

codata

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NAME

codata - fundamental physical constants

LIBRARY

Codata (**-libcodata**, **-lcodata**)

SYNOPSIS

```

use codata
include "codata.h"
import pycodata

character(len=:), pointer function get_version() ()
char** codata_get_version(void)
pycodata.__version__

```

DESCRIPTION

codata is a Fortran library providing the fundamental physical constants according to CODATA <https://www.nist.gov/programs-projects/codata-values-fundamental-physical-constants>. A C API allows usage from C, or can be used as a basis for other wrappers. Python wrapper allows easy usage from Python.

The latest *codata* constants 2022 <https://pml.nist.gov/cuu/Constants> were integrated in stdlib <https://github.com/fortran-lang/stdlib/releases/tag/v0.7.0>. The constants are implemented as derived type which carries the name, the value, the uncertainty and the unit. This library is complementary to the constants defined in the stdlib by providing older values for the constants.

The latest values (2022) do not have the year as a suffix in their name. Older values can be used and they feature the year as a suffix in their name.

All *codata* (physical) constants are defined as a derived type `codata_constant_type`. All the *codata* constants are provided as double precision reals. The names are quite long and can be aliased with shorter names.

The derived type `codata_constant_type` defines 4 members:

- o name** string
- o value** double precision real
- o uncertainty**
double precision real
- o unit** string

The derived type `codata_constant_type` defines 2 type-bound procedures:

- o print** to print the values of the constant members;
- o to_real**
to get the value or the uncertainty to the desired precision.

A module level interface `to_real` is available for getting the constant value or uncertainty of a constant.

The C API exposes a structure `codata_constant_ttype` that defines the same members as in Fortran. The Python wrapper encapsulates the members in a dictionary.

NOTES

To **use** *codata* within your fpm <https://github.com/fortran-lang/fpm> project, add the following lines to your file:

```

[dependencies]
codata = { git="https://github.com/MilanSkocic/codata.git" }

```

EXAMPLE

Example in Fortran

```

program example_in_f
use iso_fortran_env
use codata
implicit none

print '(A)', '##### EXAMPLE IN FORTRAN #####'

print '(A)', '# VERSION'
print *, "version = ", get_version()

print '(A)', '# CONSTANTS'
print *, "c = ", SPEED_OF_LIGHT_IN_VACUUM%value

print '(A)', '# UNCERTAINTY'
print *, "u(c) = ", SPEED_OF_LIGHT_IN_VACUUM%uncertainty

print '(A)', '# OLDER VALUES'
print '(A, F23.16)', "Mu_2022(latest) = ", MOLAR_MASS_CONSTANT%value
print '(A, F23.16)', "Mu_2018 = ", MOLAR_MASS_CONSTANT_2018%value
print '(A, F23.16)', "Mu_2014 = ", MOLAR_MASS_CONSTANT_2014%value
print '(A, F23.16)', "Mu_2010 = ", MOLAR_MASS_CONSTANT_2010%value
end program

```

Example in C:

```

#include <stdio.h>
#include "codata.h"

int main(void){

printf("##### EXAMPLE IN C #####0);

printf("%s0, "# VERSION");
printf("version = %s0, codata_get_version());

printf("%s0, "# CONSTANTS");
printf("c = %f0, SPEED_OF_LIGHT_IN_VACUUM.value);

printf("%s0, "# UNCERTAINTY");
printf("u(c) = %f0, SPEED_OF_LIGHT_IN_VACUUM.uncertainty);

printf("%s0, "# OLDER VALUES");
printf("Mu_2022(latest) = %23.16f0, MOLAR_MASS_CONSTANT.value);
printf("Mu_2018 = %23.16f0, MOLAR_MASS_CONSTANT_2018.value);
printf("Mu_2014 = %23.16f0, MOLAR_MASS_CONSTANT_2014.value);
printf("Mu_2010 = %23.16f0, MOLAR_MASS_CONSTANT_2010.value);

return 0;
}

```

Example in Python:

```
import pycodata
```

```

print("##### EXAMPLE IN PYTHON #####")
print("# VERSION")
print(f"version = {pycodata.__version__}")

print("# Constants")
print(f"c =", pycodata.SPEED_OF_LIGHT_IN_VACUUM["value"])

print("# UNCERTAINTY")
print(f"u(c) = ", pycodata.SPEED_OF_LIGHT_IN_VACUUM["uncertainty"])

print("# OLDER VALUES")
print(f"Mu_2022 = ", pycodata.MOLAR_MASS_CONSTANT["value"])
print(f"Mu_2018 = ", pycodata.MOLAR_MASS_CONSTANT_2018["value"])
print(f"Mu_2014 = ", pycodata.MOLAR_MASS_CONSTANT_2014["value"])
print(f"Mu_2010 = ", pycodata.MOLAR_MASS_CONSTANT_2010["value"])

```

SEE ALSO

gsl(3)

CODATA 2022

- ALPHA_PARTICLE_ELECTRON_MASS_RATIO
- ALPHA_PARTICLE_MASS
- ALPHA_PARTICLE_MASS_ENERGY_EQUIVALENT
- ALPHA_PARTICLE_MASS_ENERGY_EQUIVALENT_IN_MEV
- ALPHA_PARTICLE_MASS_IN_U
- ALPHA_PARTICLE_MOLAR_MASS
- ALPHA_PARTICLE_PROTON_MASS_RATIO
- ALPHA_PARTICLE_RELATIVE_ATOMIC_MASS
- ALPHA_PARTICLE_RMS_CHARGE_RADIUS
- ANGSTROM_STAR
- ATOMIC_MASS_CONSTANT
- ATOMIC_MASS_CONSTANT_ENERGY_EQUIVALENT
- ATOMIC_MASS_CONSTANT_ENERGY_EQUIVALENT_IN_MEV
- ATOMIC_MASS_UNIT_ELECTRON_VOLT_RELATIONSHIP
- ATOMIC_MASS_UNIT_HARTREE_RELATIONSHIP
- ATOMIC_MASS_UNIT_HERTZ_RELATIONSHIP
- ATOMIC_MASS_UNIT_INVERSE_METER_RELATIONSHIP
- ATOMIC_MASS_UNIT_JOULE_RELATIONSHIP
- ATOMIC_MASS_UNIT_KELVIN_RELATIONSHIP
- ATOMIC_MASS_UNIT_KILOGRAM_RELATIONSHIP
- ATOMIC_UNIT_OF_1ST_HYPERPOLARIZABILITY
- ATOMIC_UNIT_OF_2ND_HYPERPOLARIZABILITY
- ATOMIC_UNIT_OF_ACTION

