

# The **physconst** package\*

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## 1 Introduction

This package consists of several macros that are shorthand for a variety of physical constants, e.g. the speed of light. The package developed out of physics and astronomy classes that I have taught and wanted to ensure that I had correct values for each constant and did not wish to retype them every time I use them. The constants can be used in two forms, the most accurate available values, or versions that are rounded to 3 significant digits for use in typical classroom settings, homework assignments, etc.

Most constants are taken from CODATA 2018, with the exception of the astronomical objects, whose values are taken from their current wikipedia entries. If you have an interest and/or need for more reliable data, please contact me.

### 1.1 Options

There are three options available: `shortconst`, `cgs`, and `unseparateddecimals`. They can be invoked when the package is declared, e.g.  
`\usepackage[shortconst]{physconst}`.

`shortconst` will reduce the precision to 3 digits for all constants. This is intended when you don't want to have the details of the constants, just the general value (e.g.  $1.60 \times 10^{-19}$  C instead of  $1.602176634 \times 10^{-19}$  C).

`cgs` will provide all constants in cgs, i.e. the units used in astronomy.

`unseparateddecimals` is for situations when you don't want spaces in the decimal portion of full precision constants. E.g. the elementary charge would appear as

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\*This document corresponds to `physconst` v1.0.2, dated 2020/01/26.

$1.602176634 \times 10^{-19}$  C instead of  $1.602\,176\,634 \times 10^{-19}$  C. (notice the gaps between digits in the latter.

## 1.2 Macros

### 1.3 Normal Macros

The normal macros are the ones that you will typically use, whose values are determined by the choice of options when the package is invoked.

### 1.4 Naming Convention

Each macro starts with a lower case ‘k’ to indicate that it is a constant. If the macro is of special units, e.g. eV, those units will be specified next. If the macro is part of a fundamental unit group, it then gets the name of the group, e.g. Mass, Charge, etc. Finally is the details or name of the constants, e.g. Proton, Planck, etc.

#### 1.4.1 Mass

|                               |   |
|-------------------------------|---|
| <code>\kMassElectron</code>   | <code>\kMassElectron</code> is the mass of an electron.               |
| <code>\keVMassElectron</code> | <code>\keVMassElectron</code> is the mass of an electron.             |
| <code>\kMassProton</code>     | <code>\kMassProton</code> is the mass of a proton.                    |
| <code>\keVMassProton</code>   | <code>\keVMassProton</code> is the mass of a proton.                  |
| <code>\kMassHydrogen</code>   | <code>\kMassHydrogen</code> is the mass of a neutral hydrogen atom.   |
| <code>\keVMassHydrogen</code> | <code>\keVMassHydrogen</code> is the mass of a neutral hydrogen atom. |
| <code>\kMassSun</code>        | <code>\kMassSun</code> is the mass of the Sun.                        |
| <code>\kMassAMU</code>        | <code>\kMassAMU</code> is the mass of an atomic mass unit.            |
| <code>\keVMassAMU</code>      | <code>\keVMassAMU</code> is the mass of an atomic mass unit.          |

#### 1.4.2 Charge

|                                  |   |
|----------------------------------|---|
| <code>\kChargeFundamental</code> | <code>\kChargeFundamental</code> is the fundamental charge. |
|----------------------------------|---|

`\kChargeElectron` `\kChargeElectron` is the charge of an electron.

`\kChargeProton` `\kChargeProton` is the charge of a proton.

#### 1.4.3 Distances and Lengths

`\kRadiusBohr` `\kRadiusBohr` is Bohr radius of an atom.

`\kAstronomicalUnit` `\kAstronomicalUnit` is the astronomical unit (the average distance between the Earth and the Sun).

`\kParsec` `\kParsec` is the length of a parsec ( $\frac{648000 \text{ au}}{\pi}$ ).

`\kRadiusSun` `\kRadiusSun` is the mean radius of the Sun.

#### 1.4.4 Energy, Power, and Luminosity

`\kRydberg` `\kRydberg` is the Rydberg energy (the binding energy of Hydrogen).

`\keVRydberg` `\keVRydberg` is the Rydberg energy (the binding energy of Hydrogen).

`\kLuminositySun` `\kLuminositySun` is the luminosity of the Sun.

#### 1.4.5 Pressure

`\kPressureAtmosphere` `\kPressureAtmosphere` is the standard atmospheric pressure.

`\kPressureStandard` `\kPressureStandard` is the standard atmospheric pressure.

#### 1.4.6 Velocity, Speed and Acceleration

`\kSpeedLight` `\kSpeedLight` is the speed of light.

`\kAccelGravity` `\kAccelGravity` is the acceleration due to gravity at the surface of the Earth.

#### 1.4.7 Other Constants

`\kCoulomb` `\kCoulomb` is the Coulomb constant ( $\frac{1}{4\pi\epsilon_0}$ ).

