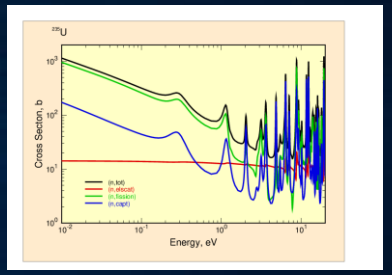
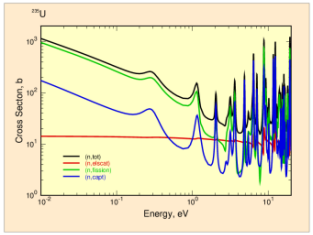


NJOY2016 (and NJOY2012) Status

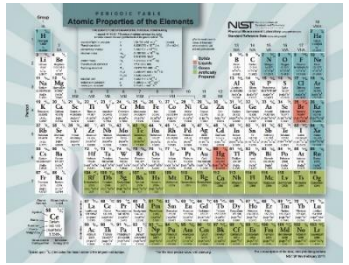
Dr. A. C. (Skip) Kahler
Kahler Nuclear Data Services, LLC

Presented at the
IAEA Consultant's Meeting on
International Radiation Characterization Benchmark Experiment
Project (IRCBEP)

August 6 – 8, 2018
Vienna, Austria



NJOY2016 (and NJOY2012)



- NJOY2016 is the official NJOY production version.
  - … currently NJOY2016.39 (03jul18).
- Primary code developers are Jeremy Conlin (jlconlin@lanl.gov) and Wim Haeck (wim@lanl.gov).
- NJOY users can communicate with the developers via njoy@lanl.gov.
- NJOY2012 is nearing end-of-life support …
  - At the Fall 2017 CSEWG meeting LANL promised NJOY2012 support through 9/30/2018, but LANL's legacy NJOY web pages (http://t2.lanl.gov/nis/codes/NJOY12/) are no longer maintained.
  - Latest available update from LANL is NJOY2012.82 (posted 2/3/2017).
  - Latest available update from the NEA is NJOY2012.99 (posted 8/2/2017).
    - ***Neither of these NJOY2012 versions can process the entire ENDF/B-VIII.0 neutron release.***
    - ***Last minute revisions to the new fission multiplicity format impact one or more of ^{235,238}U and ^{239}Pu.***
  - The IAEA has contracted to receive additional NJOY2012 updates that maintain equivalence with NJOY2016 … a upn file for NJOY2012.134 is equivalent to NJOY2016.39.

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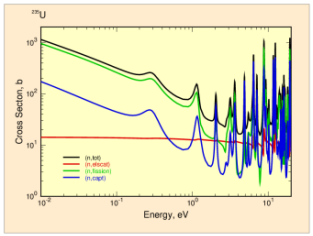
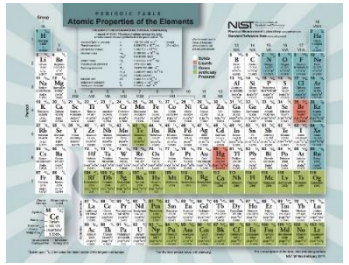


