codata Documentation

Release 0.7.1

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ONE

GETTING STARTED

1.1 codata

codata provides, automatically generated, source files for the lastest codata constants (2018). The raw codata from http://physics.nist.gov/constants are parsed line by line and converted into declarations as constants for different languages:

- Fortran module named *fcodata.f90*
- C header named *ccodata.h*
- Python module named *pycodata.py*
- CPython extension named *cpycodata.c*

The sources can be directly included in projects where they are needed.

1.1.1 How to install

Copy and paste the source code for the language of your choice.

1.1.2 Dependencies

```
gcc>=4.6 or msvc>=14

gfortran>=4.6 or ifort>=18

cmake>=3.10
```

1.1.3 License

```
GNU General Public License v3 (GPLv3)
```

1.2 pycodata

Python module containing the codata constants.

For now, the wrapper must be compiled using the compiler that was used to compile your python interpreter.

1.2.1 How to install

```
pip install pycodata
```

1.2.2 Dependencies

```

```

1.2.3 License

GNU General Public License v3 (GPLv3)

1.3 Examples

CHAPTER

TWO

RELEASE NOTES

2.1 Codata 0.7.1 Release Note

2.1.1 Summary

- Minor fixes in generator code
- Add automatic copy of c sources for the python wrapper.

2.1.2 Download

Codata Releases

PYPI

2.1.3 Contributors

Milan Skocic

2.1.4 Commits

Full Changelog: https://github.com/MilanSkocic/codata/compare/0.7.0...0.7.1

2.2 Codata 0.7.0 Release Note

2.2.1 Changes

- Migrate documentation from doxygen to sphinx+breathe.
- Add YEAR constant indicating the year of the codata constants.
- Refractoring

2.2.2 Download

Codata Releases

PYPI

2.2.3 Contributors

Milan Skocic

2.2.4 Commits

Full Changelog: https://github.com/MilanSkocic/codata/compare/0.6.0...0.7.0

2.3 Codata 0.6.0 Release Note

2.3.1 Changes

- Created documentation.
- Fixed missing uncertainties for Cpython.

2.3.2 Download

Codata Releases

PYPI

2.3.3 Contributors

Milan Skocic

2.3.4 Commits

Full Changelog: https://github.com/MilanSkocic/codata/compare/0.5.0...0.6.0

2.4 Codata 0.5.0 Release Note

2.4.1 Changes

- Changed the complete approach by not generating a library but only source files for different languages.
- Available languages: Fortran, C, python, CPython

2.4.2 Download

Codata Releases

PYPI

2.4.3 Contributors

Milan Skocic

2.4.4 Commits

Full Changelog: https://github.com/MilanSkocic/codata/compare/0.4.0...0.5.0

2.5 Codata 0.4.0 Release Note

2.5.1 Changes

- Bring back pywrapper in the codata repository to sync versions.
- Improvements of the documentation.

2.5.2 Download

Codata Releases

PYPI

2.5.3 Contributors

Milan Skocic

2.5.4 Commits

Full Changelog: https://github.com/MilanSkocic/codata/compare/0.3.0...0.4.0

2.6 Codata 0.3.0 Release Note

2.6.1 Changes

- Only last codata constants.

2.6.2 Download

Codata Releases

PYPI

2.6.3 Contributors

Milan Skocic

2.6.4 Commits

Full Changelog: https://github.com/MilanSkocic/codata/compare/0.2.1...0.3.0

2.7 Codata 0.2.1 Release Note

2.7.1 Changes

- Integration of Intel Fortran compiler and MSVC in cmake scripts.
- Add specifications and instructions for compiling on Windows

2.7.2 Download

Codata Releases

PYPI

2.7.3 Contributors

Milan Skocic

2.7.4 Commits

Full Changelog: https://github.com/MilanSkocic/codata/compare/0.2.0...0.2.1

2.8 Codata 0.2.0 Release Note

2.8.1 Changes

- Bug fixes for the codata 2010.
- Bug fixes in the tests linked to the codata 2010.
- Add python wrapper for the number of constants method.

2.8.2 Download

Codata Releases

PYPI

2.8.3 Contributors

Milan Skocic

2.8.4 Commits

Full Changelog: https://github.com/MilanSkocic/codata/compare/0.1.0...0.2.0

2.9 Codata 0.1.0 Release Note

2.9.1 Changes

Implementation of:

- the parser of the codata raw data
- the generator of the Fortran modules
- the C API and C header
- the python wrapper (will be moved to its repository next release).

2.9.2 Download

Codata Releases

PYPI

2.9.3 Contributors

Milan Skocic

2.9.4 Commits

Full Changelog: https://github.com/MilanSkocic/codata/compare/....0.1.0

CHAPTER

THREE

AUTOGENERATED DOCUMENTATION

3.1 codata

The available codata constants are listed here:

```
YEAR = 2018

ALPHA_PARTICLE_ELECTRON_MASS_RATIO = 7294.29954142e0
U_ALPHA_PARTICLE_ELECTRON_MASS_RATIO = 0.00000024e0

ALPHA_PARTICLE_MASS = 6.6446573357e-27 kg
U_ALPHA_PARTICLE_MASS = 0.0000000020e-27 kg

ALPHA_PARTICLE_MASS_ENERGY_EQUIVALENT = 5.9719201914e-10 J
U_ALPHA_PARTICLE_MASS_ENERGY_EQUIVALENT = 0.0000000018e-10 J

ALPHA_PARTICLE_MASS_ENERGY_EQUIVALENT_IN_MEV = 3727.3794066e0 MeV
U_ALPHA_PARTICLE_MASS_ENERGY_EQUIVALENT_IN_MEV = 0.0000011e0 MeV

ALPHA_PARTICLE_MASS_IN_U = 4.001506179127e0 u
U_ALPHA_PARTICLE_MASS_IN_U = 0.000000000063e0 u

ALPHA_PARTICLE_MOLAR_MASS = 4.0015061777e-3 kg mol^-1
U_ALPHA_PARTICLE_MOLAR_MASS = 0.0000000012e-3 kg mol^-1

ALPHA_PARTICLE_PROTON_MASS_RATIO = 3.97259969009e0
U_ALPHA_PARTICLE_PROTON_MASS_RATIO = 0.00000000022e0

ALPHA_PARTICLE_RELATIVE_ATOMIC_MASS = 4.001506179127e0
U_ALPHA_PARTICLE_RELATIVE_ATOMIC_MASS = 0.000000000063e0

ANGSTROM_STAR = 1.00001495e-10 m
U_ANGSTROM_STAR = 0.00000090e-10 m

ATOMIC_MASS_CONSTANT = 1.66053906660e-27 kg
U_ATOMIC_MASS_CONSTANT = 0.00000000050e-27 kg

ATOMIC_MASS_CONSTANT_ENERGY_EQUIVALENT = 1.49241808560e-10 J
U_ATOMIC_MASS_CONSTANT_ENERGY_EQUIVALENT = 0.00000000045e-10 J

ATOMIC_MASS_CONSTANT_ENERGY_EQUIVALENT_IN_MEV = 931.49410242e0 MeV
U_ATOMIC_MASS_CONSTANT_ENERGY_EQUIVALENT_IN_MEV = 0.00000028e0 MeV

ATOMIC_MASS_UNIT_ELECTRON_VOLT_RELATIONSHIP = 9.3149410242e8 eV
U_ATOMIC_MASS_UNIT_ELECTRON_VOLT_RELATIONSHIP = 0.0000000028e8 eV
```

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```
ATOMIC_MASS_UNIT_HARTREE_RELATIONSHIP = 3.4231776874e7 E_h
U_ATOMIC_MASS_UNIT_HARTREE_RELATIONSHIP = 0.0000000010e7 E_h

ATOMIC_MASS_UNIT_HERTZ_RELATIONSHIP = 2.25234271871e23 Hz
U_ATOMIC_MASS_UNIT_HERTZ_RELATIONSHIP = 0.00000000068e23 Hz

ATOMIC_MASS_UNIT_INVERSE_METER_RELATIONSHIP = 7.5130066104e14 m^-1
U_ATOMIC_MASS_UNIT_INVERSE_METER_RELATIONSHIP = 0.0000000023e14 m^-1

ATOMIC_MASS_UNIT_JOULE_RELATIONSHIP = 1.49241808560e-10 J
U_ATOMIC_MASS_UNIT_JOULE_RELATIONSHIP = 0.00000000045e-10 J

ATOMIC_MASS_UNIT_KELVIN_RELATIONSHIP = 1.08095401916e13 K
U_ATOMIC_MASS_UNIT_KELVIN_RELATIONSHIP = 0.00000000033e13 K

ATOMIC_MASS_UNIT_KILOGRAM_RELATIONSHIP = 1.66053906660e-27 kg
U_ATOMIC_MASS_UNIT_KILOGRAM_RELATIONSHIP = 0.00000000050e-27 kg