`\kVacuumPermittivity` `\kVacuumPermittivity` is the electric permittivity of the vacuum.

|  |   |
|--|---|
| <code>\kVacuumPermeability</code>      | <code>\kVacuumPermeability</code> is the magnetic permeability of the vacuum.   |
| <code>\kVacuumImpedance</code>         | <code>\kVacuumImpedance</code> is the characteristic impedance of the vacuum.   |
| <code>\kBoltzmann</code>               | <code>\kBoltzmann</code> is the Boltzmann constant.   |
| <code>\keVBoltzmann</code>             | <code>\keVBoltzmann</code> is the Boltzmann constant.   |
| <code>\kPlanck</code>                  | <code>\kPlanck</code> is the Planck constant.   |
| <code>\keVPlanck</code>                | <code>\keVPlanck</code> is the Planck constant.   |
| <code>\kPlanckReduced</code>           | <code>\kPlanckReduced</code> is the Reduced Planck constant $\left(\frac{h}{2\pi}\right)$ .                               |
| <code>\keVPlanckReduced</code>         | <code>\keVPlanckReduced</code> is the Reduced Planck constant $\left(\frac{h}{2\pi}\right)$ .                             |
| <code>\kGravity</code>                 | <code>\kGravity</code> is Newton's gravitational constant.  |
| <code>\kStefanBoltzmann</code>         | <code>\kStefanBoltzmann</code> is the Stefan-Boltzmann blackbody constant $\left(\frac{2\pi^5 k_B^4}{15h^3 c^2}\right)$ . |
| <code>\kRadiation</code>               | <code>\kRadiation</code> is the radiation constant, $a \left(\frac{8\pi^5 k_B^4}{15c^3 h^3}\right)$ .                     |
| <code>\kFineStructure</code>           | <code>\kFineStructure</code> is the fine structure constant.  |
| <code>\kFineStructureReciprocal</code> | <code>\kFineStructureReciprocal</code> is the reciprocal of the fine structure constant.                                  |
| <code>\kAvogadro</code>                | <code>\kAvogadro</code> is Avogadro's Number (the number of particles in a mole).   |

## 1.5 Detailed Macros

These macros are used to access the constants with specific units and precision. They require use of `\makeatletter` and `\makeatother` in order to be used. They are used internally by `physconst` to define the macros that are normally used (those described above).

## 1.6 NamingConvention

The detailed macros are named like `@units@precision@name`. The units specify which units the constant is in (SI, cgs, or eV). For constants that are independent of the unit system (e.g. Avogadro's number and the fine structure constant), the units are omitted. The precision is either 'short' or 'full' to indicate how much precision is included in the number. All short precision constants have 3 significant figures. The precision of full precision constants vary by their definition and/or inputs. Finally, the name or description of the constant appears.

### 1.6.1 Mass

`\k@SI@short@MassElectron` `\k@SI@short@MassElectron` is the mass of an electron in SI units with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@short@MassElectron
\makeatother
```

Resulting in

```
The value is  $9.11 \times 10^{-34}$  kg
```

`\k@SI@full@MassElectron` `\k@SI@full@MassElectron` is the mass of an electron in SI units with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@full@MassElectron
\makeatother
```

Resulting in

```
The value is  $9.108\,980\,087\,382 \times 10^{-34}$  kg
```

`\k@cgs@short@MassElectron` `\k@cgs@short@MassElectron` is the mass of an electron in cgs units with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@short@MassElectron
\makeatother
```

Resulting in

```
The value is  $9.11 \times 10^{-31}$  g
```

`\k@cgs@full@MassElectron` `\k@cgs@full@MassElectron` is the mass of an electron in cgs units with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@full@MassElectron
\makeatother
```

Resulting in

The value is  $9.108\,980\,087\,382 \times 10^{-31} \text{ g}$

`\k@eV@short@MassElectron` `\k@eV@short@MassElectron` is the mass of an electron in eV with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@eV@short@MassElectron
\makeatother
```

Resulting in

The value is  $5.69 \times 10^{-19} \text{ eV } c^{-2}$

`\k@eV@full@MassElectron` `\k@eV@full@MassElectron` is the mass of an electron in eV with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@eV@full@MassElectron
\makeatother
```

Resulting in

The value is  $5.685\,378\,187\,448 \times 10^{-19} \text{ eV } c^{-2}$

`\k@SI@short@MassProton` `\k@SI@short@MassProton` is the mass of a proton in SI units with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@short@MassProton
\makeatother
```

Resulting in

The value is  $1.67 \times 10^{-30}$  kg

`\k@SI@full@MassProton` `\k@SI@full@MassProton` is the mass of a proton in SI units with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@full@MassProton
\makeatother
```

Resulting in

The value is  $1.672\,547\,813\,969 \times 10^{-30}$  kg

`\k@cgs@short@MassProton` `\k@cgs@short@MassProton` is the mass of a proton in cgs units with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@short@MassProton
\makeatother
```

Resulting in

The value is  $1.67 \times 10^{-27}$  g

`\k@cgs@full@MassProton` `\k@cgs@full@MassProton` is the mass of a proton in cgs units with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@full@MassProton
\makeatother
```