- ATOMIC_UNIT_OF_CHARGE
- ATOMIC_UNIT_OF_CHARGE_DENSITY
- ATOMIC_UNIT_OF_CURRENT
- ATOMIC_UNIT_OF_ELECTRIC_DIPOLE_MOM
- ATOMIC_UNIT_OF_ELECTRIC_FIELD
- ATOMIC_UNIT_OF_ELECTRIC_FIELD_GRADIENT
- ATOMIC_UNIT_OF_ELECTRIC_POLARIZABILITY
- ATOMIC_UNIT_OF_ELECTRIC_POTENTIAL
- ATOMIC_UNIT_OF_ELECTRIC_QUADRUPOLE_MOM
- ATOMIC_UNIT_OF_ENERGY
- ATOMIC_UNIT_OF_FORCE
- ATOMIC_UNIT_OF_LENGTH
- ATOMIC_UNIT_OF_MAG_DIPOLE_MOM
- ATOMIC_UNIT_OF_MAG_FLUX_DENSITY
- ATOMIC_UNIT_OF_MAGNETIZABILITY
- ATOMIC_UNIT_OF_MASS
- ATOMIC_UNIT_OF_MOMENTUM
- ATOMIC_UNIT_OF_PERMITTIVITY
- ATOMIC_UNIT_OF_TIME
- ATOMIC_UNIT_OF_VELOCITY
- AVOGADRO_CONSTANT
- BOHR_MAGNETON
- BOHR_MAGNETON_IN_EV_T
- BOHR_MAGNETON_IN_HZ_T
- BOHR_MAGNETON_IN_INVERSE_METER_PER_TESLA
- BOHR_MAGNETON_IN_K_T
- BOHR_RADIUS
- BOLTZMANN_CONSTANT
- BOLTZMANN_CONSTANT_IN_EV_K
- BOLTZMANN_CONSTANT_IN_HZ_K
- BOLTZMANN_CONSTANT_IN_INVERSE_METER_PER_KELVIN
- CHARACTERISTIC_IMPEDANCE_OF_VACUUM
- CLASSICAL_ELECTRON_RADIUS
- COMPTON_WAVELENGTH
- CONDUCTANCE_QUANTUM
- CONVENTIONAL_VALUE_OF_AMPERE_90
- CONVENTIONAL_VALUE_OF_COULOMB_90
- CONVENTIONAL_VALUE_OF_FARAD_90

- CONVENTIONAL_VALUE_OF_HENRY_90
- CONVENTIONAL_VALUE_OF_JOSEPHSON_CONSTANT
- CONVENTIONAL_VALUE_OF_OHM_90
- CONVENTIONAL_VALUE_OF_VOLT_90
- CONVENTIONAL_VALUE_OF_VON_KLITZING_CONSTANT
- CONVENTIONAL_VALUE_OF_WATT_90
- COPPER_X_UNIT
- DEUTERON_ELECTRON_MAG_MOM_RATIO
- DEUTERON_ELECTRON_MASS_RATIO
- DEUTERON_G_FACTOR
- DEUTERON_MAG_MOM
- DEUTERON_MAG_MOM_TO_BOHR_MAGNETON_RATIO
- DEUTERON_MAG_MOM_TO_NUCLEAR_MAGNETON_RATIO
- DEUTERON_MASS
- DEUTERON_MASS_ENERGY_EQUIVALENT
- DEUTERON_MASS_ENERGY_EQUIVALENT_IN_MEV
- DEUTERON_MASS_IN_U
- DEUTERON_MOLAR_MASS
- DEUTERON_NEUTRON_MAG_MOM_RATIO
- DEUTERON_PROTON_MAG_MOM_RATIO
- DEUTERON_PROTON_MASS_RATIO
- DEUTERON_RELATIVE_ATOMIC_MASS
- DEUTERON_RMS_CHARGE_RADIUS
- ELECTRON_CHARGE_TO_MASS_QUOTIENT
- ELECTRON_DEUTERON_MAG_MOM_RATIO
- ELECTRON_DEUTERON_MASS_RATIO
- ELECTRON_G_FACTOR
- ELECTRON_GYROMAG_RATIO
- ELECTRON_GYROMAG_RATIO_IN_MHZ_T
- ELECTRON_HELION_MASS_RATIO
- ELECTRON_MAG_MOM
- ELECTRON_MAG_MOM_ANOMALY
- ELECTRON_MAG_MOM_TO_BOHR_MAGNETON_RATIO
- ELECTRON_MAG_MOM_TO_NUCLEAR_MAGNETON_RATIO
- ELECTRON_MASS
- ELECTRON_MASS_ENERGY_EQUIVALENT
- ELECTRON_MASS_ENERGY_EQUIVALENT_IN_MEV
- ELECTRON_MASS_IN_U