NJOY2016

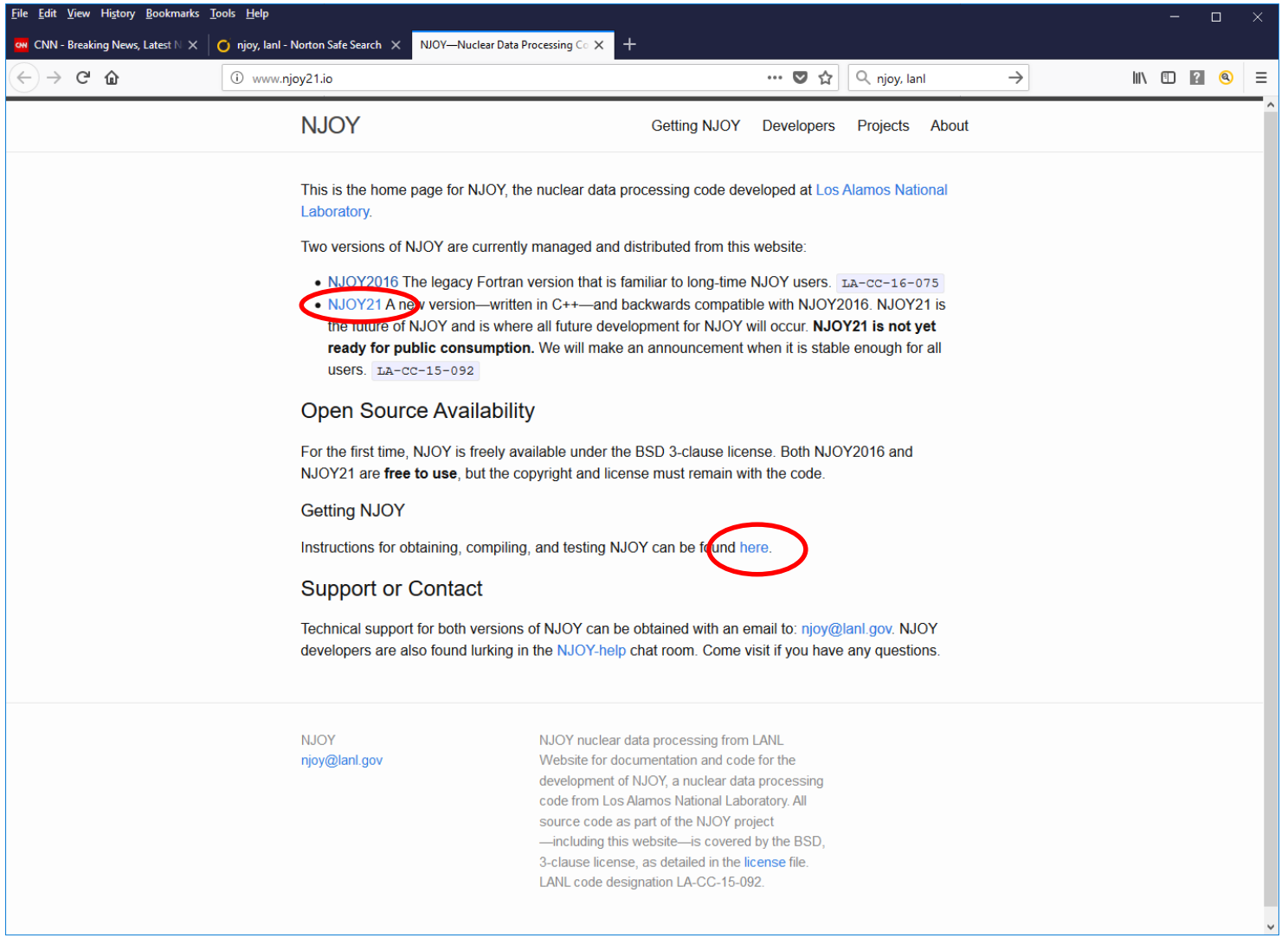


- The NJOY home page …
- http://njoy.lanl.gov/

- NJOY2016 is “open source” … i.e., freely available to all.

- NJOY2016 and earlier only process ENDF evaluations that use the legacy card-image format.

- The next major NJOY release, NJOY21, will be GND compatible.