ATOMIC_UNIT_OF_1ST_HYPERPOLARIZABILITY = 3.2063613061e-53 C^3 m^3 J^-2
U_ATOMIC_UNIT_OF_1ST_HYPERPOLARIZABILITY = 0.0000000015e-53 C^3 m^3 J^-2

ATOMIC_UNIT_OF_2ND_HYPERPOLARIZABILITY = 6.2353799905e-65 C^4 m^4 J^-3
U_ATOMIC_UNIT_OF_2ND_HYPERPOLARIZABILITY = 0.0000000038e-65 C^4 m^4 J^-3

ATOMIC_UNIT_OF_ACTION = 1.054571817e-34 J s
U_ATOMIC_UNIT_OF_ACTION = 0.0e0 J s

ATOMIC_UNIT_OF_CHARGE = 1.602176634e-19 C
U_ATOMIC_UNIT_OF_CHARGE = 0.0e0 C

ATOMIC_UNIT_OF_CHARGE_DENSITY = 1.08120238457e12 C m^-3
U_ATOMIC_UNIT_OF_CHARGE_DENSITY = 0.00000000049e12 C m^-3

ATOMIC_UNIT_OF_CURRENT = 6.623618237510e-3 A
U_ATOMIC_UNIT_OF_CURRENT = 0.000000000013e-3 A

ATOMIC_UNIT_OF_ELECTRIC_DIPOLE_MOM = 8.4783536255e-30 C m
U_ATOMIC_UNIT_OF_ELECTRIC_DIPOLE_MOM = 0.0000000013e-30 C m

ATOMIC_UNIT_OF_ELECTRIC_FIELD = 5.14220674763e11 V m^-1
U_ATOMIC_UNIT_OF_ELECTRIC_FIELD = 0.00000000078e11 V m^-1

ATOMIC_UNIT_OF_ELECTRIC_FIELD_GRADIENT = 9.7173624292e21 V m^-2
U_ATOMIC_UNIT_OF_ELECTRIC_FIELD_GRADIENT = 0.0000000029e21 V m^-2

ATOMIC_UNIT_OF_ELECTRIC_POLARIZABILITY = 1.64877727436e-41 C^2 m^2 J^-1
U_ATOMIC_UNIT_OF_ELECTRIC_POLARIZABILITY = 0.00000000050e-41 C^2 m^2 J^-1

ATOMIC_UNIT_OF_ELECTRIC_POTENTIAL = 27.211386245988e0 V
U_ATOMIC_UNIT_OF_ELECTRIC_POTENTIAL = 0.000000000053e0 V

ATOMIC_UNIT_OF_ELECTRIC_QUADRUPOLE_MOM = 4.4865515246e-40 C m^2
U_ATOMIC_UNIT_OF_ELECTRIC_QUADRUPOLE_MOM = 0.0000000014e-40 C m^2

ATOMIC_UNIT_OF_ENERGY = 4.3597447222071e-18 J
```

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```
U_ATOMIC_UNIT_OF_ENERGY = 0.0000000000085e-18 J

ATOMIC_UNIT_OF_FORCE = 8.2387234983e-8 N
U_ATOMIC_UNIT_OF_FORCE = 0.0000000012e-8 N

ATOMIC_UNIT_OF_LENGTH = 5.29177210903e-11 m
U_ATOMIC_UNIT_OF_LENGTH = 0.00000000080e-11 m

ATOMIC_UNIT_OF_MAG__DIPOLE_MOM = 1.85480201566e-23 J T^-1
U_ATOMIC_UNIT_OF_MAG__DIPOLE_MOM = 0.00000000056e-23 J T^-1

ATOMIC_UNIT_OF_MAG__FLUX_DENSITY = 2.35051756758e5 T
U_ATOMIC_UNIT_OF_MAG__FLUX_DENSITY = 0.00000000071e5 T

ATOMIC_UNIT_OF_MAGNETIZABILITY = 7.8910366008e-29 J T^-2
U_ATOMIC_UNIT_OF_MAGNETIZABILITY = 0.0000000048e-29 J T^-2

ATOMIC_UNIT_OF_MASS = 9.1093837015e-31 kg
U_ATOMIC_UNIT_OF_MASS = 0.0000000028e-31 kg

ATOMIC_UNIT_OF_MOMENTUM = 1.99285191410e-24 kg m s^-1
U_ATOMIC_UNIT_OF_MOMENTUM = 0.00000000030e-24 kg m s^-1

ATOMIC_UNIT_OF_PERMITTIVITY = 1.11265005545e-10 F m^-1
U_ATOMIC_UNIT_OF_PERMITTIVITY = 0.00000000017e-10 F m^-1

ATOMIC_UNIT_OF_TIME = 2.4188843265857e-17 s
U_ATOMIC_UNIT_OF_TIME = 0.0000000000047e-17 s

ATOMIC_UNIT_OF_VELOCITY = 2.18769126364e6 m s^-1
U_ATOMIC_UNIT_OF_VELOCITY = 0.00000000033e6 m s^-1

AVOGADRO_CONSTANT = 6.02214076e23 mol^-1
U_AVOGADRO_CONSTANT = 0.0e0 mol^-1

BOHR_MAGNETON = 9.2740100783e-24 J T^-1
U_BOHR_MAGNETON = 0.0000000028e-24 J T^-1

BOHR_MAGNETON_IN_EV_T = 5.7883818060e-5 eV T^-1
U_BOHR_MAGNETON_IN_EV_T = 0.0000000017e-5 eV T^-1

BOHR_MAGNETON_IN_HZ_T = 1.39962449361e10 Hz T^-1
U_BOHR_MAGNETON_IN_HZ_T = 0.00000000042e10 Hz T^-1

BOHR_MAGNETON_IN_INVERSE_METER_PER_TESLA = 46.686447783e0 m^-1 T^-1
U_BOHR_MAGNETON_IN_INVERSE_METER_PER_TESLA = 0.000000014e0 m^-1 T^-1

BOHR_MAGNETON_IN_K_T = 0.67171381563e0 K T^-1
U_BOHR_MAGNETON_IN_K_T = 0.00000000020e0 K T^-1

BOHR_RADIUS = 5.29177210903e-11 m
U_BOHR_RADIUS = 0.00000000080e-11 m

BOLTZMANN_CONSTANT = 1.380649e-23 J K^-1
U_BOLTZMANN_CONSTANT = 0.0e0 J K^-1
```

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```
BOLTZMANN_CONSTANT_IN_EV_K = 8.617333262e-5 eV K^-1
U_BOLTZMANN_CONSTANT_IN_EV_K = 0.0e0 eV K^-1

BOLTZMANN_CONSTANT_IN_HZ_K = 2.083661912e10 Hz K^-1
U_BOLTZMANN_CONSTANT_IN_HZ_K = 0.0e0 Hz K^-1

BOLTZMANN_CONSTANT_IN_INVERSE_METER_PER_KELVIN = 69.50348004e0 m^-1 K^-1
U_BOLTZMANN_CONSTANT_IN_INVERSE_METER_PER_KELVIN = 0.0e0 m^-1 K^-1