Resulting in

The value is  $1.672\,547\,813\,969 \times 10^{-27}$  g

`\k@eV@short@MassProton` `\k@eV@short@MassProton` is the mass of a proton in eV with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@eV@short@MassProton
\makeatother
```

Resulting in

The value is  $1.04 \times 10^{-15} \text{ eV } c^{-2}$

`\k@eV@full@MassProton` `\k@eV@full@MassProton` is the mass of a proton in eV with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@eV@full@MassProton
\makeatother
```

Resulting in

The value is  $1.043\,922\,235\,836 \times 10^{-15} \text{ eV } c^{-2}$

`\k@SI@short@MassHydrogen` `\k@SI@short@MassHydrogen` is the mass of a neutral hydrogen atom in SI units with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@short@MassHydrogen
\makeatother
```

Resulting in

The value is  $1.67 \times 10^{-30} \text{ kg}$

`\k@SI@full@MassHydrogen` `\k@SI@full@MassHydrogen` is the mass of a neutral hydrogen atom in SI units with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@full@MassHydrogen
\makeatother
```

Resulting in



The value is  $1.673\,458\,687\,724 \times 10^{-30}$  kg

`\k@cgs@short@MassHydrogen` `\k@cgs@short@MassHydrogen` is the mass of a neutral hydrogen atom in cgs units with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@short@MassHydrogen
\makeatother
```

Resulting in

The value is  $1.67 \times 10^{-27}$  g

`\k@cgs@full@MassHydrogen` `\k@cgs@full@MassHydrogen` is the mass of a neutral hydrogen atom in cgs units with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@full@MassHydrogen
\makeatother
```

Resulting in

The value is  $1.673\,458\,687\,724 \times 10^{-27}$  g

`\k@eV@short@MassHydrogen` `\k@eV@short@MassHydrogen` is the mass of a neutral hydrogen atom in eV with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@eV@short@MassHydrogen
\makeatother
```

Resulting in

The value is  $1.04 \times 10^{-15}$  eV  $c^{-2}$

`\k@eV@full@MassHydrogen` `\k@eV@full@MassHydrogen` is the mass of a neutral hydrogen atom in eV with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@eV@full@MassHydrogen
\makeatother
```

Resulting in

The value is  $1.044\,490\,758\,517 \times 10^{-15} \text{ eV } c^{-2}$

`\k@SI@short@MassSun` `\k@SI@short@MassSun` is the mass of the Sun in SI units with reduced precision. (IAU Resolution B3 2015)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@short@MassSun
\makeatother
```

Resulting in

The value is  $1.99 \times 10^{30} \text{ kg}$

`\k@SI@full@MassSun` `\k@SI@full@MassSun` is the mass of the Sun in SI units with full precision. (IAU Resolution B3 2015)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@full@MassSun
\makeatother
```

Resulting in

The value is  $1.988\,409\,9 \times 10^{30} \text{ kg}$

`\k@cgs@short@MassSun` `\k@cgs@short@MassSun` is the mass of the Sun in cgs units with reduced precision. (IAU Resolution B3 2015)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@short@MassSun
\makeatother
```

Resulting in

The value is  $1.99 \times 10^{33}$  g

`\k@cgs@full@MassSun` `\k@cgs@full@MassSun` is the mass of the Sun in cgs units with full precision. (IAU Resolution B3 2015)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@full@MassSun
\makeatother
```

Resulting in

The value is  $1.988\,409\,9 \times 10^{33}$  g

`\k@SI@short@MassAMU` `\k@SI@short@MassAMU` is the mass of an atomic mass unit in SI units with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@short@MassAMU
\makeatother
```

Resulting in

The value is  $1.66 \times 10^{-30}$  kg

`\k@SI@full@MassAMU` `\k@SI@full@MassAMU` is the mass of an atomic mass unit in SI units with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@full@MassAMU
\makeatother
```

Resulting in

The value is  $1.660\,465\,492\,239 \times 10^{-30}$  kg

`\k@cgs@short@MassAMU` `\k@cgs@short@MassAMU` is the mass of an atomic mass unit in cgs units with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@short@MassAMU
\makeatother
```

Resulting in

The value is  $1.66 \times 10^{-27} \text{ g}$

`\k@cgs@full@MassAMU` `\k@cgs@full@MassAMU` is the mass of an atomic mass unit in cgs units with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@full@MassAMU
\makeatother
```

Resulting in

The value is  $1.660\,465\,492\,239 \times 10^{-27} \text{ g}$

`\k@eV@short@MassAMU` `\k@eV@short@MassAMU` is the mass of an atomic mass unit in eV with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@eV@short@MassAMU
\makeatother
```

Resulting in

The value is  $1.04 \times 10^{-15} \text{ eV } c^{-2}$

`\k@eV@full@MassAMU` `\k@eV@full@MassAMU` is the mass of an atomic mass unit in eV with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@eV@full@MassAMU
\makeatother
```