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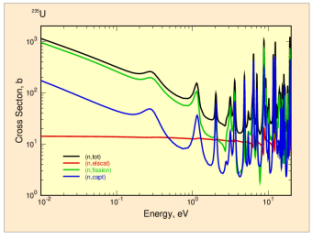
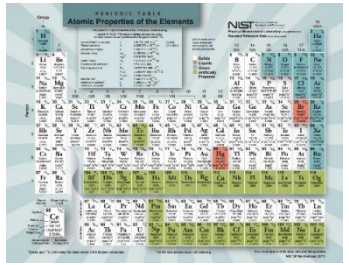
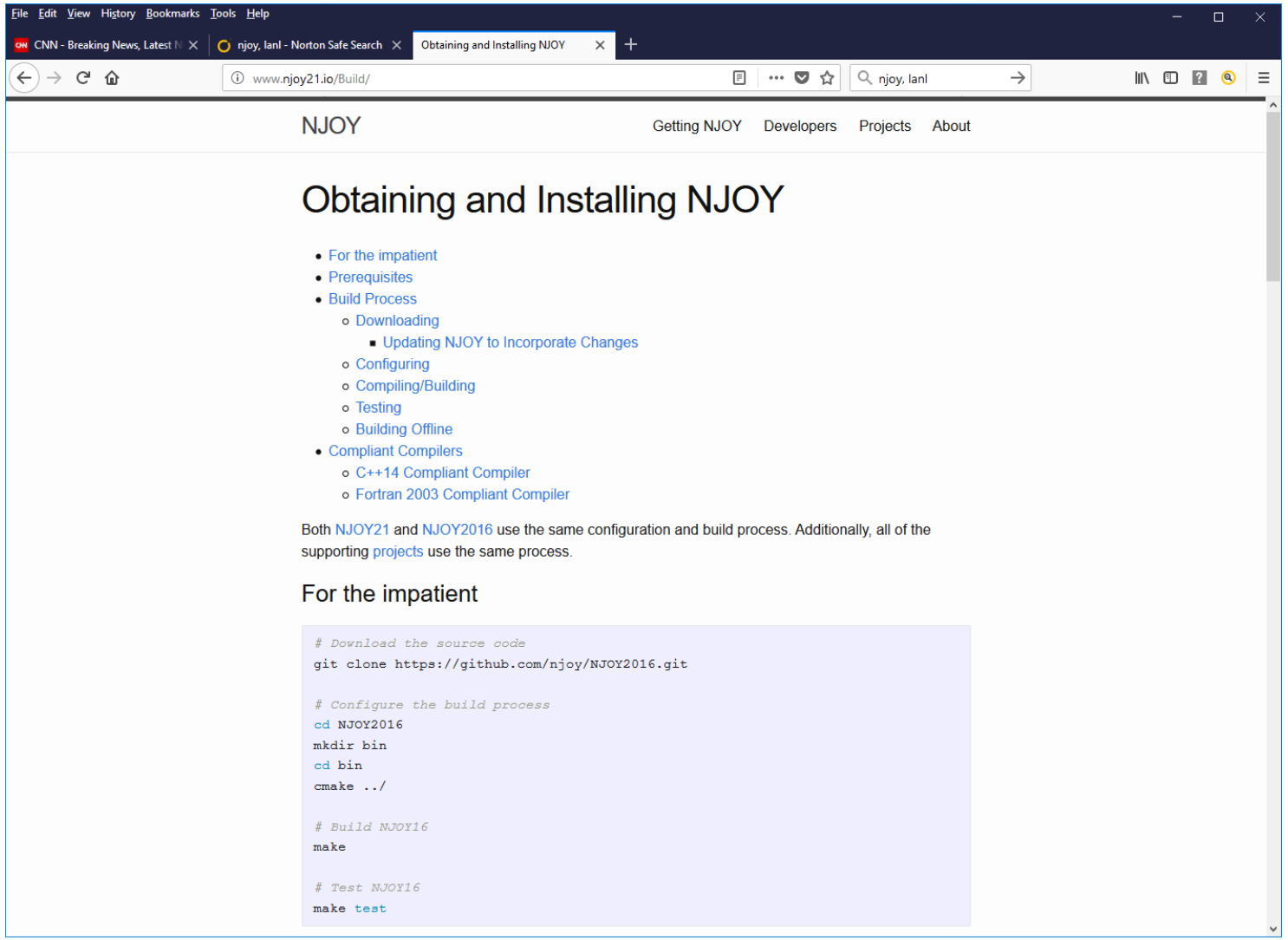


NJOY2016



- The NJOY home page …
- *http://njoy.lanl.gov/*
- Instructions on how to obtain the code …
- *http://www.njoy21.io/Build/*



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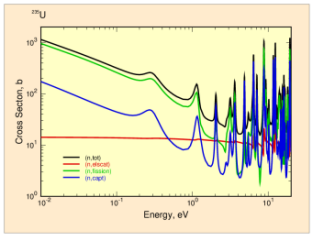
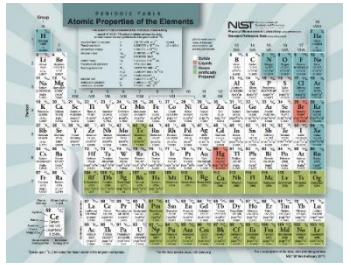