CHARACTERISTIC_IMPEDANCE_OF_VACUUM = 376.730313668e0 ohm
U_CHARACTERISTIC_IMPEDANCE_OF_VACUUM = 0.000000057e0 ohm

CLASSICAL_ELECTRON_RADIUS = 2.8179403262e-15 m
U_CLASSICAL_ELECTRON_RADIUS = 0.0000000013e-15 m

COMPTON_WAVELENGTH = 2.42631023867e-12 m
U_COMPTON_WAVELENGTH = 0.00000000073e-12 m

CONDUCTANCE_QUANTUM = 7.748091729e-5 S
U_CONDUCTANCE_QUANTUM = 0.0e0 S

CONVENTIONAL_VALUE_OF_AMPERE_90 = 1.00000008887e0 A
U_CONVENTIONAL_VALUE_OF_AMPERE_90 = 0.0e0 A

CONVENTIONAL_VALUE_OF_COULOMB_90 = 1.00000008887e0 C
U_CONVENTIONAL_VALUE_OF_COULOMB_90 = 0.0e0 C

CONVENTIONAL_VALUE_OF_FARAD_90 = 0.99999998220e0 F
U_CONVENTIONAL_VALUE_OF_FARAD_90 = 0.0e0 F

CONVENTIONAL_VALUE_OF_HENRY_90 = 1.00000001779e0 H
U_CONVENTIONAL_VALUE_OF_HENRY_90 = 0.0e0 H

CONVENTIONAL_VALUE_OF_JOSEPHSON_CONSTANT = 483597.9e9 Hz V^-1
U_CONVENTIONAL_VALUE_OF_JOSEPHSON_CONSTANT = 0.0e0 Hz V^-1

CONVENTIONAL_VALUE_OF_OHM_90 = 1.00000001779e0 ohm
U_CONVENTIONAL_VALUE_OF_OHM_90 = 0.0e0 ohm

CONVENTIONAL_VALUE_OF_VOLT_90 = 1.00000010666e0 V
U_CONVENTIONAL_VALUE_OF_VOLT_90 = 0.0e0 V

CONVENTIONAL_VALUE_OF_VON_KLITZING_CONSTANT = 25812.807e0 ohm
U_CONVENTIONAL_VALUE_OF_VON_KLITZING_CONSTANT = 0.0e0 ohm

CONVENTIONAL_VALUE_OF_WATT_90 = 1.00000019553e0 W
U_CONVENTIONAL_VALUE_OF_WATT_90 = 0.0e0 W

COPPER_X_UNIT = 1.00207697e-13 m
U_COPPER_X_UNIT = 0.00000028e-13 m

DEUTERON_ELECTRON_MAG__MOM__RATIO = -4.664345551e-4
U_DEUTERON_ELECTRON_MAG__MOM__RATIO = 0.000000012e-4

DEUTERON_ELECTRON_MASS_RATIO = 3670.48296788e0
U_DEUTERON_ELECTRON_MASS_RATIO = 0.00000013e0
```

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```
DEUTERON_G_FACTOR = 0.8574382338e0
U_DEUTERON_G_FACTOR = 0.0000000022e0

DEUTERON_MAG__MOM = 4.330735094e-27 J T^-1
U_DEUTERON_MAG__MOM = 0.000000011e-27 J T^-1

DEUTERON_MAG__MOM__TO_BOHR_MAGNETON_RATIO = 4.669754570e-4
U_DEUTERON_MAG__MOM__TO_BOHR_MAGNETON_RATIO = 0.000000012e-4

DEUTERON_MAG__MOM__TO_NUCLEAR_MAGNETON_RATIO = 0.8574382338e0
U_DEUTERON_MAG__MOM__TO_NUCLEAR_MAGNETON_RATIO = 0.0000000022e0

DEUTERON_MASS = 3.3435837724e-27 kg
U_DEUTERON_MASS = 0.0000000010e-27 kg

DEUTERON_MASS_ENERGY_EQUIVALENT = 3.00506323102e-10 J
U_DEUTERON_MASS_ENERGY_EQUIVALENT = 0.00000000091e-10 J

DEUTERON_MASS_ENERGY_EQUIVALENT_IN_MEV = 1875.61294257e0 MeV
U_DEUTERON_MASS_ENERGY_EQUIVALENT_IN_MEV = 0.00000057e0 MeV

DEUTERON_MASS_IN_U = 2.013553212745e0 u
U_DEUTERON_MASS_IN_U = 0.000000000040e0 u

DEUTERON_MOLAR_MASS = 2.01355321205e-3 kg mol^-1
U_DEUTERON_MOLAR_MASS = 0.00000000061e-3 kg mol^-1

DEUTERON_NEUTRON_MAG__MOM__RATIO = -0.44820653e0
U_DEUTERON_NEUTRON_MAG__MOM__RATIO = 0.00000011e0

DEUTERON_PROTON_MAG__MOM__RATIO = 0.30701220939e0
U_DEUTERON_PROTON_MAG__MOM__RATIO = 0.00000000079e0

DEUTERON_PROTON_MASS_RATIO = 1.99900750139e0
U_DEUTERON_PROTON_MASS_RATIO = 0.00000000011e0

DEUTERON_RELATIVE_ATOMIC_MASS = 2.013553212745e0
U_DEUTERON_RELATIVE_ATOMIC_MASS = 0.000000000040e0

DEUTERON_RMS_CHARGE_RADIUS = 2.12799e-15 m
U_DEUTERON_RMS_CHARGE_RADIUS = 0.00074e-15 m

ELECTRON_CHARGE_TO_MASS_QUOTIENT = -1.75882001076e11 C kg^-1
U_ELECTRON_CHARGE_TO_MASS_QUOTIENT = 0.00000000053e11 C kg^-1

ELECTRON_DEUTERON_MAG__MOM__RATIO = -2143.9234915e0
U_ELECTRON_DEUTERON_MAG__MOM__RATIO = 0.0000056e0

ELECTRON_DEUTERON_MASS_RATIO = 2.724437107462e-4
U_ELECTRON_DEUTERON_MASS_RATIO = 0.000000000096e-4

ELECTRON_G_FACTOR = -2.00231930436256e0
U_ELECTRON_G_FACTOR = 0.00000000000035e0

ELECTRON_GYROMAG__RATIO = 1.76085963023e11 s^-1 T^-1
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```
U_ELECTRON_GYROMAG__RATIO = 0.00000000053e11 s^-1 T^-1

ELECTRON_GYROMAG__RATIO_IN_MHZ_T = 28024.9514242e0 MHz T^-1
U_ELECTRON_GYROMAG__RATIO_IN_MHZ_T = 0.0000085e0 MHz T^-1

ELECTRON_HELION_MASS_RATIO = 1.819543074573e-4
U_ELECTRON_HELION_MASS_RATIO = 0.000000000079e-4

ELECTRON_MAG__MOM = -9.2847647043e-24 J T^-1
U_ELECTRON_MAG__MOM = 0.0000000028e-24 J T^-1

ELECTRON_MAG__MOM__ANOMALY = 1.15965218128e-3
U_ELECTRON_MAG__MOM__ANOMALY = 0.00000000018e-3

ELECTRON_MAG__MOM__TO_BOHR_MAGNETON_RATIO = -1.00115965218128e0
U_ELECTRON_MAG__MOM__TO_BOHR_MAGNETON_RATIO = 0.00000000000018e0

ELECTRON_MAG__MOM__TO_NUCLEAR_MAGNETON_RATIO = -1838.28197188e0
U_ELECTRON_MAG__MOM__TO_NUCLEAR_MAGNETON_RATIO = 0.00000011e0

ELECTRON_MASS = 9.1093837015e-31 kg
U_ELECTRON_MASS = 0.0000000028e-31 kg

ELECTRON_MASS_ENERGY_EQUIVALENT = 8.1871057769e-14 J
U_ELECTRON_MASS_ENERGY_EQUIVALENT = 0.0000000025e-14 J

ELECTRON_MASS_ENERGY_EQUIVALENT_IN_MEV = 0.51099895000e0 MeV
U_ELECTRON_MASS_ENERGY_EQUIVALENT_IN_MEV = 0.00000000015e0 MeV

ELECTRON_MASS_IN_U = 5.48579909065e-4 u
U_ELECTRON_MASS_IN_U = 0.00000000016e-4 u

ELECTRON_MOLAR_MASS = 5.4857990888e-7 kg mol^-1
U_ELECTRON_MOLAR_MASS = 0.0000000017e-7 kg mol^-1

ELECTRON_MUON_MAG__MOM__RATIO = 206.7669883e0
U_ELECTRON_MUON_MAG__MOM__RATIO = 0.0000046e0

ELECTRON_MUON_MASS_RATIO = 4.83633169e-3
U_ELECTRON_MUON_MASS_RATIO = 0.00000011e-3

ELECTRON_NEUTRON_MAG__MOM__RATIO = 960.92050e0
U_ELECTRON_NEUTRON_MAG__MOM__RATIO = 0.00023e0

ELECTRON_NEUTRON_MASS_RATIO = 5.4386734424e-4
U_ELECTRON_NEUTRON_MASS_RATIO = 0.0000000026e-4

ELECTRON_PROTON_MAG__MOM__RATIO = -658.21068789e0