Resulting in

The value is  $1.036\,381\,043\,764 \times 10^{-15} \text{ eV } c^{-2}$

### 1.6.2 Charge

`\k@SI@short@ChargeFundamental` `\k@SI@short@ChargeFundamental` is the fundamental charge in SI units with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@short@ChargeFundamental
\makeatother
```

Resulting in

The value is  $1.60 \times 10^{-19} \text{ C}$

`\k@SI@full@ChargeFundamental` `\k@SI@full@ChargeFundamental` is the fundamental charge in SI units with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@full@ChargeFundamental
\makeatother
```

Resulting in

The value is  $1.602\,176\,634 \times 10^{-19} \text{ C}$

`\k@cgs@short@ChargeFundamental` `\k@cgs@short@ChargeFundamental` is the fundamental charge in cgs units with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@short@ChargeFundamental
\makeatother
```

Resulting in

The value is  $4.80 \times 10^{-10}$  esu

`\k@cgs@full@ChargeFundamental` `\k@cgs@full@ChargeFundamental` is the fundamental charge in cgs units with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@full@ChargeFundamental
\makeatother
```

Resulting in

The value is  $4.803\,204\,713 \times 10^{-10}$  esu

`\k@SI@short@ChargeElectron` `\k@SI@short@ChargeElectron` is the charge of an electron in SI units with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@short@ChargeElectron
\makeatother
```

Resulting in

The value is  $-1.60 \times 10^{-19}$  C

`\k@SI@full@ChargeElectron` `\k@SI@full@ChargeElectron` is the charge of an electron in SI units with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@full@ChargeElectron
\makeatother
```

Resulting in

The value is  $-1.602\,176\,634 \times 10^{-19}$  C

`\k@cgs@short@ChargeElectron` `\k@cgs@short@ChargeElectron` is the charge of an electron in cgs units with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@short@ChargeElectron
\makeatother
```

Resulting in

The value is  $-4.80 \times 10^{-10}$  esu

`\k@cgs@full@ChargeElectron` `\k@cgs@full@ChargeElectron` is the charge of an electron in cgs units with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@full@ChargeElectron
\makeatother
```

Resulting in

The value is  $-4.803\,204\,713 \times 10^{-10}$  esu

`\k@SI@short@ChargeProton` `\k@SI@short@ChargeProton` is the charge of a proton in SI units with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@short@ChargeProton
\makeatother
```

Resulting in

The value is  $1.60 \times 10^{-19}$  C

`\k@SI@full@ChargeProton` `\k@SI@full@ChargeProton` is the charge of a proton in SI units with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@full@ChargeProton
\makeatother
```

Resulting in

The value is  $1.602\,176\,634 \times 10^{-19}$  C

`\k@cgs@short@ChargeProton` `\k@cgs@short@ChargeProton` is the charge of a proton in cgs units with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@short@ChargeProton
\makeatother
```

Resulting in

The value is  $4.80 \times 10^{-10}$  esu

`\k@cgs@full@ChargeProton` `\k@cgs@full@ChargeProton` is the charge of a proton in cgs units with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@full@ChargeProton
\makeatother
```

Resulting in

The value is  $4.803\,204\,713 \times 10^{-10}$  esu

### 1.6.3 Distances and Lengths

`\k@SI@short@RadiusBohr` `\k@SI@short@RadiusBohr` is Bohr radius of an atom in SI units with reduced precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@short@RadiusBohr
\makeatother
```

Resulting in



The value is  $5.29 \times 10^{-8}$  m

`\k@SI@full@RadiusBohr` `\k@SI@full@RadiusBohr` is Bohr radius of an atom in SI units with full precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@full@RadiusBohr
\makeatother
```

Resulting in

The value is  $5.292\,006\,59 \times 10^{-8}$  m

`\k@cgs@short@RadiusBohr` `\k@cgs@short@RadiusBohr` is Bohr radius of an atom in cgs units with reduced precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@short@RadiusBohr
\makeatother
```

Resulting in

The value is  $5.29 \times 10^{-6}$  cm

`\k@cgs@full@RadiusBohr` `\k@cgs@full@RadiusBohr` is Bohr radius of an atom in cgs units with full precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@full@RadiusBohr
\makeatother
```

Resulting in

The value is  $5.292\,006\,59 \times 10^{-6}$  cm

`\k@SI@short@AstronomicalUnit` `\k@SI@short@AstronomicalUnit` is the astronomical unit (the average distance between the Earth and the Sun) in SI units with reduced precision. (IAU Resolution B2 2012)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@short@AstronomicalUnit
\makeatother
```

Resulting in

The value is  $1.50 \times 10^{11}$  m

`\k@SI@full@AstronomicalUnit` `\k@SI@full@AstronomicalUnit` is the astronomical unit (the average distance between the Earth and the Sun) in SI units with full precision. (IAU Resolution B2 2012)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@full@AstronomicalUnit
\makeatother
```