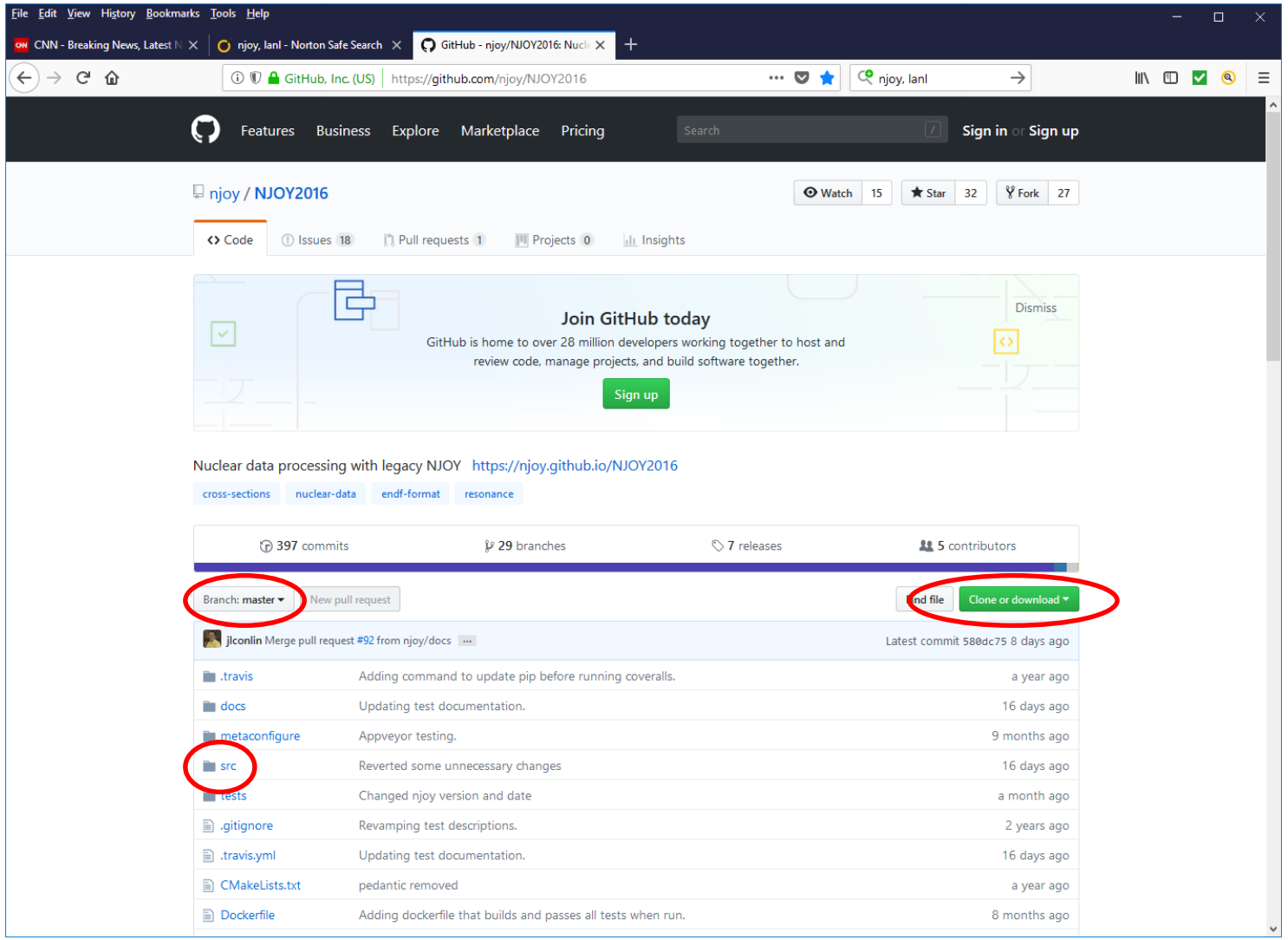
NJOY2016



- The NJOY home page …
- http://njoy.lanl.gov/

- Instructions on how to obtain the code …
- http://www.njoy21.io/Build/

- *… or if you are not GitHub literate …*
- https://github.com/njoy/NJOY2016



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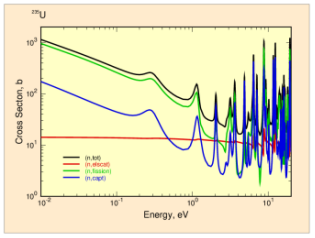