U_ELECTRON_PROTON_MAG__MOM__RATIO = 0.00000020e0

ELECTRON_PROTON_MASS_RATIO = 5.44617021487e-4
U_ELECTRON_PROTON_MASS_RATIO = 0.00000000033e-4

ELECTRON_RELATIVE_ATOMIC_MASS = 5.48579909065e-4
U_ELECTRON_RELATIVE_ATOMIC_MASS = 0.00000000016e-4
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```
ELECTRON_TAU_MASS_RATIO = 2.87585e-4
U_ELECTRON_TAU_MASS_RATIO = 0.00019e-4

ELECTRON_TO_ALPHA_PARTICLE_MASS_RATIO = 1.370933554787e-4
U_ELECTRON_TO_ALPHA_PARTICLE_MASS_RATIO = 0.000000000045e-4

ELECTRON_TO_SHIELDED_HELION_MAG__MOM__RATIO = 864.058257e0
U_ELECTRON_TO_SHIELDED_HELION_MAG__MOM__RATIO = 0.000010e0

ELECTRON_TO_SHIELDED_PROTON_MAG__MOM__RATIO = -658.2275971e0
U_ELECTRON_TO_SHIELDED_PROTON_MAG__MOM__RATIO = 0.0000072e0

ELECTRON_TRITON_MASS_RATIO = 1.819200062251e-4
U_ELECTRON_TRITON_MASS_RATIO = 0.000000000090e-4

ELECTRON_VOLT = 1.602176634e-19 J
U_ELECTRON_VOLT = 0.0e0 J

ELECTRON_VOLT_ATOMIC_MASS_UNIT_RELATIONSHIP = 1.07354410233e-9 u
U_ELECTRON_VOLT_ATOMIC_MASS_UNIT_RELATIONSHIP = 0.00000000032e-9 u

ELECTRON_VOLT_HARTREE_RELATIONSHIP = 3.6749322175655e-2 E_h
U_ELECTRON_VOLT_HARTREE_RELATIONSHIP = 0.0000000000071e-2 E_h

ELECTRON_VOLT_HERTZ_RELATIONSHIP = 2.417989242e14 Hz
U_ELECTRON_VOLT_HERTZ_RELATIONSHIP = 0.0e0 Hz

ELECTRON_VOLT_INVERSE_METER_RELATIONSHIP = 8.065543937e5 m^-1
U_ELECTRON_VOLT_INVERSE_METER_RELATIONSHIP = 0.0e0 m^-1

ELECTRON_VOLT_JOULE_RELATIONSHIP = 1.602176634e-19 J
U_ELECTRON_VOLT_JOULE_RELATIONSHIP = 0.0e0 J

ELECTRON_VOLT_KELVIN_RELATIONSHIP = 1.160451812e4 K
U_ELECTRON_VOLT_KELVIN_RELATIONSHIP = 0.0e0 K

ELECTRON_VOLT_KILOGRAM_RELATIONSHIP = 1.782661921e-36 kg
U_ELECTRON_VOLT_KILOGRAM_RELATIONSHIP = 0.0e0 kg

ELEMENTARY_CHARGE = 1.602176634e-19 C
U_ELEMENTARY_CHARGE = 0.0e0 C

ELEMENTARY_CHARGE_OVER_H_BAR = 1.519267447e15 A J^-1
U_ELEMENTARY_CHARGE_OVER_H_BAR = 0.0e0 A J^-1

FARADAY_CONSTANT = 96485.33212e0 C mol^-1
U_FARADAY_CONSTANT = 0.0e0 C mol^-1

FERMI_COUPLING_CONSTANT = 1.1663787e-5 GeV^-2
U_FERMI_COUPLING_CONSTANT = 0.0000006e-5 GeV^-2

FINE_STRUCTURE_CONSTANT = 7.2973525693e-3
U_FINE_STRUCTURE_CONSTANT = 0.0000000011e-3

FIRST_RADIATION_CONSTANT = 3.741771852e-16 W m^2
U_FIRST_RADIATION_CONSTANT = 0.0e0 W m^2
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FIRST_RADIATION_CONSTANT_FOR_SPECTRAL_RADIANCE = 1.191042972e-16 W m^2 sr^-1
U_FIRST_RADIATION_CONSTANT_FOR_SPECTRAL_RADIANCE = 0.0e0 W m^2 sr^-1

HARTREE_ATOMIC_MASS_UNIT_RELATIONSHIP = 2.92126232205e-8 u
U_HARTREE_ATOMIC_MASS_UNIT_RELATIONSHIP = 0.00000000088e-8 u

HARTREE_ELECTRON_VOLT_RELATIONSHIP = 27.211386245988e0 eV
U_HARTREE_ELECTRON_VOLT_RELATIONSHIP = 0.000000000053e0 eV

HARTREE_ENERGY = 4.3597447222071e-18 J
U_HARTREE_ENERGY = 0.0000000000085e-18 J

HARTREE_ENERGY_IN_EV = 27.211386245988e0 eV
U_HARTREE_ENERGY_IN_EV = 0.000000000053e0 eV

HARTREE_HERTZ_RELATIONSHIP = 6.579683920502e15 Hz
U_HARTREE_HERTZ_RELATIONSHIP = 0.000000000013e15 Hz

HARTREE_INVERSE_METER_RELATIONSHIP = 2.1947463136320e7 m^-1
U_HARTREE_INVERSE_METER_RELATIONSHIP = 0.0000000000043e7 m^-1

HARTREE_JOULE_RELATIONSHIP = 4.3597447222071e-18 J
U_HARTREE_JOULE_RELATIONSHIP = 0.0000000000085e-18 J

HARTREE_KELVIN_RELATIONSHIP = 3.1577502480407e5 K
U_HARTREE_KELVIN_RELATIONSHIP = 0.0000000000061e5 K

HARTREE_KILOGRAM_RELATIONSHIP = 4.8508702095432e-35 kg
U_HARTREE_KILOGRAM_RELATIONSHIP = 0.0000000000094e-35 kg

HELION_ELECTRON_MASS_RATIO = 5495.88528007e0
U_HELION_ELECTRON_MASS_RATIO = 0.00000024e0

HELION_G_FACTOR = -4.255250615e0
U_HELION_G_FACTOR = 0.000000050e0

HELION_MAG__MOM = -1.074617532e-26 J T^-1
U_HELION_MAG__MOM = 0.000000013e-26 J T^-1

HELION_MAG__MOM__TO_BOHR_MAGNETON_RATIO = -1.158740958e-3
U_HELION_MAG__MOM__TO_BOHR_MAGNETON_RATIO = 0.000000014e-3

HELION_MAG__MOM__TO_NUCLEAR_MAGNETON_RATIO = -2.127625307e0
U_HELION_MAG__MOM__TO_NUCLEAR_MAGNETON_RATIO = 0.000000025e0

HELION_MASS = 5.0064127796e-27 kg
U_HELION_MASS = 0.0000000015e-27 kg

HELION_MASS_ENERGY_EQUIVALENT = 4.4995394125e-10 J
U_HELION_MASS_ENERGY_EQUIVALENT = 0.0000000014e-10 J

HELION_MASS_ENERGY_EQUIVALENT_IN_MEV = 2808.39160743e0 MeV
U_HELION_MASS_ENERGY_EQUIVALENT_IN_MEV = 0.00000085e0 MeV

HELION_MASS_IN_U = 3.014932247175e0 u
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U_HELION_MASS_IN_U = 0.000000000097e0 u

HELION_MOLAR_MASS = 3.01493224613e-3 kg mol^-1
U_HELION_MOLAR_MASS = 0.00000000091e-3 kg mol^-1

HELION_PROTON_MASS_RATIO = 2.99315267167e0
U_HELION_PROTON_MASS_RATIO = 0.00000000013e0

HELION_RELATIVE_ATOMIC_MASS = 3.014932247175e0
U_HELION_RELATIVE_ATOMIC_MASS = 0.000000000097e0

HELION_SHIELDING_SHIFT = 5.996743e-5
U_HELION_SHIELDING_SHIFT = 0.000010e-5

HERTZ_ATOMIC_MASS_UNIT_RELATIONSHIP = 4.4398216652e-24 u
U_HERTZ_ATOMIC_MASS_UNIT_RELATIONSHIP = 0.0000000013e-24 u

HERTZ_ELECTRON_VOLT_RELATIONSHIP = 4.135667696e-15 eV
U_HERTZ_ELECTRON_VOLT_RELATIONSHIP = 0.0e0 eV

HERTZ_HARTREE_RELATIONSHIP = 1.5198298460570e-16 E_h
U_HERTZ_HARTREE_RELATIONSHIP = 0.0000000000029e-16 E_h

HERTZ_INVERSE_METER_RELATIONSHIP = 3.335640951e-9 m^-1
U_HERTZ_INVERSE_METER_RELATIONSHIP = 0.0e0 m^-1

HERTZ_JOULE_RELATIONSHIP = 6.62607015e-34 J
U_HERTZ_JOULE_RELATIONSHIP = 0.0e0 J

HERTZ_KELVIN_RELATIONSHIP = 4.799243073e-11 K
