NUCI - A NUCLEAR INFORMATION PROGRAM

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The motivation for this work was to provide our local staff with an easier and more rapid access to information contained in the Evaluated Nuclear Structure Data file, ENSDF[1]. Decay data for all (1557 radioactive and 241 stable) nuclei were extracted using the NNDC On-Line Data Service NUDAT program. A directory to the database was generated and a user program NUCI was written which provides instant retrieval, display and logging of any data that is available. Nuclear masses[2] are also provided. The program may be executed from /usr/hhirf/nuci. The following list of commands and examples illustrate the features available.

List of commands:

alla	amu	- Displays/logs	all nuclei with mass#	(amu)
allz	z	- Displays/logs	all nuclei with atomic#	(z)
all	elenam	- Displays/logs	all nuclei for element	(elenam)
mass	nucnam	- Displays/logs	mass (amu) for nucleus	(nucnam)
d	nucnam	- Displays	data-table for nucleus	(nucnam)
log	nucnam	- Logs	data-table for nucleus	(nucnam)

Decay mode notation: stable (sta), beta decay (e-), electron capture (ec) alpha emission (a), isomeric transition (it).

Half-life notation: Entries without units are in seconds; otherwise: m, h, d, y, c denotes minutes, hours, days, years, centuries.

The command: all al - produces the following display and log:

Nucleus	Decay-Mode	Half-life	Daughter
^{27}Al		Stable	
^{24}Al	ec	2.05	^{24}Mg
^{25}Al	ec	7.18	^{25}Mg
^{26}Al	ec	7+3c	^{26}Mg
^{28}Al	b-	134	^{28}Si
^{29}Al	b-	393	^{29}Si
^{30}Al	b-	3.60	^{30}Si

The command: alla 27 - produces the following display and log:

Nucleus	Decay-Mode	Half-life	Daughter
^{27}Al		Stable	
^{27}Mg	b-	567	^{27}Al

^{27}Si	ec	4.16	^{27}Al

The command: log 17f - produces the following output to NUCI.log:

A	ELE	Z	Decay Mode	Half-Life	Rad. Type	Radiation Energy (keV)	End-point Energy (keV)	Radiation Intensity (%)	Dose G-RAD /UCI-H
17	F	9	EC	64.49 S 0.16	B+	349.28 0.23	867.9 0.5	0.017 0.017	0.0001
17	F	9	EC	64.49 S 0.16	B+ TOT	739.54 0.23		99.871 0.018	1.57
17	F	9	EC	64.49 S 0.16	B+	739.61 0.23	1738.5 0.5	99.8540(20)	1.57
17	F	9	EC	64.49 S 0.16	E AU K	0.5200		0.1368	0
17	F	9	EC	64.49 S 0.16	G X K	0.52		0.000799	0
17	F	9	EC	64.49 S 0.16	G AN	511.		≤199.74	

The command: mass f17 - produces the following display and log:

17F 17.002095237 From Audi & Wapstra's 1995 mass table
0.000000266

[1] ENSDF is produced by the International Nuclear Structure and Decay Data Network and is maintained by the National Nuclear Data Center, Brookhaven National Laboratory, USA.
[2] G. Audi and A. H. Wapstra, Nucl. Phys. A **595**, 409-480 (1995), Data extracted from the MASSES library using the NNDC On-Line Data Service.