Resulting in

The value is  $1.495\,978\,707 \times 10^{11}$  m

`\k@cgs@short@AstronomicalUnit` `\k@cgs@short@AstronomicalUnit` is the astronomical unit (the average distance between the Earth and the Sun) in cgs units with reduced precision. (IAU Resolution B2 2012)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@short@AstronomicalUnit
\makeatother
```

Resulting in

The value is  $1.50 \times 10^{13}$  cm

`\k@cgs@full@AstronomicalUnit` `\k@cgs@full@AstronomicalUnit` is the astronomical unit (the average distance between the Earth and the Sun) in cgs units with full precision. (IAU Resolution B2 2012)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@full@AstronomicalUnit
\makeatother
```

Resulting in

The value is  $1.495\,978\,707 \times 10^{13}$  cm

`\k@SI@short@Parsec` `\k@SI@short@Parsec` is the length of a parsec ( $\frac{648000 \text{ au}}{\pi}$ ) in SI units with reduced precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@short@Parsec
\makeatother
```

Resulting in

The value is  $3.09 \times 10^{16}$  m

`\k@SI@full@Parsec` `\k@SI@full@Parsec` is the length of a parsec ( $\frac{648000 \text{ au}}{\pi}$ ) in SI units with full precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@full@Parsec
\makeatother
```

Resulting in

The value is  $3.085\,677\,581 \times 10^{16}$  m

`\k@cgs@short@Parsec` `\k@cgs@short@Parsec` is the length of a parsec ( $\frac{648000 \text{ au}}{\pi}$ ) in cgs units with reduced precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@short@Parsec
\makeatother
```

Resulting in

The value is  $3.09 \times 10^{18}$  cm

`\k@cgs@full@Parsec` `\k@cgs@full@Parsec` is the length of a parsec ( $\frac{648000 \text{ au}}{\pi}$ ) in cgs units with full precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@full@Parsec
\makeatother
```

Resulting in

The value is  $3.085\,677\,581 \times 10^{18}$  cm

`\k@SI@short@RadiusSun` `\k@SI@short@RadiusSun` is the mean radius of the Sun in SI units with reduced precision. (IAU Resolution B3 2015)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@short@RadiusSun
\makeatother
```

Resulting in

The value is  $6.96 \times 10^8$  m

`\k@SI@full@RadiusSun` `\k@SI@full@RadiusSun` is the mean radius of the Sun in SI units with full precision. (IAU Resolution B3 2015)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@full@RadiusSun
\makeatother
```

Resulting in

The value is  $6.957 \times 10^8$  m

`\k@cgs@short@RadiusSun` `\k@cgs@short@RadiusSun` is the mean radius of the Sun in cgs units with reduced precision. (IAU Resolution B3 2015)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@short@RadiusSun
\makeatother
```

Resulting in

The value is  $6.96 \times 10^{10}$  cm

`\k@cgs@full@RadiusSun` `\k@cgs@full@RadiusSun` is the mean radius of the Sun in cgs units with full precision. (IAU Resolution B3 2015)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@full@RadiusSun
\makeatother
```

Resulting in

The value is  $6.957 \times 10^{10}$  cm

#### 1.6.4 Energy, Power, and Luminosity

`\k@SI@short@Rydberg` `\k@SI@short@Rydberg` is the Rydberg energy (the binding energy of Hydrogen) in SI units with reduced precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@short@Rydberg
\makeatother
```

Resulting in

The value is  $2.18 \times 10^{-21}$  J

`\k@SI@full@Rydberg` `\k@SI@full@Rydberg` is the Rydberg energy (the binding energy of Hydrogen) in SI units with full precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@full@Rydberg
\makeatother
```

Resulting in

The value is  $2.179\,775\,77 \times 10^{-21}$  J

`\k@cgs@short@Rydberg` `\k@cgs@short@Rydberg` is the Rydberg energy (the binding energy of Hydrogen) in cgs units with reduced precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@short@Rydberg
\makeatother
```

Resulting in

The value is  $2.18 \times 10^{-14}$  erg

`\k@cgs@full@Rydberg` `\k@cgs@full@Rydberg` is the Rydberg energy (the binding energy of Hydrogen) in cgs units with full precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@full@Rydberg
\makeatother
```

Resulting in

The value is  $2.179\,775\,77 \times 10^{-14}$  erg

`\k@eV@short@Rydberg` `\k@eV@short@Rydberg` is the Rydberg energy (the binding energy of Hydrogen) in eV with reduced precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@eV@short@Rydberg
\makeatother
```

Resulting in

The value is  $1.36 \times 10^{-2}$  eV

`\k@eV@full@Rydberg` `\k@eV@full@Rydberg` is the Rydberg energy (the binding energy of Hydrogen) in eV with full precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@eV@full@Rydberg
\makeatother
```