U_HERTZ_KELVIN_RELATIONSHIP = 0.0e0 K

HERTZ_KILOGRAM_RELATIONSHIP = 7.372497323e-51 kg
U_HERTZ_KILOGRAM_RELATIONSHIP = 0.0e0 kg

HYPERFINE_TRANSITION_FREQUENCY_OF_CS_133 = 9192631770.0e0 Hz
U_HYPERFINE_TRANSITION_FREQUENCY_OF_CS_133 = 0.0e0 Hz

INVERSE_FINE_STRUCTURE_CONSTANT = 137.035999084e0
U_INVERSE_FINE_STRUCTURE_CONSTANT = 0.000000021e0

INVERSE_METER_ATOMIC_MASS_UNIT_RELATIONSHIP = 1.33102505010e-15 u
U_INVERSE_METER_ATOMIC_MASS_UNIT_RELATIONSHIP = 0.00000000040e-15 u

INVERSE_METER_ELECTRON_VOLT_RELATIONSHIP = 1.239841984e-6 eV
U_INVERSE_METER_ELECTRON_VOLT_RELATIONSHIP = 0.0e0 eV

INVERSE_METER_HARTREE_RELATIONSHIP = 4.5563352529120e-8 E_h
U_INVERSE_METER_HARTREE_RELATIONSHIP = 0.0000000000088e-8 E_h

INVERSE_METER_HERTZ_RELATIONSHIP = 299792458.0e0 Hz
U_INVERSE_METER_HERTZ_RELATIONSHIP = 0.0e0 Hz

INVERSE_METER_JOULE_RELATIONSHIP = 1.986445857e-25 J
U_INVERSE_METER_JOULE_RELATIONSHIP = 0.0e0 J
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INVERSE_METER_KELVIN_RELATIONSHIP = 1.438776877e-2 K
U_INVERSE_METER_KELVIN_RELATIONSHIP = 0.0e0 K

INVERSE_METER_KILOGRAM_RELATIONSHIP = 2.210219094e-42 kg
U_INVERSE_METER_KILOGRAM_RELATIONSHIP = 0.0e0 kg

INVERSE_OF_CONDUCTANCE_QUANTUM = 12906.40372e0 ohm
U_INVERSE_OF_CONDUCTANCE_QUANTUM = 0.0e0 ohm

JOSEPHSON_CONSTANT = 483597.8484e9 Hz V^-1
U_JOSEPHSON_CONSTANT = 0.0e0 Hz V^-1

JOULE_ATOMIC_MASS_UNIT_RELATIONSHIP = 6.7005352565e9 u
U_JOULE_ATOMIC_MASS_UNIT_RELATIONSHIP = 0.0000000020e9 u

JOULE_ELECTRON_VOLT_RELATIONSHIP = 6.241509074e18 eV
U_JOULE_ELECTRON_VOLT_RELATIONSHIP = 0.0e0 eV

JOULE_HARTREE_RELATIONSHIP = 2.2937122783963e17 E_h
U_JOULE_HARTREE_RELATIONSHIP = 0.0000000000045e17 E_h

JOULE_HERTZ_RELATIONSHIP = 1.509190179e33 Hz
U_JOULE_HERTZ_RELATIONSHIP = 0.0e0 Hz

JOULE_INVERSE_METER_RELATIONSHIP = 5.034116567e24 m^-1
U_JOULE_INVERSE_METER_RELATIONSHIP = 0.0e0 m^-1

JOULE_KELVIN_RELATIONSHIP = 7.242970516e22 K
U_JOULE_KELVIN_RELATIONSHIP = 0.0e0 K

JOULE_KILOGRAM_RELATIONSHIP = 1.112650056e-17 kg
U_JOULE_KILOGRAM_RELATIONSHIP = 0.0e0 kg

KELVIN_ATOMIC_MASS_UNIT_RELATIONSHIP = 9.2510873014e-14 u
U_KELVIN_ATOMIC_MASS_UNIT_RELATIONSHIP = 0.0000000028e-14 u

KELVIN_ELECTRON_VOLT_RELATIONSHIP = 8.617333262e-5 eV
U_KELVIN_ELECTRON_VOLT_RELATIONSHIP = 0.0e0 eV

KELVIN_HARTREE_RELATIONSHIP = 3.1668115634556e-6 E_h
U_KELVIN_HARTREE_RELATIONSHIP = 0.0000000000061e-6 E_h

KELVIN_HERTZ_RELATIONSHIP = 2.083661912e10 Hz
U_KELVIN_HERTZ_RELATIONSHIP = 0.0e0 Hz

KELVIN_INVERSE_METER_RELATIONSHIP = 69.50348004e0 m^-1
U_KELVIN_INVERSE_METER_RELATIONSHIP = 0.0e0 m^-1

KELVIN_JOULE_RELATIONSHIP = 1.380649e-23 J
U_KELVIN_JOULE_RELATIONSHIP = 0.0e0 J

KELVIN_KILOGRAM_RELATIONSHIP = 1.536179187e-40 kg
U_KELVIN_KILOGRAM_RELATIONSHIP = 0.0e0 kg

KILOGRAM_ATOMIC_MASS_UNIT_RELATIONSHIP = 6.0221407621e26 u
U_KILOGRAM_ATOMIC_MASS_UNIT_RELATIONSHIP = 0.0000000018e26 u
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KILOGRAM_ELECTRON_VOLT_RELATIONSHIP = 5.609588603e35 eV
U_KILOGRAM_ELECTRON_VOLT_RELATIONSHIP = 0.0e0 eV

KILOGRAM_HARTREE_RELATIONSHIP = 2.0614857887409e34 E_h
U_KILOGRAM_HARTREE_RELATIONSHIP = 0.0000000000040e34 E_h

KILOGRAM_HERTZ_RELATIONSHIP = 1.356392489e50 Hz
U_KILOGRAM_HERTZ_RELATIONSHIP = 0.0e0 Hz

KILOGRAM_INVERSE_METER_RELATIONSHIP = 4.524438335e41 m^-1
U_KILOGRAM_INVERSE_METER_RELATIONSHIP = 0.0e0 m^-1

KILOGRAM_JOULE_RELATIONSHIP = 8.987551787e16 J
U_KILOGRAM_JOULE_RELATIONSHIP = 0.0e0 J

KILOGRAM_KELVIN_RELATIONSHIP = 6.509657260e39 K
U_KILOGRAM_KELVIN_RELATIONSHIP = 0.0e0 K

LATTICE_PARAMETER_OF_SILICON = 5.431020511e-10 m
U_LATTICE_PARAMETER_OF_SILICON = 0.000000089e-10 m

LATTICE_SPACING_OF_IDEAL_SI__220 = 1.920155716e-10 m
U_LATTICE_SPACING_OF_IDEAL_SI__220 = 0.000000032e-10 m

LOSCHMIDT_CONSTANT__273_15_K__100_KPA = 2.651645804e25 m^-3
U_LOSCHMIDT_CONSTANT__273_15_K__100_KPA = 0.0e0 m^-3

LOSCHMIDT_CONSTANT__273_15_K__101_325_KPA = 2.686780111e25 m^-3
U_LOSCHMIDT_CONSTANT__273_15_K__101_325_KPA = 0.0e0 m^-3

LUMINOUS_EFFICACY = 683.0e0 lm W^-1
U_LUMINOUS_EFFICACY = 0.0e0 lm W^-1

MAG__FLUX_QUANTUM = 2.067833848e-15 Wb
U_MAG__FLUX_QUANTUM = 0.0e0 Wb

MOLAR_GAS_CONSTANT = 8.314462618e0 J mol^-1 K^-1
U_MOLAR_GAS_CONSTANT = 0.0e0 J mol^-1 K^-1

MOLAR_MASS_CONSTANT = 0.99999999965e-3 kg mol^-1
U_MOLAR_MASS_CONSTANT = 0.00000000030e-3 kg mol^-1

MOLAR_MASS_OF_CARBON_12 = 11.9999999958e-3 kg mol^-1
U_MOLAR_MASS_OF_CARBON_12 = 0.0000000036e-3 kg mol^-1

MOLAR_PLANCK_CONSTANT = 3.990312712e-10 J Hz^-1 mol^-1
U_MOLAR_PLANCK_CONSTANT = 0.0e0 J Hz^-1 mol^-1

MOLAR_VOLUME_OF_IDEAL_GAS__273_15_K__100_KPA = 22.71095464e-3 m^3 mol^-1
U_MOLAR_VOLUME_OF_IDEAL_GAS__273_15_K__100_KPA = 0.0e0 m^3 mol^-1

MOLAR_VOLUME_OF_IDEAL_GAS__273_15_K__101_325_KPA = 22.41396954e-3 m^3 mol^-1
U_MOLAR_VOLUME_OF_IDEAL_GAS__273_15_K__101_325_KPA = 0.0e0 m^3 mol^-1

MOLAR_VOLUME_OF_SILICON = 1.205883199e-5 m^3 mol^-1
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U_MOLAR_VOLUME_OF_SILICON = 0.000000060e-5 m^3 mol^-1

MOLYBDENUM_X_UNIT = 1.00209952e-13 m
U_MOLYBDENUM_X_UNIT = 0.00000053e-13 m

MUON_COMPTON_WAVELENGTH = 1.173444110e-14 m
U_MUON_COMPTON_WAVELENGTH = 0.000000026e-14 m

MUON_ELECTRON_MASS_RATIO = 206.7682830e0