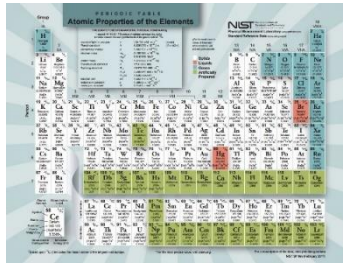
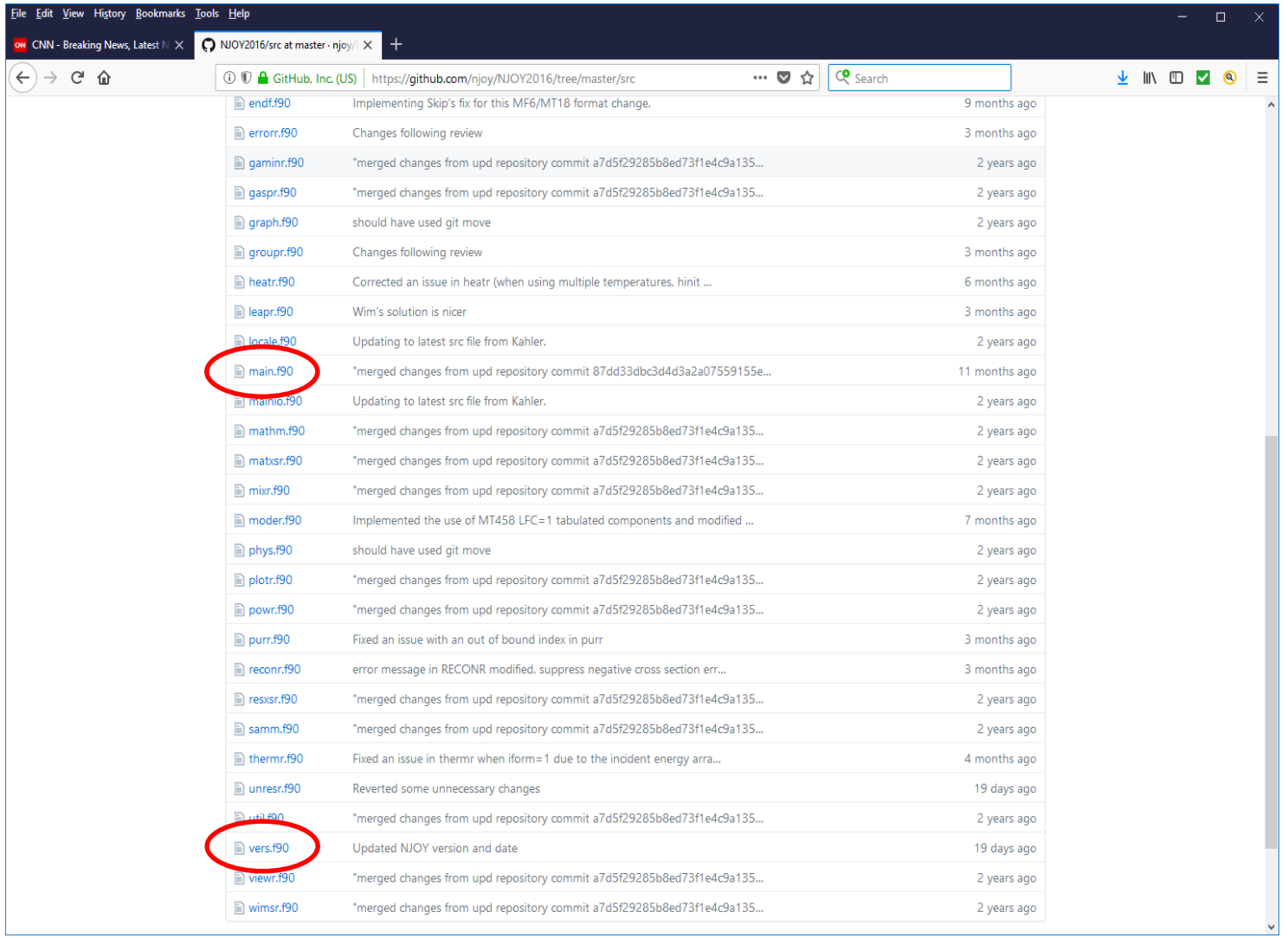


NJOY2016



- *… or if you are not GitHub literate …*
- *https://github.com/njoy/NJOY2016*
- "scr" folder contains all *.f90 source code routines.
- vers.f90 contains the current version
- main.f90 was called njoy.f90 in NJOY2012 and earlier code releases.