- ELECTRON_MOLAR_MASS
- ELECTRON_MUON_MAG_MOM_RATIO
- ELECTRON_MUON_MASS_RATIO
- ELECTRON_NEUTRON_MAG_MOM_RATIO
- ELECTRON_NEUTRON_MASS_RATIO
- ELECTRON_PROTON_MAG_MOM_RATIO
- ELECTRON_PROTON_MASS_RATIO
- ELECTRON_RELATIVE_ATOMIC_MASS
- ELECTRON_TAU_MASS_RATIO
- ELECTRON_TO_ALPHA_PARTICLE_MASS_RATIO
- ELECTRON_TO_SHIELDED_HELION_MAG_MOM_RATIO
- ELECTRON_TO_SHIELDED_PROTON_MAG_MOM_RATIO
- ELECTRON_TRITON_MASS_RATIO
- ELECTRON_VOLT
- ELECTRON_VOLT_ATOMIC_MASS_UNIT_RELATIONSHIP
- ELECTRON_VOLT_HARTREE_RELATIONSHIP
- ELECTRON_VOLT_HERTZ_RELATIONSHIP
- ELECTRON_VOLT_INVERSE_METER_RELATIONSHIP
- ELECTRON_VOLT_JOULE_RELATIONSHIP
- ELECTRON_VOLT_KELVIN_RELATIONSHIP
- ELECTRON_VOLT_KILOGRAM_RELATIONSHIP
- ELEMENTARY_CHARGE
- ELEMENTARY_CHARGE_OVER_H_BAR
- FARADAY_CONSTANT
- FERMI_COUPLING_CONSTANT
- FINE_STRUCTURE_CONSTANT
- FIRST_RADIATION_CONSTANT
- FIRST_RADIATION_CONSTANT_FOR_SPECTRAL_RADIANCE
- HARTREE_ATOMIC_MASS_UNIT_RELATIONSHIP
- HARTREE_ELECTRON_VOLT_RELATIONSHIP
- HARTREE_ENERGY
- HARTREE_ENERGY_IN_EV
- HARTREE_HERTZ_RELATIONSHIP
- HARTREE_INVERSE_METER_RELATIONSHIP
- HARTREE_JOULE_RELATIONSHIP
- HARTREE_KELVIN_RELATIONSHIP
- HARTREE_KILOGRAM_RELATIONSHIP
- HELION_ELECTRON_MASS_RATIO

- HELION_G_FACTOR
- HELION_MAG_MOM
- HELION_MAG_MOM_TO_BOHR_MAGNETON_RATIO
- HELION_MAG_MOM_TO_NUCLEAR_MAGNETON_RATIO
- HELION_MASS
- HELION_MASS_ENERGY_EQUIVALENT
- HELION_MASS_ENERGY_EQUIVALENT_IN_MEV
- HELION_MASS_IN_U
- HELION_MOLAR_MASS
- HELION_PROTON_MASS_RATIO
- HELION_RELATIVE_ATOMIC_MASS
- HELION_SHIELDING_SHIFT
- HERTZ_ATOMIC_MASS_UNIT_RELATIONSHIP
- HERTZ_ELECTRON_VOLT_RELATIONSHIP
- HERTZ_HARTREE_RELATIONSHIP
- HERTZ_INVERSE_METER_RELATIONSHIP
- HERTZ_JOULE_RELATIONSHIP
- HERTZ_KELVIN_RELATIONSHIP
- HERTZ_KILOGRAM_RELATIONSHIP
- HYPERFINE_TRANSITION_FREQUENCY_OF_CS_133
- INVERSE_FINE_STRUCTURE_CONSTANT
- INVERSE_METER_ATOMIC_MASS_UNIT_RELATIONSHIP
- INVERSE_METER_ELECTRON_VOLT_RELATIONSHIP
- INVERSE_METER_HARTREE_RELATIONSHIP
- INVERSE_METER_HERTZ_RELATIONSHIP
- INVERSE_METER_JOULE_RELATIONSHIP
- INVERSE_METER_KELVIN_RELATIONSHIP
- INVERSE_METER_KILOGRAM_RELATIONSHIP
- INVERSE_OF_CONDUCTANCE_QUANTUM
- JOSEPHSON_CONSTANT
- JOULE_ATOMIC_MASS_UNIT_RELATIONSHIP
- JOULE_ELECTRON_VOLT_RELATIONSHIP
- JOULE_HARTREE_RELATIONSHIP
- JOULE_HERTZ_RELATIONSHIP
- JOULE_INVERSE_METER_RELATIONSHIP
- JOULE_KELVIN_RELATIONSHIP
- JOULE_KILOGRAM_RELATIONSHIP
- KELVIN_ATOMIC_MASS_UNIT_RELATIONSHIP

- KELVIN_ELECTRON_VOLT_RELATIONSHIP
- KELVIN_HARTREE_RELATIONSHIP
- KELVIN_HERTZ_RELATIONSHIP
- KELVIN_INVERSE_METER_RELATIONSHIP
- KELVIN_JOULE_RELATIONSHIP
- KELVIN_KILOGRAM_RELATIONSHIP
- KILOGRAM_ATOMIC_MASS_UNIT_RELATIONSHIP
- KILOGRAM_ELECTRON_VOLT_RELATIONSHIP
- KILOGRAM_HARTREE_RELATIONSHIP
- KILOGRAM_HERTZ_RELATIONSHIP
- KILOGRAM_INVERSE_METER_RELATIONSHIP
- KILOGRAM_JOULE_RELATIONSHIP
- KILOGRAM_KELVIN_RELATIONSHIP
- LATTICE_PARAMETER_OF_SILICON
- LATTICE_SPACING_OF_IDEAL_SI_220
- LOSCHMIDT_CONSTANT_273_15_K_100_KPA
- LOSCHMIDT_CONSTANT_273_15_K_101_325_KPA
- LUMINOUS EFFICACY
- MAG_FLUX_QUANTUM
- MOLAR_GAS_CONSTANT
- MOLAR_MASS_CONSTANT
- MOLAR_MASS_OF_CARBON_12
- MOLAR_PLANCK_CONSTANT
- MOLAR_VOLUME_OF_IDEAL_GAS_273_15_K_100_KPA
- MOLAR_VOLUME_OF_IDEAL_GAS_273_15_K_101_325_KPA
- MOLAR_VOLUME_OF_SILICON
- MOLYBDENUM_X_UNIT
- MUON_COMPTON_WAVELENGTH
- MUON_ELECTRON_MASS_RATIO
- MUON_G_FACTOR
- MUON_MAG_MOM
- MUON_MAG_MOM_ANOMALY
- MUON_MAG_MOM_TO_BOHR_MAGNETON_RATIO
- MUON_MAG_MOM_TO_NUCLEAR_MAGNETON_RATIO
- MUON_MASS
- MUON_MASS_ENERGY_EQUIVALENT
- MUON_MASS_ENERGY_EQUIVALENT_IN_MEV
- MUON_MASS_IN_U