U_MUON_ELECTRON_MASS_RATIO = 0.0000046e0

MUON_G_FACTOR = -2.0023318418e0
U_MUON_G_FACTOR = 0.0000000013e0

MUON_MAG__MOM = -4.49044830e-26 J T^-1
U_MUON_MAG__MOM = 0.00000010e-26 J T^-1

MUON_MAG__MOM__ANOMALY = 1.16592089e-3
U_MUON_MAG__MOM__ANOMALY = 0.00000063e-3

MUON_MAG__MOM__TO_BOHR_MAGNETON_RATIO = -4.84197047e-3
U_MUON_MAG__MOM__TO_BOHR_MAGNETON_RATIO = 0.00000011e-3

MUON_MAG__MOM__TO_NUCLEAR_MAGNETON_RATIO = -8.89059703e0
U_MUON_MAG__MOM__TO_NUCLEAR_MAGNETON_RATIO = 0.00000020e0

MUON_MASS = 1.883531627e-28 kg
U_MUON_MASS = 0.000000042e-28 kg

MUON_MASS_ENERGY_EQUIVALENT = 1.692833804e-11 J
U_MUON_MASS_ENERGY_EQUIVALENT = 0.000000038e-11 J

MUON_MASS_ENERGY_EQUIVALENT_IN_MEV = 105.6583755e0 MeV
U_MUON_MASS_ENERGY_EQUIVALENT_IN_MEV = 0.0000023e0 MeV

MUON_MASS_IN_U = 0.1134289259e0 u
U_MUON_MASS_IN_U = 0.0000000025e0 u

MUON_MOLAR_MASS = 1.134289259e-4 kg mol^-1
U_MUON_MOLAR_MASS = 0.000000025e-4 kg mol^-1

MUON_NEUTRON_MASS_RATIO = 0.1124545170e0
U_MUON_NEUTRON_MASS_RATIO = 0.0000000025e0

MUON_PROTON_MAG__MOM__RATIO = -3.183345142e0
U_MUON_PROTON_MAG__MOM__RATIO = 0.000000071e0

MUON_PROTON_MASS_RATIO = 0.1126095264e0
U_MUON_PROTON_MASS_RATIO = 0.0000000025e0

MUON_TAU_MASS_RATIO = 5.94635e-2
U_MUON_TAU_MASS_RATIO = 0.00040e-2

NATURAL_UNIT_OF_ACTION = 1.054571817e-34 J s
U_NATURAL_UNIT_OF_ACTION = 0.0e0 J s
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NATURAL_UNIT_OF_ACTION_IN_EV_S = 6.582119569e-16 eV s
U_NATURAL_UNIT_OF_ACTION_IN_EV_S = 0.0e0 eV s

NATURAL_UNIT_OF_ENERGY = 8.1871057769e-14 J
U_NATURAL_UNIT_OF_ENERGY = 0.0000000025e-14 J

NATURAL_UNIT_OF_ENERGY_IN_MEV = 0.51099895000e0 MeV
U_NATURAL_UNIT_OF_ENERGY_IN_MEV = 0.00000000015e0 MeV

NATURAL_UNIT_OF_LENGTH = 3.8615926796e-13 m
U_NATURAL_UNIT_OF_LENGTH = 0.0000000012e-13 m

NATURAL_UNIT_OF_MASS = 9.1093837015e-31 kg
U_NATURAL_UNIT_OF_MASS = 0.0000000028e-31 kg

NATURAL_UNIT_OF_MOMENTUM = 2.73092453075e-22 kg m s^-1
U_NATURAL_UNIT_OF_MOMENTUM = 0.00000000082e-22 kg m s^-1

NATURAL_UNIT_OF_MOMENTUM_IN_MEV_C = 0.51099895000e0 MeV/c
U_NATURAL_UNIT_OF_MOMENTUM_IN_MEV_C = 0.00000000015e0 MeV/c

NATURAL_UNIT_OF_TIME = 1.28808866819e-21 s
U_NATURAL_UNIT_OF_TIME = 0.00000000039e-21 s

NATURAL_UNIT_OF_VELOCITY = 299792458.0e0 m s^-1
U_NATURAL_UNIT_OF_VELOCITY = 0.0e0 m s^-1

NEUTRON_COMPTON_WAVELENGTH = 1.31959090581e-15 m
U_NEUTRON_COMPTON_WAVELENGTH = 0.00000000075e-15 m

NEUTRON_ELECTRON_MAG__MOM__RATIO = 1.04066882e-3
U_NEUTRON_ELECTRON_MAG__MOM__RATIO = 0.00000025e-3

NEUTRON_ELECTRON_MASS_RATIO = 1838.68366173e0
U_NEUTRON_ELECTRON_MASS_RATIO = 0.00000089e0

NEUTRON_G_FACTOR = -3.82608545e0
U_NEUTRON_G_FACTOR = 0.00000090e0

NEUTRON_GYROMAG__RATIO = 1.83247171e8 s^-1 T^-1
U_NEUTRON_GYROMAG__RATIO = 0.00000043e8 s^-1 T^-1

NEUTRON_GYROMAG__RATIO_IN_MHZ_T = 29.1646931e0 MHz T^-1
U_NEUTRON_GYROMAG__RATIO_IN_MHZ_T = 0.0000069e0 MHz T^-1

NEUTRON_MAG__MOM = -9.6623651e-27 J T^-1
U_NEUTRON_MAG__MOM = 0.0000023e-27 J T^-1

NEUTRON_MAG__MOM__TO_BOHR_MAGNETON_RATIO = -1.04187563e-3
U_NEUTRON_MAG__MOM__TO_BOHR_MAGNETON_RATIO = 0.00000025e-3

NEUTRON_MAG__MOM__TO_NUCLEAR_MAGNETON_RATIO = -1.91304273e0
U_NEUTRON_MAG__MOM__TO_NUCLEAR_MAGNETON_RATIO = 0.00000045e0

NEUTRON_MASS = 1.67492749804e-27 kg
U_NEUTRON_MASS = 0.00000000095e-27 kg
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NEUTRON_MASS_ENERGY_EQUIVALENT = 1.50534976287e-10 J
U_NEUTRON_MASS_ENERGY_EQUIVALENT = 0.00000000086e-10 J

NEUTRON_MASS_ENERGY_EQUIVALENT_IN_MEV = 939.56542052e0 MeV
U_NEUTRON_MASS_ENERGY_EQUIVALENT_IN_MEV = 0.00000054e0 MeV

NEUTRON_MASS_IN_U = 1.00866491595e0 u
U_NEUTRON_MASS_IN_U = 0.00000000049e0 u

NEUTRON_MOLAR_MASS = 1.00866491560e-3 kg mol^-1
U_NEUTRON_MOLAR_MASS = 0.00000000057e-3 kg mol^-1

NEUTRON_MUON_MASS_RATIO = 8.89248406e0
U_NEUTRON_MUON_MASS_RATIO = 0.00000020e0

NEUTRON_PROTON_MAG__MOM__RATIO = -0.68497934e0
U_NEUTRON_PROTON_MAG__MOM__RATIO = 0.00000016e0

NEUTRON_PROTON_MASS_DIFFERENCE = 2.30557435e-30 kg
U_NEUTRON_PROTON_MASS_DIFFERENCE = 0.00000082e-30 kg

NEUTRON_PROTON_MASS_DIFFERENCE_ENERGY_EQUIVALENT = 2.07214689e-13 J
U_NEUTRON_PROTON_MASS_DIFFERENCE_ENERGY_EQUIVALENT = 0.00000074e-13 J

NEUTRON_PROTON_MASS_DIFFERENCE_ENERGY_EQUIVALENT_IN_MEV = 1.29333236e0 MeV
U_NEUTRON_PROTON_MASS_DIFFERENCE_ENERGY_EQUIVALENT_IN_MEV = 0.00000046e0 MeV

NEUTRON_PROTON_MASS_DIFFERENCE_IN_U = 1.38844933e-3 u
U_NEUTRON_PROTON_MASS_DIFFERENCE_IN_U = 0.00000049e-3 u

NEUTRON_PROTON_MASS_RATIO = 1.00137841931e0
U_NEUTRON_PROTON_MASS_RATIO = 0.00000000049e0

NEUTRON_RELATIVE_ATOMIC_MASS = 1.00866491595e0
U_NEUTRON_RELATIVE_ATOMIC_MASS = 0.00000000049e0

NEUTRON_TAU_MASS_RATIO = 0.528779e0
U_NEUTRON_TAU_MASS_RATIO = 0.000036e0

NEUTRON_TO_SHIELDED_PROTON_MAG__MOM__RATIO = -0.68499694e0
U_NEUTRON_TO_SHIELDED_PROTON_MAG__MOM__RATIO = 0.00000016e0

NEWTONIAN_CONSTANT_OF_GRAVITATION = 6.67430e-11 m^3 kg^-1 s^-2
U_NEWTONIAN_CONSTANT_OF_GRAVITATION = 0.00015e-11 m^3 kg^-1 s^-2

NEWTONIAN_CONSTANT_OF_GRAVITATION_OVER_H_BAR_C = 6.70883e-39 (GeV/c^2)^-2
U_NEWTONIAN_CONSTANT_OF_GRAVITATION_OVER_H_BAR_C = 0.00015e-39 (GeV/c^2)^-2

NUCLEAR_MAGNETON = 5.0507837461e-27 J T^-1
U_NUCLEAR_MAGNETON = 0.0000000015e-27 J T^-1