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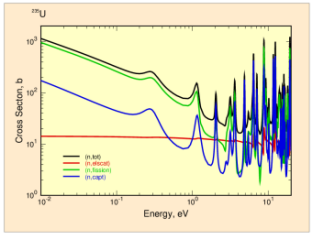
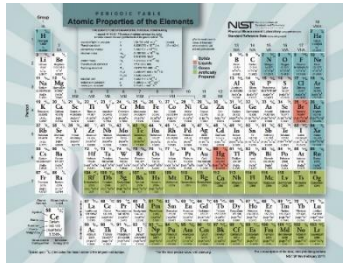


NJOY2016 (and NJOY2012)



- Issues resolved with recent updates include:
  - NJOY2016.39, July 3, 2018 (2012.134): NaN's in UNRESR. Could occur if URR parameters are not defined over the entire URR energy range. An evaluation error that should not occur.
  - NJOY2016.38, June 18, 2018 (2012.133): Possible array overflow in BROADR. Could occur if the user "thnmax" input variable was too close to the maximum energy mesh.
  - NJOY2016.37, June 12, 2018 (2012.132): Revised coding in ACER to more accurately process charged particle recoil.
  - NJOY2016.36, June 6, 2018 (2012.131): Revise a RECONR information message to more fully define the action taken when the elastic scattering cross section is too small (≤1.0 μbarn), or negative.
  - NJOY2016.35, April 30, 2018 (2012.128 – 2012.130): Several issues, including more robust array allocation in PURR, detect possible negative cross sections in PURR's probability tables (caused by σ(tot) being less than the sum of its components … another evaluation error that should not happen, sigh), small revision to the internal mt153 section format (which impacts both PURR and ACEFC).
  - NJOY2016.34, April 17, 2018 (2012.127): An earlier update allows the user to specify "ismooth" as an input variable. Modify ACER's standard output to fully identify the chosen option.
  - NJOY2016.33, April 9, 2018 (2012.126): Several revisions in LEAPR for more robust interpolation.

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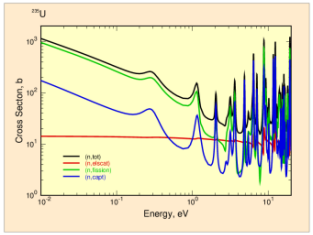
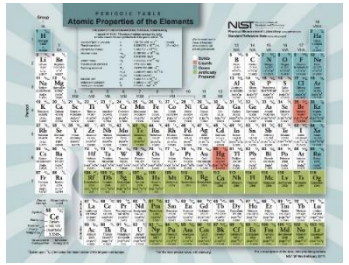


NJOY2016 (and NJOY2012)



- Further information on recent NJOY2016 updates is available from LA-UR-18-22676, "NJOY2016 Updates for ENDF/B-VIII.0" (http://permalink.lanl.gov/object/tr?what=info:lanl-repo/lareport/LA-UR-18-22676).
- Additional information can be found in LA-UR-18-24034, "Release of ENDF/B-VIII.0-Based ACE Data Files" … in the "docs" folder at https://nucleardata.lanl.gov/ACE/Production/Lib80x.html.
- In conclusion …
  - NJOY, and (IMHO) all processing codes remain a "work in progress".
  - They must respond to ever changing evaluated file format revisions.
  - NJOY is not a checking code, but evaluated file checks are increasingly necessary.
  - NJOY continues to transition to using array allocation … but fixed arrays remain and it is not always possible to know beforehand how much space may be needed.
    - Compiling with array bounds checking turned on may cause a near term performance hit … but that's better than running long term simulations with incorrect data!

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