- MUON_MOLAR_MASS
- MUON_NEUTRON_MASS_RATIO
- MUON_PROTON_MAG_MOM_RATIO
- MUON_PROTON_MASS_RATIO
- MUON_TAU_MASS_RATIO
- NATURAL_UNIT_OF_ACTION
- NATURAL_UNIT_OF_ACTION_IN_EV_S
- NATURAL_UNIT_OF_ENERGY
- NATURAL_UNIT_OF_ENERGY_IN_MEV
- NATURAL_UNIT_OF_LENGTH
- NATURAL_UNIT_OF_MASS
- NATURAL_UNIT_OF_MOMENTUM
- NATURAL_UNIT_OF_MOMENTUM_IN_MEV_C
- NATURAL_UNIT_OF_TIME
- NATURAL_UNIT_OF_VELOCITY
- NEUTRON_COMPTON_WAVELENGTH
- NEUTRON_ELECTRON_MAG_MOM_RATIO
- NEUTRON_ELECTRON_MASS_RATIO
- NEUTRON_G_FACTOR
- NEUTRON_GYROMAG_RATIO
- NEUTRON_GYROMAG_RATIO_IN_MHZ_T
- NEUTRON_MAG_MOM
- NEUTRON_MAG_MOM_TO_BOHR_MAGNETON_RATIO
- NEUTRON_MAG_MOM_TO_NUCLEAR_MAGNETON_RATIO
- NEUTRON_MASS
- NEUTRON_MASS_ENERGY_EQUIVALENT
- NEUTRON_MASS_ENERGY_EQUIVALENT_IN_MEV
- NEUTRON_MASS_IN_U
- NEUTRON_MOLAR_MASS
- NEUTRON_MUON_MASS_RATIO
- NEUTRON_PROTON_MAG_MOM_RATIO
- NEUTRON_PROTON_MASS_DIFFERENCE
- NEUTRON_PROTON_MASS_DIFFERENCE_ENERGY_EQUIVALENT
- NEUTRON_PROTON_MASS_DIFFERENCE_ENERGY_EQUIVALENT_IN_MEV
- NEUTRON_PROTON_MASS_DIFFERENCE_IN_U
- NEUTRON_PROTON_MASS_RATIO
- NEUTRON_RELATIVE_ATOMIC_MASS
- NEUTRON_TAU_MASS_RATIO

- NEUTRON_TO_SHIELDED_PROTON_MAG_MOM_RATIO
- NEWTONIAN_CONSTANT_OF_GRAVITATION
- NEWTONIAN_CONSTANT_OF_GRAVITATION_OVER_H_BAR_C
- NUCLEAR_MAGNETON
- NUCLEAR_MAGNETON_IN_EV_T
- NUCLEAR_MAGNETON_IN_INVERSE_METER_PER_TESLA
- NUCLEAR_MAGNETON_IN_K_T
- NUCLEAR_MAGNETON_IN_MHZ_T
- PLANCK_CONSTANT
- PLANCK_CONSTANT_IN_EV_HZ
- PLANCK_LENGTH
- PLANCK_MASS
- PLANCK_MASS_ENERGY_EQUIVALENT_IN_GEV
- PLANCK_TEMPERATURE
- PLANCK_TIME
- PROTON_CHARGE_TO_MASS_QUOTIENT
- PROTON_COMPTON_WAVELENGTH
- PROTON_ELECTRON_MASS_RATIO
- PROTON_G_FACTOR
- PROTON_GYROMAG_RATIO
- PROTON_GYROMAG_RATIO_IN_MHZ_T
- PROTON_MAG_MOM
- PROTON_MAG_MOM_TO_BOHR_MAGNETON_RATIO
- PROTON_MAG_MOM_TO_NUCLEAR_MAGNETON_RATIO
- PROTON_MAG_SHIELDING_CORRECTION
- PROTON_MASS
- PROTON_MASS_ENERGY_EQUIVALENT
- PROTON_MASS_ENERGY_EQUIVALENT_IN_MEV
- PROTON_MASS_IN_U
- PROTON_MOLAR_MASS
- PROTON_MUON_MASS_RATIO
- PROTON_NEUTRON_MAG_MOM_RATIO
- PROTON_NEUTRON_MASS_RATIO
- PROTON_RELATIVE_ATOMIC_MASS
- PROTON_RMS_CHARGE_RADIUS
- PROTON_TAU_MASS_RATIO
- QUANTUM_OF_CIRCULATION
- QUANTUM_OF_CIRCULATION_TIMES_2