Resulting in

The value is  $1.360\,509\,03 \times 10^{-2}$  eV

`\k@SI@short@LuminositySun` `\k@SI@short@LuminositySun` is the luminosity of the Sun in SI units with reduced precision. (IAU Resolution B3 2015)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@short@LuminositySun
\makeatother
```

Resulting in

The value is  $3.83 \times 10^{26}$  W

`\k@SI@full@LuminositySun` `\k@SI@full@LuminositySun` is the luminosity of the Sun in SI units with full precision. (IAU Resolution B3 2015)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@full@LuminositySun
\makeatother
```

Resulting in

The value is  $3.828 \times 10^{26}$  W

`\k@cgs@short@LuminositySun` `\k@cgs@short@LuminositySun` is the luminosity of the Sun in cgs units with reduced precision. (IAU Resolution B3 2015)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@short@LuminositySun
\makeatother
```

Resulting in

The value is  $3.83 \times 10^{33} \text{ erg s}^{-1}$

`\k@cgs@full@LuminositySun` `\k@cgs@full@LuminositySun` is the luminosity of the Sun in cgs units with full precision. (IAU Resolution B3 2015)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@full@LuminositySun
\makeatother
```

Resulting in

The value is  $3.828 \times 10^{33} \text{ erg s}^{-1}$

### 1.6.5 Pressure

`\k@SI@short@PressureAtmosphere` `\k@SI@short@PressureAtmosphere` is the standard atmospheric pressure in SI units with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@short@PressureAtmosphere
\makeatother
```

Resulting in

The value is  $1.01 \times 10^5 \text{ Pa}$

`\k@SI@full@PressureAtmosphere` `\k@SI@full@PressureAtmosphere` is the standard atmospheric pressure in SI units with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)



```
\makeatletter
The value is \k@SI@full@PressureAtmosphere
\makeatother
```

Resulting in

The value is  $1.013\,25 \times 10^5$  Pa

`\k@cgs@short@PressureAtmosphere` `\k@cgs@short@PressureAtmosphere` is the standard atmospheric pressure in cgs units with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@short@PressureAtmosphere
\makeatother
```

Resulting in

The value is 1.01 mbar

`\k@cgs@full@PressureAtmosphere` `\k@cgs@full@PressureAtmosphere` is the standard atmospheric pressure in cgs units with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@full@PressureAtmosphere
\makeatother
```

Resulting in

The value is 1.013 25 mbar

`\k@SI@short@PressureStandard` `\k@SI@short@PressureStandard` is the standard atmospheric pressure in SI units with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@short@PressureStandard
\makeatother
```

Resulting in

The value is  $1.00 \times 10^5$  Pa

`\k@SI@full@PressureStandard` `\k@SI@full@PressureStandard` is the standard atmospheric pressure in SI units with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@full@PressureStandard
\makeatother
```

Resulting in

The value is  $1.000\,00 \times 10^5$  Pa

`\k@cgs@short@PressureStandard` `\k@cgs@short@PressureStandard` is the standard atmospheric pressure in cgs units with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@short@PressureStandard
\makeatother
```

Resulting in

The value is 1.00 mbar

`\k@cgs@full@PressureStandard` `\k@cgs@full@PressureStandard` is the standard atmospheric pressure in cgs units with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@full@PressureStandard
\makeatother
```

Resulting in

The value is 1.000 00 mbar

### 1.6.6 Velocity, Speed and Acceleration

`\k@SI@short@SpeedLight` `\k@SI@short@SpeedLight` is the speed of light in SI units with reduced precision.

(CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@short@SpeedLight
\makeatother
```

Resulting in

```
The value is  $3.00 \times 10^8 \text{ m s}^{-1}$ 
```

`\k@SI@full@SpeedLight` `\k@SI@full@SpeedLight` is the speed of light in SI units with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@full@SpeedLight
\makeatother
```

Resulting in

```
The value is  $2.997\,924\,58 \times 10^8 \text{ m s}^{-1}$ 
```

`\k@cgs@short@SpeedLight` `\k@cgs@short@SpeedLight` is the speed of light in cgs units with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@short@SpeedLight
\makeatother
```

Resulting in

```
The value is  $3.00 \times 10^{10} \text{ cm s}^{-1}$ 
```

`\k@cgs@full@SpeedLight` `\k@cgs@full@SpeedLight` is the speed of light in cgs units with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@full@SpeedLight
\makeatother
```

Resulting in

The value is  $2.997\,924\,58 \times 10^{10} \text{ cm s}^{-1}$

`\k@SI@short@AccelGravity` `\k@SI@short@AccelGravity` is the accelertion due to gravity at the surface of the Earth in SI units with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@short@AccelGravity
\makeatother
```