NUCLEAR_MAGNETON_IN_EV_T = 3.15245125844e-8 eV T^-1
U_NUCLEAR_MAGNETON_IN_EV_T = 0.00000000096e-8 eV T^-1

NUCLEAR_MAGNETON_IN_INVERSE_METER_PER_TESLA = 2.54262341353e-2 m^-1 T^-1
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U_NUCLEAR_MAGNETON_IN_INVERSE_METER_PER_TESLA = 0.00000000078e-2 m^-1 T^-1

NUCLEAR_MAGNETON_IN_K_T = 3.6582677756e-4 K T^-1
U_NUCLEAR_MAGNETON_IN_K_T = 0.0000000011e-4 K T^-1

NUCLEAR_MAGNETON_IN_MHZ_T = 7.6225932291e0 MHz T^-1
U_NUCLEAR_MAGNETON_IN_MHZ_T = 0.0000000023e0 MHz T^-1

PLANCK_CONSTANT = 6.62607015e-34 J Hz^-1
U_PLANCK_CONSTANT = 0.0e0 J Hz^-1

PLANCK_CONSTANT_IN_EV_HZ = 4.135667696e-15 eV Hz^-1
U_PLANCK_CONSTANT_IN_EV_HZ = 0.0e0 eV Hz^-1

PLANCK_LENGTH = 1.616255e-35 m
U_PLANCK_LENGTH = 0.000018e-35 m

PLANCK_MASS = 2.176434e-8 kg
U_PLANCK_MASS = 0.000024e-8 kg

PLANCK_MASS_ENERGY_EQUIVALENT_IN_GEV = 1.220890e19 GeV
U_PLANCK_MASS_ENERGY_EQUIVALENT_IN_GEV = 0.000014e19 GeV

PLANCK_TEMPERATURE = 1.416784e32 K
U_PLANCK_TEMPERATURE = 0.000016e32 K

PLANCK_TIME = 5.391247e-44 s
U_PLANCK_TIME = 0.000060e-44 s

PROTON_CHARGE_TO_MASS_QUOTIENT = 9.5788331560e7 C kg^-1
U_PROTON_CHARGE_TO_MASS_QUOTIENT = 0.0000000029e7 C kg^-1

PROTON_COMPTON_WAVELENGTH = 1.32140985539e-15 m
U_PROTON_COMPTON_WAVELENGTH = 0.00000000040e-15 m

PROTON_ELECTRON_MASS_RATIO = 1836.15267343e0
U_PROTON_ELECTRON_MASS_RATIO = 0.00000011e0

PROTON_G_FACTOR = 5.5856946893e0
U_PROTON_G_FACTOR = 0.0000000016e0

PROTON_GYROMAG__RATIO = 2.6752218744e8 s^-1 T^-1
U_PROTON_GYROMAG__RATIO = 0.0000000011e8 s^-1 T^-1

PROTON_GYROMAG__RATIO_IN_MHZ_T = 42.577478518e0 MHz T^-1
U_PROTON_GYROMAG__RATIO_IN_MHZ_T = 0.000000018e0 MHz T^-1

PROTON_MAG__MOM = 1.41060679736e-26 J T^-1
U_PROTON_MAG__MOM = 0.00000000060e-26 J T^-1

PROTON_MAG__MOM__TO_BOHR_MAGNETON_RATIO = 1.52103220230e-3
U_PROTON_MAG__MOM__TO_BOHR_MAGNETON_RATIO = 0.00000000046e-3

PROTON_MAG__MOM__TO_NUCLEAR_MAGNETON_RATIO = 2.79284734463e0
U_PROTON_MAG__MOM__TO_NUCLEAR_MAGNETON_RATIO = 0.00000000082e0
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PROTON_MAG__SHIELDING_CORRECTION = 2.5689e-5
U_PROTON_MAG__SHIELDING_CORRECTION = 0.0011e-5

PROTON_MASS = 1.67262192369e-27 kg
U_PROTON_MASS = 0.00000000051e-27 kg

PROTON_MASS_ENERGY_EQUIVALENT = 1.50327761598e-10 J
U_PROTON_MASS_ENERGY_EQUIVALENT = 0.00000000046e-10 J

PROTON_MASS_ENERGY_EQUIVALENT_IN_MEV = 938.27208816e0 MeV
U_PROTON_MASS_ENERGY_EQUIVALENT_IN_MEV = 0.00000029e0 MeV

PROTON_MASS_IN_U = 1.007276466621e0 u
U_PROTON_MASS_IN_U = 0.000000000053e0 u

PROTON_MOLAR_MASS = 1.00727646627e-3 kg mol^-1
U_PROTON_MOLAR_MASS = 0.00000000031e-3 kg mol^-1

PROTON_MUON_MASS_RATIO = 8.88024337e0
U_PROTON_MUON_MASS_RATIO = 0.00000020e0

PROTON_NEUTRON_MAG__MOM__RATIO = -1.45989805e0
U_PROTON_NEUTRON_MAG__MOM__RATIO = 0.00000034e0

PROTON_NEUTRON_MASS_RATIO = 0.99862347812e0
U_PROTON_NEUTRON_MASS_RATIO = 0.00000000049e0

PROTON_RELATIVE_ATOMIC_MASS = 1.007276466621e0
U_PROTON_RELATIVE_ATOMIC_MASS = 0.000000000053e0

PROTON_RMS_CHARGE_RADIUS = 8.414e-16 m
U_PROTON_RMS_CHARGE_RADIUS = 0.019e-16 m

PROTON_TAU_MASS_RATIO = 0.528051e0
U_PROTON_TAU_MASS_RATIO = 0.000036e0

QUANTUM_OF_CIRCULATION = 3.6369475516e-4 m^2 s^-1
U_QUANTUM_OF_CIRCULATION = 0.0000000011e-4 m^2 s^-1

QUANTUM_OF_CIRCULATION_TIMES_2 = 7.2738951032e-4 m^2 s^-1
U_QUANTUM_OF_CIRCULATION_TIMES_2 = 0.0000000022e-4 m^2 s^-1

REDUCED_COMPTON_WAVELENGTH = 3.8615926796e-13 m
U_REDUCED_COMPTON_WAVELENGTH = 0.0000000012e-13 m

REDUCED_MUON_COMPTON_WAVELENGTH = 1.867594306e-15 m
U_REDUCED_MUON_COMPTON_WAVELENGTH = 0.000000042e-15 m

REDUCED_NEUTRON_COMPTON_WAVELENGTH = 2.1001941552e-16 m
U_REDUCED_NEUTRON_COMPTON_WAVELENGTH = 0.0000000012e-16 m

REDUCED_PLANCK_CONSTANT = 1.054571817e-34 J s
U_REDUCED_PLANCK_CONSTANT = 0.0e0 J s

REDUCED_PLANCK_CONSTANT_IN_EV_S = 6.582119569e-16 eV s
U_REDUCED_PLANCK_CONSTANT_IN_EV_S = 0.0e0 eV s
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REDUCED_PLANCK_CONSTANT_TIMES_C_IN_MEV_FM = 197.3269804e0 MeV fm
U_REDUCED_PLANCK_CONSTANT_TIMES_C_IN_MEV_FM = 0.0e0 MeV fm

REDUCED_PROTON_COMPTON_WAVELENGTH = 2.10308910336e-16 m
U_REDUCED_PROTON_COMPTON_WAVELENGTH = 0.00000000064e-16 m

REDUCED_TAU_COMPTON_WAVELENGTH = 1.110538e-16 m
U_REDUCED_TAU_COMPTON_WAVELENGTH = 0.000075e-16 m

RYDBERG_CONSTANT = 10973731.568160e0 m^-1
U_RYDBERG_CONSTANT = 0.000021e0 m^-1

RYDBERG_CONSTANT_TIMES_C_IN_HZ = 3.2898419602508e15 Hz
U_RYDBERG_CONSTANT_TIMES_C_IN_HZ = 0.0000000000064e15 Hz

RYDBERG_CONSTANT_TIMES_HC_IN_EV = 13.605693122994e0 eV
U_RYDBERG_CONSTANT_TIMES_HC_IN_EV = 0.000000000026e0 eV

RYDBERG_CONSTANT_TIMES_HC_IN_J = 2.1798723611035e-18 J
U_RYDBERG_CONSTANT_TIMES_HC_IN_J = 0.0000000000042e-18 J

SACKUR_TETRODE_CONSTANT__1_K__100_KPA = -1.15170753706e0
U_SACKUR_TETRODE_CONSTANT__1_K__100_KPA = 0.00000000045e0

SACKUR_TETRODE_CONSTANT__1_K__101_325_KPA = -1.16487052358e0
U_SACKUR_TETRODE_CONSTANT__1_K__101_325_KPA = 0.00000000045e0

SECOND_RADIATION_CONSTANT = 1.438776877e-2 m K
U_SECOND_RADIATION_CONSTANT = 0.0e0 m K

SHIELDED_HELION_GYROMAG__RATIO = 2.037894569e8 s^-1 T^-1
U_SHIELDED_HELION_GYROMAG__RATIO = 0.000000024e8 s^-1 T^-1

SHIELDED_HELION_GYROMAG__RATIO_IN_MHZ_T = 32.43409942e0 MHz T^-1