- REDUCED_COMPTON_WAVELENGTH
- REDUCED_MUON_COMPTON_WAVELENGTH
- REDUCED_NEUTRON_COMPTON_WAVELENGTH
- REDUCED_PLANCK_CONSTANT
- REDUCED_PLANCK_CONSTANT_IN_EV_S
- REDUCED_PLANCK_CONSTANT_TIMES_C_IN_MEV_FM
- REDUCED_PROTON_COMPTON_WAVELENGTH
- REDUCED_TAU_COMPTON_WAVELENGTH
- RYDBERG_CONSTANT
- RYDBERG_CONSTANT_TIMES_C_IN_HZ
- RYDBERG_CONSTANT_TIMES_HC_IN_EV
- RYDBERG_CONSTANT_TIMES_HC_IN_J
- SACKUR_TETRODE_CONSTANT_1_K_100_KPA
- SACKUR_TETRODE_CONSTANT_1_K_101_325_KPA
- SECOND_RADIATION_CONSTANT
- SHIELDED_HELION_GYROMAG_RATIO
- SHIELDED_HELION_GYROMAG_RATIO_IN_MHZ_T
- SHIELDED_HELION_MAG_MOM
- SHIELDED_HELION_MAG_MOM_TO_BOHR_MAGNETON_RATIO
- SHIELDED_HELION_MAG_MOM_TO_NUCLEAR_MAGNETON_RATIO
- SHIELDED_HELION_TO_PROTON_MAG_MOM_RATIO
- SHIELDED_HELION_TO_SHIELDED_PROTON_MAG_MOM_RATIO
- SHIELDED_PROTON_GYROMAG_RATIO
- SHIELDED_PROTON_GYROMAG_RATIO_IN_MHZ_T
- SHIELDED_PROTON_MAG_MOM
- SHIELDED_PROTON_MAG_MOM_TO_BOHR_MAGNETON_RATIO
- SHIELDED_PROTON_MAG_MOM_TO_NUCLEAR_MAGNETON_RATIO
- SHIELDING_DIFFERENCE_OF_D_AND_P_IN_HD
- SHIELDING_DIFFERENCE_OF_T_AND_P_IN_HT
- SPEED_OF_LIGHT_IN_VACUUM
- STANDARD_ACCELERATION_OF_GRAVITY
- STANDARD_ATMOSPHERE
- STANDARD_STATE_PRESSURE
- STEFAN_BOLTZMANN_CONSTANT
- TAU_COMPTON_WAVELENGTH
- TAU_ELECTRON_MASS_RATIO
- TAU_ENERGY_EQUIVALENT
- TAU_MASS

- TAU_MASS_ENERGY_EQUIVALENT
- TAU_MASS_IN_U
- TAU_MOLAR_MASS
- TAU_MUON_MASS_RATIO
- TAU_NEUTRON_MASS_RATIO
- TAU_PROTON_MASS_RATIO
- THOMSON_CROSS_SECTION
- TRITON_ELECTRON_MASS_RATIO
- TRITON_G_FACTOR
- TRITON_MAG_MOM
- TRITON_MAG_MOM_TO_BOHR_MAGNETON_RATIO
- TRITON_MAG_MOM_TO_NUCLEAR_MAGNETON_RATIO
- TRITON_MASS
- TRITON_MASS_ENERGY_EQUIVALENT
- TRITON_MASS_ENERGY_EQUIVALENT_IN_MEV
- TRITON_MASS_IN_U
- TRITON_MOLAR_MASS
- TRITON_PROTON_MASS_RATIO
- TRITON_RELATIVE_ATOMIC_MASS
- TRITON_TO_PROTON_MAG_MOM_RATIO
- UNIFIED_ATOMIC_MASS_UNIT
- VACUUM_ELECTRIC_PERMITTIVITY
- VACUUM_MAG_PERMEABILITY
- VON_KLITZING_CONSTANT
- WEAK_MIXING_ANGLE
- WIEN_FREQUENCY_DISPLACEMENT_LAW_CONSTANT
- WIEN_WAVELENGTH_DISPLACEMENT_LAW_CONSTANT
- W_TO_Z_MASS_RATIO

CODATA 2018

- ALPHA_PARTICLE_ELECTRON_MASS_RATIO_2018
- ALPHA_PARTICLE_MASS_2018
- ALPHA_PARTICLE_MASS_ENERGY_EQUIVALENT_2018
- ALPHA_PARTICLE_MASS_ENERGY_EQUIVALENT_IN_MEV_2018
- ALPHA_PARTICLE_MASS_IN_U_2018
- ALPHA_PARTICLE_MOLAR_MASS_2018
- ALPHA_PARTICLE_PROTON_MASS_RATIO_2018
- ALPHA_PARTICLE_RELATIVE_ATOMIC_MASS_2018
- ANGSTROM_STAR_2018

- ATOMIC_MASS_CONSTANT_2018
- ATOMIC_MASS_CONSTANT_ENERGY_EQUIVALENT_2018
- ATOMIC_MASS_CONSTANT_ENERGY_EQUIVALENT_IN_MEV_2018
- ATOMIC_MASS_UNIT_ELECTRON_VOLT_RELATIONSHIP_2018
- ATOMIC_MASS_UNIT_HARTREE_RELATIONSHIP_2018
- ATOMIC_MASS_UNIT_HERTZ_RELATIONSHIP_2018
- ATOMIC_MASS_UNIT_INVERSE_METER_RELATIONSHIP_2018
- ATOMIC_MASS_UNIT_JOULE_RELATIONSHIP_2018
- ATOMIC_MASS_UNIT_KELVIN_RELATIONSHIP_2018
- ATOMIC_MASS_UNIT_KILOGRAM_RELATIONSHIP_2018
- ATOMIC_UNIT_OF_1ST_HYPERPOLARIZABILITY_2018
- ATOMIC_UNIT_OF_2ND_HYPERPOLARIZABILITY_2018
- ATOMIC_UNIT_OF_ACTION_2018
- ATOMIC_UNIT_OF_CHARGE_2018
- ATOMIC_UNIT_OF_CHARGE_DENSITY_2018
- ATOMIC_UNIT_OF_CURRENT_2018
- ATOMIC_UNIT_OF_ELECTRIC_DIPOLE_MOM_2018
- ATOMIC_UNIT_OF_ELECTRIC_FIELD_2018
- ATOMIC_UNIT_OF_ELECTRIC_FIELD_GRADIENT_2018
- ATOMIC_UNIT_OF_ELECTRIC_POLARIZABILITY_2018
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- ATOMIC_UNIT_OF_ELECTRIC_QUADRUPOLE_MOM_2018
- ATOMIC_UNIT_OF_ENERGY_2018
- ATOMIC_UNIT_OF_FORCE_2018
- ATOMIC_UNIT_OF_LENGTH_2018
- ATOMIC_UNIT_OF_MAG_DIPOLE_MOM_2018
- ATOMIC_UNIT_OF_MAG_FLUX_DENSITY_2018
- ATOMIC_UNIT_OF_MAGNETIZABILITY_2018
- ATOMIC_UNIT_OF_MASS_2018
- ATOMIC_UNIT_OF_MOMENTUM_2018
- ATOMIC_UNIT_OF_PERMITTIVITY_2018
- ATOMIC_UNIT_OF_TIME_2018
- ATOMIC_UNIT_OF_VELOCITY_2018
- AVOGADRO_CONSTANT_2018
- BOHR_MAGNETON_2018
- BOHR_MAGNETON_IN_EV_T_2018
- BOHR_MAGNETON_IN_HZ_T_2018
- BOHR_MAGNETON_IN_INVERSE_METER_PER_TESLA_2018