Resulting in

The value is  $6.67 \times 10^{-11} \text{ N kg}^{-2} \text{ m}^2$

`\k@SI@full@AccelGravity` `\k@SI@full@AccelGravity` is the accelertion due to gravity at the surface of the Earth in SI units with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@full@AccelGravity
\makeatother
```

Resulting in

The value is  $6.674\,30 \times 10^{-11} \text{ N kg}^{-2} \text{ m}^2$

`\k@cgs@short@AccelGravity` `\k@cgs@short@AccelGravity` is the accelertion due to gravity at the surface of the Earth in cgs units with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@short@AccelGravity
\makeatother
```

Resulting in

The value is  $6.67 \times 10^{-8} \text{ dyn g}^{-2} \text{ cm}^2$

`\k@cgs@full@AccelGravity` `\k@cgs@full@AccelGravity` is the acceleration due to gravity at the surface of the Earth in cgs units with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@full@AccelGravity
\makeatother
```

Resulting in

The value is  $6.674\,30 \times 10^{-8} \text{ dyn g}^{-2} \text{ cm}^2$

### 1.6.7 Other Constants

`\k@SI@short@Coulomb` `\k@SI@short@Coulomb` is the Coulomb constant ( $\frac{1}{4\pi\epsilon_0}$ ) in SI units with reduced precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@short@Coulomb
\makeatother
```

Resulting in

The value is  $8.99 \times 10^{13} \text{ N m}^2 \text{ C}^{-2}$

`\k@SI@full@Coulomb` `\k@SI@full@Coulomb` is the Coulomb constant ( $\frac{1}{4\pi\epsilon_0}$ ) in SI units with full precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@full@Coulomb
\makeatother
```

Resulting in

The value is  $8.987\,551\,79 \times 10^{13} \text{ N m}^2 \text{ C}^{-2}$

`\k@cgs@short@Coulomb` `\k@cgs@short@Coulomb` is the Coulomb constant ( $\frac{1}{4\pi\epsilon_0}$ ) in cgs units with reduced precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@short@Coulomb
\makeatother
```

Resulting in

The value is 1.00

`\k@cgs@full@Coulomb` `\k@cgs@full@Coulomb` is the Coulomb constant ( $\frac{1}{4\pi\epsilon_0}$ ) in cgs units with full precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@full@Coulomb
\makeatother
```

Resulting in

The value is 1.000 000 00

`\k@SI@short@VacuumPermittivity` `\k@SI@short@VacuumPermittivity` is the electric permittivity of the vacuum in SI units with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@short@VacuumPermittivity
\makeatother
```

Resulting in

The value is  $8.85 \times 10^{-12} \text{ F m}^{-1}$

`\k@SI@full@VacuumPermittivity` `\k@SI@full@VacuumPermittivity` is the electric permittivity of the vacuum in SI units with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@full@VacuumPermittivity
\makeatother
```

Resulting in

The value is  $8.854\,187\,812\,8 \times 10^{-12} \text{ F m}^{-1}$

`\k@cgs@short@VacuumPermittivity` `\k@cgs@short@VacuumPermittivity` is the electric permittivity of the vacuum in cgs units with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@short@VacuumPermittivity
\makeatother
```

Resulting in

The value is  $7.96 \times 10^{-2}$

`\k@cgs@full@VacuumPermittivity` `\k@cgs@full@VacuumPermittivity` is the electric permittivity of the vacuum in cgs units with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@full@VacuumPermittivity
\makeatother
```

Resulting in

The value is  $7.957\,747\,154\,6 \times 10^{-2}$

`\k@SI@short@VacuumPermeability` `\k@SI@short@VacuumPermeability` is the magnetic permeability of the vacuum in SI units with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@short@VacuumPermeability
\makeatother
```

Resulting in

The value is  $8.85 \times 10^{-12} \text{ N A}^{-2}$

`\k@SI@full@VacuumPermeability` `\k@SI@full@VacuumPermeability` is the magnetic permeability of the vacuum in SI units with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@full@VacuumPermeability
\makeatother
```

Resulting in

The value is  $8.854\,187\,812\,8 \times 10^{-12} \text{ N A}^{-2}$

`\k@cgs@short@VacuumPermeability` `\k@cgs@short@VacuumPermeability` is the magnetic permeability of the vacuum in cgs units with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@short@VacuumPermeability
\makeatother
```

Resulting in

The value is  $1.26 \times 10^1$

`\k@cgs@full@VacuumPermeability` `\k@cgs@full@VacuumPermeability` is the magnetic permeability of the vacuum in cgs units with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@full@VacuumPermeability
\makeatother
```

Resulting in

The value is  $1.256\,637\,061\,4 \times 10^1$

`\k@short@VacuumImpedance` `\k@short@VacuumImpedance` is the characteristic impedance of the vacuum with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)