U_SHIELDED_HELION_GYROMAG__RATIO_IN_MHZ_T = 0.00000038e0 MHz T^-1

SHIELDED_HELION_MAG__MOM = -1.074553090e-26 J T^-1
U_SHIELDED_HELION_MAG__MOM = 0.000000013e-26 J T^-1

SHIELDED_HELION_MAG__MOM__TO_BOHR_MAGNETON_RATIO = -1.158671471e-3
U_SHIELDED_HELION_MAG__MOM__TO_BOHR_MAGNETON_RATIO = 0.000000014e-3

SHIELDED_HELION_MAG__MOM__TO_NUCLEAR_MAGNETON_RATIO = -2.127497719e0
U_SHIELDED_HELION_MAG__MOM__TO_NUCLEAR_MAGNETON_RATIO = 0.000000025e0

SHIELDED_HELION_TO_PROTON_MAG__MOM__RATIO = -0.7617665618e0
U_SHIELDED_HELION_TO_PROTON_MAG__MOM__RATIO = 0.0000000089e0

SHIELDED_HELION_TO_SHIELDED_PROTON_MAG__MOM__RATIO = -0.7617861313e0
U_SHIELDED_HELION_TO_SHIELDED_PROTON_MAG__MOM__RATIO = 0.0000000033e0

SHIELDED_PROTON_GYROMAG__RATIO = 2.675153151e8 s^-1 T^-1
U_SHIELDED_PROTON_GYROMAG__RATIO = 0.000000029e8 s^-1 T^-1

SHIELDED_PROTON_GYROMAG__RATIO_IN_MHZ_T = 42.57638474e0 MHz T^-1
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U_SHIELDED_PROTON_GYROMAG__RATIO_IN_MHZ_T = 0.00000046e0 MHz T^-1

SHIELDED_PROTON_MAG__MOM = 1.410570560e-26 J T^-1
U_SHIELDED_PROTON_MAG__MOM = 0.000000015e-26 J T^-1

SHIELDED_PROTON_MAG__MOM__TO_BOHR_MAGNETON_RATIO = 1.520993128e-3
U_SHIELDED_PROTON_MAG__MOM__TO_BOHR_MAGNETON_RATIO = 0.000000017e-3

SHIELDED_PROTON_MAG__MOM__TO_NUCLEAR_MAGNETON_RATIO = 2.792775599e0
U_SHIELDED_PROTON_MAG__MOM__TO_NUCLEAR_MAGNETON_RATIO = 0.000000030e0

SHIELDING_DIFFERENCE_OF_D_AND_P_IN_HD = 2.0200e-8
U_SHIELDING_DIFFERENCE_OF_D_AND_P_IN_HD = 0.0020e-8

SHIELDING_DIFFERENCE_OF_T_AND_P_IN_HT = 2.4140e-8
U_SHIELDING_DIFFERENCE_OF_T_AND_P_IN_HT = 0.0020e-8

SPEED_OF_LIGHT_IN_VACUUM = 299792458.0e0 m s^-1
U_SPEED_OF_LIGHT_IN_VACUUM = 0.0e0 m s^-1

STANDARD_ACCELERATION_OF_GRAVITY = 9.80665e0 m s^-2
U_STANDARD_ACCELERATION_OF_GRAVITY = 0.0e0 m s^-2

STANDARD_ATMOSPHERE = 101325.0e0 Pa
U_STANDARD_ATMOSPHERE = 0.0e0 Pa

STANDARD_STATE_PRESSURE = 100000.0e0 Pa
U_STANDARD_STATE_PRESSURE = 0.0e0 Pa

STEFAN_BOLTZMANN_CONSTANT = 5.670374419e-8 W m^-2 K^-4
U_STEFAN_BOLTZMANN_CONSTANT = 0.0e0 W m^-2 K^-4

TAU_COMPTON_WAVELENGTH = 6.97771e-16 m
U_TAU_COMPTON_WAVELENGTH = 0.00047e-16 m

TAU_ELECTRON_MASS_RATIO = 3477.23e0
U_TAU_ELECTRON_MASS_RATIO = 0.23e0

TAU_ENERGY_EQUIVALENT = 1776.86e0 MeV
U_TAU_ENERGY_EQUIVALENT = 0.12e0 MeV

TAU_MASS = 3.16754e-27 kg
U_TAU_MASS = 0.00021e-27 kg

TAU_MASS_ENERGY_EQUIVALENT = 2.84684e-10 J
U_TAU_MASS_ENERGY_EQUIVALENT = 0.00019e-10 J

TAU_MASS_IN_U = 1.90754e0 u
U_TAU_MASS_IN_U = 0.00013e0 u

TAU_MOLAR_MASS = 1.90754e-3 kg mol^-1
U_TAU_MOLAR_MASS = 0.00013e-3 kg mol^-1

TAU_MUON_MASS_RATIO = 16.8170e0
U_TAU_MUON_MASS_RATIO = 0.0011e0
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TAU_NEUTRON_MASS_RATIO = 1.89115e0
U_TAU_NEUTRON_MASS_RATIO = 0.00013e0

TAU_PROTON_MASS_RATIO = 1.89376e0
U_TAU_PROTON_MASS_RATIO = 0.00013e0

THOMSON_CROSS_SECTION = 6.6524587321e-29 m^2
U_THOMSON_CROSS_SECTION = 0.0000000060e-29 m^2

TRITON_ELECTRON_MASS_RATIO = 5496.92153573e0
U_TRITON_ELECTRON_MASS_RATIO = 0.00000027e0

TRITON_G_FACTOR = 5.957924931e0
U_TRITON_G_FACTOR = 0.000000012e0

TRITON_MAG__MOM = 1.5046095202e-26 J T^-1
U_TRITON_MAG__MOM = 0.0000000030e-26 J T^-1

TRITON_MAG__MOM__TO_BOHR_MAGNETON_RATIO = 1.6223936651e-3
U_TRITON_MAG__MOM__TO_BOHR_MAGNETON_RATIO = 0.0000000032e-3

TRITON_MAG__MOM__TO_NUCLEAR_MAGNETON_RATIO = 2.9789624656e0
U_TRITON_MAG__MOM__TO_NUCLEAR_MAGNETON_RATIO = 0.0000000059e0

TRITON_MASS = 5.0073567446e-27 kg
U_TRITON_MASS = 0.0000000015e-27 kg

TRITON_MASS_ENERGY_EQUIVALENT = 4.5003878060e-10 J
U_TRITON_MASS_ENERGY_EQUIVALENT = 0.0000000014e-10 J

TRITON_MASS_ENERGY_EQUIVALENT_IN_MEV = 2808.92113298e0 MeV
U_TRITON_MASS_ENERGY_EQUIVALENT_IN_MEV = 0.00000085e0 MeV

TRITON_MASS_IN_U = 3.01550071621e0 u
U_TRITON_MASS_IN_U = 0.00000000012e0 u

TRITON_MOLAR_MASS = 3.01550071517e-3 kg mol^-1
U_TRITON_MOLAR_MASS = 0.00000000092e-3 kg mol^-1

TRITON_PROTON_MASS_RATIO = 2.99371703414e0
U_TRITON_PROTON_MASS_RATIO = 0.00000000015e0

TRITON_RELATIVE_ATOMIC_MASS = 3.01550071621e0
U_TRITON_RELATIVE_ATOMIC_MASS = 0.00000000012e0

TRITON_TO_PROTON_MAG__MOM__RATIO = 1.0666399191e0
U_TRITON_TO_PROTON_MAG__MOM__RATIO = 0.0000000021e0

UNIFIED_ATOMIC_MASS_UNIT = 1.66053906660e-27 kg
U_UNIFIED_ATOMIC_MASS_UNIT = 0.00000000050e-27 kg

VACUUM_ELECTRIC_PERMITTIVITY = 8.8541878128e-12 F m^-1
U_VACUUM_ELECTRIC_PERMITTIVITY = 0.0000000013e-12 F m^-1

VACUUM_MAG__PERMEABILITY = 1.25663706212e-6 N A^-2
U_VACUUM_MAG__PERMEABILITY = 0.00000000019e-6 N A^-2
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VON_KLITZING_CONSTANT = 25812.80745e0 ohm
U_VON_KLITZING_CONSTANT = 0.0e0 ohm

WEAK_MIXING_ANGLE = 0.22290e0
U_WEAK_MIXING_ANGLE = 0.00030e0

WIEN_FREQUENCY_DISPLACEMENT_LAW_CONSTANT = 5.878925757e10 Hz K^-1
U_WIEN_FREQUENCY_DISPLACEMENT_LAW_CONSTANT = 0.0e0 Hz K^-1

WIEN_WAVELENGTH_DISPLACEMENT_LAW_CONSTANT = 2.897771955e-3 m K
U_WIEN_WAVELENGTH_DISPLACEMENT_LAW_CONSTANT = 0.0e0 m K

W_TO_Z_MASS_RATIO = 0.88153e0
U_W_TO_Z_MASS_RATIO = 0.00017e0
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3.2 pycodata

All constant as declared in the *codata* are inserted at the top level of the module.

CHAPTER

FOUR

INDICES AND TABLES

- genindex
- modindex
- search