- BOHR_MAGNETON_IN_K_T_2018
- BOHR_RADIUS_2018
- BOLTZMANN_CONSTANT_2018
- BOLTZMANN_CONSTANT_IN_EV_K_2018
- BOLTZMANN_CONSTANT_IN_HZ_K_2018
- BOLTZMANN_CONSTANT_IN_INVERSE_METER_PER_KELVIN_2018
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- CLASSICAL_ELECTRON_RADIUS_2018
- COMPTON_WAVELENGTH_2018
- CONDUCTANCE_QUANTUM_2018
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- CONVENTIONAL_VALUE_OF_COULOMB_90_2018
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- CONVENTIONAL_VALUE_OF_HENRY_90_2018
- CONVENTIONAL_VALUE_OF_JOSEPHSON_CONSTANT_2018
- CONVENTIONAL_VALUE_OF_OHM_90_2018
- CONVENTIONAL_VALUE_OF_VOLT_90_2018
- CONVENTIONAL_VALUE_OF_VON_KLITZING_CONSTANT_2018
- CONVENTIONAL_VALUE_OF_WATT_90_2018
- COPPER_X_UNIT_2018
- DEUTERON_ELECTRON_MAG_MOM_RATIO_2018
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- DEUTERON_MAG_MOM_2018
- DEUTERON_MAG_MOM_TO_BOHR_MAGNETON_RATIO_2018
- DEUTERON_MAG_MOM_TO_NUCLEAR_MAGNETON_RATIO_2018
- DEUTERON_MASS_2018
- DEUTERON_MASS_ENERGY_EQUIVALENT_2018
- DEUTERON_MASS_ENERGY_EQUIVALENT_IN_MEV_2018
- DEUTERON_MASS_IN_U_2018
- DEUTERON_MOLAR_MASS_2018
- DEUTERON_NEUTRON_MAG_MOM_RATIO_2018
- DEUTERON_PROTON_MAG_MOM_RATIO_2018
- DEUTERON_PROTON_MASS_RATIO_2018
- DEUTERON_RELATIVE_ATOMIC_MASS_2018
- DEUTERON_RMS_CHARGE_RADIUS_2018
- ELECTRON_CHARGE_TO_MASS_QUOTIENT_2018
- ELECTRON_DEUTERON_MAG_MOM_RATIO_2018

- ELECTRON_DEUTERON_MASS_RATIO_2018
- ELECTRON_G_FACTOR_2018
- ELECTRON_GYROMAG_RATIO_2018
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- ELECTRON_HELION_MASS_RATIO_2018
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- ELECTRON_MAG_MOM_TO_BOHR_MAGNETON_RATIO_2018
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- ELECTRON_MASS_2018
- ELECTRON_MASS_ENERGY_EQUIVALENT_2018
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- ELECTRON_MOLAR_MASS_2018
- ELECTRON_MUON_MAG_MOM_RATIO_2018
- ELECTRON_MUON_MASS_RATIO_2018
- ELECTRON_NEUTRON_MAG_MOM_RATIO_2018
- ELECTRON_NEUTRON_MASS_RATIO_2018
- ELECTRON_PROTON_MAG_MOM_RATIO_2018
- ELECTRON_PROTON_MASS_RATIO_2018
- ELECTRON_RELATIVE_ATOMIC_MASS_2018
- ELECTRON_TAU_MASS_RATIO_2018
- ELECTRON_TO_ALPHA_PARTICLE_MASS_RATIO_2018
- ELECTRON_TO_SHIELDED_HELION_MAG_MOM_RATIO_2018
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- ELECTRON_VOLT_KELVIN_RELATIONSHIP_2018
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- ELEMENTARY_CHARGE_2018
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- INVERSE_METER_JOULE_RELATIONSHIP_2018
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- MOLAR_VOLUME_OF_IDEAL_GAS_273_15_K_100_KPA_2018
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- MUON_MAG_MOM_TO_BOHR_MAGNETON_RATIO_2018
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- MUON_MASS_ENERGY_EQUIVALENT_2018
- MUON_MASS_ENERGY_EQUIVALENT_IN_MEV_2018
- MUON_MASS_IN_U_2018
- MUON_MOLAR_MASS_2018
- MUON_NEUTRON_MASS_RATIO_2018
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- MUON_PROTON_MASS_RATIO_2018
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- NEUTRON_PROTON_MAG_MOM_RATIO_2018
- NEUTRON_PROTON_MASS_DIFFERENCE_2018
- NEUTRON_PROTON_MASS_DIFFERENCE_ENERGY_EQUIVALENT_2018
- NEUTRON_PROTON_MASS_DIFFERENCE_ENERGY_EQUIVALENT_IN_MEV_2018
- NEUTRON_PROTON_MASS_DIFFERENCE_IN_U_2018
- NEUTRON_PROTON_MASS_RATIO_2018
- NEUTRON_RELATIVE_ATOMIC_MASS_2018
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- NEUTRON_TO_SHIELDED_PROTON_MAG_MOM_RATIO_2018
- NEWTONIAN_CONSTANT_OF_GRAVITATION_2018
- NEWTONIAN_CONSTANT_OF_GRAVITATION_OVER_H_BAR_C_2018
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- NUCLEAR_MAGNETON_IN_K_T_2018
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- PROTON_COMPTON_WAVELENGTH_2018
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- PROTON_MOLAR_MASS_2018
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- PROTON_NEUTRON_MAG_MOM_RATIO_2018
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- PROTON_RMS_CHARGE_RADIUS_2018
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- REDUCED_PROTON_COMPTON_WAVELENGTH_2018
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- SACKUR_TETRODE_CONSTANT_1_K_100_KPA_2018
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- SHIELDED_HELION_GYROMAG_RATIO_2018
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- SHIELDED_HELION_MAG_MOM_2018
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- SHIELDED_HELION_TO_PROTON_MAG_MOM_RATIO_2018
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- SHIELDED_PROTON_MAG_MOM_2018

