a new distribution model ... to be discussed by Jeremy Conlin in the NJOY21 update.

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# NJOY Training

- Producing ACE files and Visualizing Nuclear Data ...
- an NJOY training class offered in conjunction with MCNP training ...
- Next class in March, 2017.
  - Also advertised through the monthly RSICC newsletter

LANL - MCNP: Class Schedule

https://mcnp.lanl.gov/classes/classinf

mcnp training

Los Alamos NATIONAL LABORATORY EST. 1943

**A General Monte Carlo N-Particle (MCNP) Transport Code**

**mcnp**

MCNP5  
MCNP6  
MCNP FAQ  
MCNP Bugs  
Upcoming Classes  
Related Efforts  
Monte Carlo Team Personnel  
User Manual  
Reference Collection  
Forum For Users  
How to get MCNP

**CONTACTS**  
MCNP Team  
MCNP Web Admin

**MCNP Class Schedule for 2016**

Oct 25-26, 2016 Los Alamos, NM	Using NJOY to Create MCNP ACE Files & Visualize Nuclear Data Non-US citizens must register by 2016-08-01   Thursday 10:00 - Fri 5:00	\$800 or \$600*
Oct 31 - Nov 4, 2016 Los Alamos, NM	Introduction to MCNP6 ***** FULL ***** Non-US citizens must register by 2016-08-08   Mon 10:30 - Fri 12:00	\$1800 or \$1500*
March 7-9, 2017 Los Alamos, NM	Using NJOY to Create MCNP ACE Files & Visualize Nuclear Data Non-US citizens must register by 2016-12-12   Tues 10:00 - Thur 5:00	\$1200 or \$900*
Apr 2-7, 2017 Los Alamos, NM	Criticality Calculations with MCNP6 Non-US citizens must register by 2017-01-09   Mon 10:30 - Fri 12:00	\$1800 or \$1500*
Apr 10-14, 2017 Los Alamos, NM	Introduction to MCNP6 Non-US citizens must register by 2017-01-16   Mon 10:30 - Fri 12:00	\$1800 or \$1500*
May 16-19, 2017 Los Alamos, NM	Unstructured Mesh with Attila4MC Non-US citizens must register by 2017-02-20   Tues 12:30 - Fri 4:30	\$1500 or \$1200*
June 5-9, 2017 Los Alamos, NM	Introduction to MCNP6 Non-US citizens must register by 2017-03-13   Mon 10:30 - Fri 12:00	\$1800 or \$1500*
July 31 - Aug 4, 2017 Los Alamos, NM	Introduction to MCNP6 Non-US citizens must register by 2017-05-08   Mon 10:30 - Fri 12:00	\$1800 or \$1500*
Aug 7-11, 2017 Los Alamos, NM	Variance Reduction with MCNP6 Non-US citizens must register by 2017-05-15   Mon 10:30 - Fri 12:00	\$1800 or \$1500*
Aug 14-18, 2017 Los Alamos, NM	Criticality Calculations with MCNP6 Non-US citizens must register by 2017-05-22   Mon 10:30 - Fri 12:00	\$1800 or \$1500*

\* Early payment discount: A discount of is given when the registration payment is received in full at least 4 weeks before the start of class.

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# NJOY2012, 2016, 21 – Future Plans

## ■ Near Term

- Incorporate patches developed to support ENDF/B “beta” and JEFF “test” library processing.
  - e.g., Oscar Cabellos (NEA) report from the Spring, 2016 JEFF meeting.
- Complete work on a new clean code version ... NJOY2016.

## ■ (Not so) Long Term

- For me ... retirement, ☺!
- For NJOY ... “NJOY21” ... Jeremy Conlin
  - NJOY21 = NJOY for the 21<sup>st</sup> Century
  - Current and past NJOY i/o is very much “cardimage” and ENDF “mf” and “mt” centric
    - NJOY21 will work with the new “GND” format.

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# NJOY21 – NJOY for the 21<sup>st</sup> Century

- *Major* updated to NJOY2016—ground-up rewrite of NJOY2016
- Ability to utilize modern nuclear data formats (ENDF and GND)
- Modern ways of interacting with NJOY
- Easier, faster, more flexible, and more maintainable
- Improved diagnostics (error messages)
- **Maintain capabilities of and backwards compatibility with NJOY2016**

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# NJOY21 Development Plan

- Wrap every Legacy NJOY module in C++
- **Legacy modules are replaced as functionality is developed in C++**
- Thoroughly tested (unit, system, integration)
- Continuously tested (<https://travis-ci.org/njoy/>)

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# NJOY21 – Current Status

- Foundation:
  - **utility**      Operations used throughout all NJOY21 projects
  - **math**        Mathematical objects and operations
  
- **nuclearData**      Generic, in-memory, data objects
- **ENDFtk**            Toolkit for reading/writing ENDF files
- **ACEtk**             Toolkit for reading/writing ACEfiles
  
- Resonance reconstruction

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# NJOY21 Distribution Model

<http://njoy.lanl.gov>

<http://github.com/njoy>

- **Open Source — NJOY21 and NJOY2016**

- No export control restrictions
- Free

**DOE Approval has  
been received, 😊.**

- Increase Availability
- Encourage wider use
- Encourage collaboration

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# NJOY Open Source Collaboration

- NJOY has long history of non-LANL contributions
- Contributing
  - Fork repository on GitHub
  - Modify code
  - Write code tests
  - Initiate pull request
- NJOY2016 and NJOY21

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# Concluding Remarks

- NJOY has a long history as the premier ENDF processing code system ... and LANL is committed to maintaining this capability as the ENDF format evolves.
- NJOY's past success is due to (i) Bob MacFarlane, and (ii) feedback by national and international users on code features of importance to them.
- We continue to welcome this interaction between LANL and the world-wide user community.
  - Send input to [njoy@lanl.gov](mailto:njoy@lanl.gov)

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