- SHIELDED_PROTON_MAG_MOM_TO_BOHR_MAGNETON_RATIO_2018
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- DEUTERON_NEUTRON_MAG_MOM_RATIO_2014
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- ELECTRON_DEUTERON_MAG_MOM_RATIO_2014
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- MUON_COMPTON_WAVELENGTH_2010
- MUON_COMPTON_WAVELENGTH_OVER_2_PI_2010
- MUON_ELECTRON_MASS_RATIO_2010
- MUON_G_FACTOR_2010
- MUON_MAG_MOM_2010
- MUON_MAG_MOM_ANOMALY_2010
- MUON_MAG_MOM_TO_BOHR_MAGNETON_RATIO_2010
- MUON_MAG_MOM_TO_NUCLEAR_MAGNETON_RATIO_2010
- MUON_MASS_2010
- MUON_MASS_ENERGY_EQUIVALENT_2010
- MUON_MASS_ENERGY_EQUIVALENT_IN_MEV_2010
- MUON_MASS_IN_U_2010
- MUON_MOLAR_MASS_2010
- MUON_NEUTRON_MASS_RATIO_2010
- MUON_PROTON_MAG_MOM_RATIO_2010
- MUON_PROTON_MASS_RATIO_2010
- MUON_TAU_MASS_RATIO_2010
- NATURAL_UNIT_OF_ACTION_2010
- NATURAL_UNIT_OF_ACTION_IN_EV_S_2010
- NATURAL_UNIT_OF_ENERGY_2010
- NATURAL_UNIT_OF_ENERGY_IN_MEV_2010
- NATURAL_UNIT_OF_LENGTH_2010
- NATURAL_UNIT_OF_MASS_2010
- NATURAL_UNIT_OF_MOMUM_2010
- NATURAL_UNIT_OF_MOMUM_IN_MEV_C_2010
- NATURAL_UNIT_OF_TIME_2010
- NATURAL_UNIT_OF_VELOCITY_2010
- NEUTRON_COMPTON_WAVELENGTH_2010
- NEUTRON_COMPTON_WAVELENGTH_OVER_2_PI_2010
- NEUTRON_ELECTRON_MAG_MOM_RATIO_2010
- NEUTRON_ELECTRON_MASS_RATIO_2010
- NEUTRON_G_FACTOR_2010
- NEUTRON_GYROMAG_RATIO_2010
- NEUTRON_GYROMAG_RATIO_OVER_2_PI_2010
- NEUTRON_MAG_MOM_2010
- NEUTRON_MAG_MOM_TO_BOHR_MAGNETON_RATIO_2010
- NEUTRON_MAG_MOM_TO_NUCLEAR_MAGNETON_RATIO_2010
- NEUTRON_MASS_2010

- NEUTRON_MASS_ENERGY_EQUIVALENT_2010
- NEUTRON_MASS_ENERGY_EQUIVALENT_IN_MEV_2010
- NEUTRON_MASS_IN_U_2010
- NEUTRON_MOLAR_MASS_2010
- NEUTRON_MUON_MASS_RATIO_2010
- NEUTRON_PROTON_MAG_MOM_RATIO_2010
- NEUTRON_PROTON_MASS_DIFFERENCE_2010
- NEUTRON_PROTON_MASS_DIFFERENCE_ENERGY_EQUIVALENT_2010
- NEUTRON_PROTON_MASS_DIFFERENCE_ENERGY_EQUIVALENT_IN_MEV_2010
- NEUTRON_PROTON_MASS_DIFFERENCE_IN_U_2010
- NEUTRON_PROTON_MASS_RATIO_2010
- NEUTRON_TAU_MASS_RATIO_2010
- NEUTRON_TO_SHIELDED_PROTON_MAG_MOM_RATIO_2010
- NEWTONIAN_CONSTANT_OF_GRAVITATION_2010
- NEWTONIAN_CONSTANT_OF_GRAVITATION_OVER_H_BAR_C_2010
- NUCLEAR_MAGNETON_2010
- NUCLEAR_MAGNETON_IN_EV_T_2010
- NUCLEAR_MAGNETON_IN_INVERSE_METERS_PER_TESLA_2010
- NUCLEAR_MAGNETON_IN_K_T_2010
- NUCLEAR_MAGNETON_IN_MHZ_T_2010
- PLANCK_CONSTANT_2010
- PLANCK_CONSTANT_IN_EV_S_2010
- PLANCK_CONSTANT_OVER_2_PI_2010
- PLANCK_CONSTANT_OVER_2_PI_IN_EV_S_2010
- PLANCK_CONSTANT_OVER_2_PI_TIMES_C_IN_MEV_FM_2010
- PLANCK_LENGTH_2010
- PLANCK_MASS_2010
- PLANCK_MASS_ENERGY_EQUIVALENT_IN_GEV_2010
- PLANCK_TEMPERATURE_2010
- PLANCK_TIME_2010
- PROTON_CHARGE_TO_MASS_QUOTIENT_2010
- PROTON_COMPTON_WAVELENGTH_2010
- PROTON_COMPTON_WAVELENGTH_OVER_2_PI_2010
- PROTON_ELECTRON_MASS_RATIO_2010
- PROTON_G_FACTOR_2010
- PROTON_GYROMAG_RATIO_2010
- PROTON_GYROMAG_RATIO_OVER_2_PI_2010
- PROTON_MAG_MOM_2010

- PROTON_MAG_MOM_TO_BOHR_MAGNETON_RATIO_2010
- PROTON_MAG_MOM_TO_NUCLEAR_MAGNETON_RATIO_2010
- PROTON_MAG_SHIELDING_CORRECTION_2010
- PROTON_MASS_2010
- PROTON_MASS_ENERGY_EQUIVALENT_2010
- PROTON_MASS_ENERGY_EQUIVALENT_IN_MEV_2010
- PROTON_MASS_IN_U_2010
- PROTON_MOLAR_MASS_2010
- PROTON_MUON_MASS_RATIO_2010
- PROTON_NEUTRON_MAG_MOM_RATIO_2010
- PROTON_NEUTRON_MASS_RATIO_2010
- PROTON_RMS_CHARGE_RADIUS_2010
- PROTON_TAU_MASS_RATIO_2010
- QUANTUM_OF_CIRCULATION_2010
- QUANTUM_OF_CIRCULATION_TIMES_2_2010
- RYDBERG_CONSTANT_2010
- RYDBERG_CONSTANT_TIMES_C_IN_HZ_2010
- RYDBERG_CONSTANT_TIMES_HC_IN_EV_2010
- RYDBERG_CONSTANT_TIMES_HC_IN_J_2010
- SACKUR_TETRODE_CONSTANT_1_K_100_KPA_2010
- SACKUR_TETRODE_CONSTANT_1_K_101_325_KPA_2010
- SECOND_RADIATION_CONSTANT_2010
- SHIELDED_HELION_GYROMAG_RATIO_2010
- SHIELDED_HELION_GYROMAG_RATIO_OVER_2_PI_2010
- SHIELDED_HELION_MAG_MOM_2010
- SHIELDED_HELION_MAG_MOM_TO_BOHR_MAGNETON_RATIO_2010
- SHIELDED_HELION_MAG_MOM_TO_NUCLEAR_MAGNETON_RATIO_2010
- SHIELDED_HELION_TO_PROTON_MAG_MOM_RATIO_2010
- SHIELDED_HELION_TO_SHIELDED_PROTON_MAG_MOM_RATIO_2010
- SHIELDED_PROTON_GYROMAG_RATIO_2010
- SHIELDED_PROTON_GYROMAG_RATIO_OVER_2_PI_2010
- SHIELDED_PROTON_MAG_MOM_2010
- SHIELDED_PROTON_MAG_MOM_TO_BOHR_MAGNETON_RATIO_2010
- SHIELDED_PROTON_MAG_MOM_TO_NUCLEAR_MAGNETON_RATIO_2010
- SPEED_OF_LIGHT_IN_VACUUM_2010
- STANDARD_ACCELERATION_OF_GRAVITY_2010
- STANDARD_ATMOSPHERE_2010
- STANDARD_STATE_PRESSURE_2010

- STEFAN_BOLTZMANN_CONSTANT_2010
- TAU_COMPTON_WAVELENGTH_2010
- TAU_COMPTON_WAVELENGTH_OVER_2_PI_2010
- TAU_ELECTRON_MASS_RATIO_2010
- TAU_MASS_2010
- TAU_MASS_ENERGY_EQUIVALENT_2010
- TAU_MASS_ENERGY_EQUIVALENT_IN_MEV_2010
- TAU_MASS_IN_U_2010
- TAU_MOLAR_MASS_2010
- TAU_MUON_MASS_RATIO_2010
- TAU_NEUTRON_MASS_RATIO_2010
- TAU_PROTON_MASS_RATIO_2010
- THOMSON_CROSS_SECTION_2010
- TRITON_ELECTRON_MASS_RATIO_2010
- TRITON_G_FACTOR_2010
- TRITON_MAG_MOM_2010
- TRITON_MAG_MOM_TO_BOHR_MAGNETON_RATIO_2010
- TRITON_MAG_MOM_TO_NUCLEAR_MAGNETON_RATIO_2010
- TRITON_MASS_2010
- TRITON_MASS_ENERGY_EQUIVALENT_2010
- TRITON_MASS_ENERGY_EQUIVALENT_IN_MEV_2010
- TRITON_MASS_IN_U_2010
- TRITON_MOLAR_MASS_2010
- TRITON_PROTON_MASS_RATIO_2010
- UNIFIED_ATOMIC_MASS_UNIT_2010
- VON_KLITZING_CONSTANT_2010
- WEAK_MIXING_ANGLE_2010
- WIEN_FREQUENCY_DISPLACEMENT_LAW_CONSTANT_2010
- WIEN_WAVELENGTH_DISPLACEMENT_LAW_CONSTANT_2010

NAME

codatacli(1) - Command line for codata

SYNOPSIS

codatacli [*OPTIONS*]

DESCRIPTION

codatacli is command line interface which prints all the codata constants. The current values are from 2022.

OPTIONS

- o --year, -y**
Year of the codata constants: 2022, 2018, 2014, 2010
- o --help**
Show help text and exit
- o --verbose**
Display additional information when available.
- o --version**
Show version information and exit.