```
\makeatletter
The value is \k@short@VacuumImpedance
\makeatother
```

Resulting in

The value is  $3.77 \times 10^2 \Omega$

`\k@full@VacuumImpedance` `\k@full@VacuumImpedance` is the characteristic impedance of the vacuum with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@full@VacuumImpedance
\makeatother
```

Resulting in

The value is  $3.767\,303\,136\,68 \times 10^2 \Omega$

`\k@SI@short@Boltzmann` `\k@SI@short@Boltzmann` is the Boltzmann constant in SI units with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@short@Boltzmann
\makeatother
```

Resulting in

The value is  $1.38 \times 10^{-23} \text{ J K}^{-1}$

`\k@SI@full@Boltzmann` `\k@SI@full@Boltzmann` is the Boltzmann constant in SI units with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@full@Boltzmann
\makeatother
```

Resulting in

The value is  $1.380\,649 \times 10^{-23} \text{ J K}^{-1}$

`\k@cgs@short@Boltzmann` `\k@cgs@short@Boltzmann` is the Boltzmann constant in cgs units with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@short@Boltzmann
\makeatother
```

Resulting in

The value is  $1.38 \times 10^{-16} \text{ erg K}^{-1}$

`\k@cgs@full@Boltzmann` `\k@cgs@full@Boltzmann` is the Boltzmann constant in cgs units with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@full@Boltzmann
\makeatother
```

Resulting in

The value is  $1.380\,649 \times 10^{-16} \text{ erg K}^{-1}$

`\k@eV@short@Boltzmann` `\k@eV@short@Boltzmann` is the Boltzmann constant in eV with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@eV@short@Boltzmann
\makeatother
```

Resulting in

The value is  $8.62 \times 10^{-5} \text{ eV K}^{-1}$

`\k@eV@full@Boltzmann` `\k@eV@full@Boltzmann` is the Boltzmann constant in eV with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@eV@full@Boltzmann
\makeatother
```

Resulting in

The value is  $8.617\,333 \times 10^{-5} \text{ eV K}^{-1}$

`\k@SI@short@Planck` `\k@SI@short@Planck` is the Planck constant in SI units with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@short@Planck
\makeatother
```

Resulting in

The value is  $6.63 \times 10^{-34} \text{ J s}$

`\k@SI@full@Planck` `\k@SI@full@Planck` is the Planck constant in SI units with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@full@Planck
\makeatother
```

Resulting in

The value is  $6.626\,070\,15 \times 10^{-34} \text{ J s}$

`\k@cgs@short@Planck` `\k@cgs@short@Planck` is the Planck constant in cgs units with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@short@Planck
\makeatother
```

Resulting in

The value is  $6.63 \times 10^{-27}$  erg s

`\k@cgs@full@Planck` `\k@cgs@full@Planck` is the Planck constant in cgs units with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@full@Planck
\makeatother
```

Resulting in

The value is  $6.626\,070\,15 \times 10^{-27}$  erg s

`\k@eV@short@Planck` `\k@eV@short@Planck` is the Planck constant in eV with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@eV@short@Planck
\makeatother
```

Resulting in

The value is  $4.14 \times 10^{-15}$  eV s

`\k@eV@full@Planck` `\k@eV@full@Planck` is the Planck constant in eV with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@eV@full@Planck
\makeatother
```

Resulting in

The value is  $4.135\,667\,70 \times 10^{-15}$  eV s

`\k@SI@short@PlanckReduced` `\k@SI@short@PlanckReduced` is the Reduced Planck constant ( $\frac{h}{2\pi}$ ) in SI units with reduced precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@short@PlanckReduced
\makeatother
```

Resulting in

The value is  $1.05 \times 10^{-34}$  J s

`\k@SI@full@PlanckReduced` `\k@SI@full@PlanckReduced` is the Reduced Planck constant ( $\frac{h}{2\pi}$ ) in SI units with full precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@full@PlanckReduced
\makeatother
```

Resulting in

The value is  $1.054\,571\,82 \times 10^{-34}$  J s

`\k@cgs@short@PlanckReduced` `\k@cgs@short@PlanckReduced` is the Reduced Planck constant ( $\frac{h}{2\pi}$ ) in cgs units with reduced precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@short@PlanckReduced
\makeatother
```

Resulting in

The value is  $1.05 \times 10^{-27}$  erg s

`\k@cgs@full@PlanckReduced` `\k@cgs@full@PlanckReduced` is the Reduced Planck constant ( $\frac{h}{2\pi}$ ) in cgs units with full precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@full@PlanckReduced
\makeatother
```

Resulting in

The value is  $1.054\,571\,82 \times 10^{-27}$  erg s

`\k@eV@short@PlanckReduced` `\k@eV@short@PlanckReduced` is the Reduced Planck constant ( $\frac{h}{2\pi}$ ) in eV with reduced precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@eV@short@PlanckReduced
\makeatother
```

Resulting in

The value is  $6.58 \times 10^{-16}$  eV s

`\k@eV@full@PlanckReduced` `\k@eV@full@PlanckReduced` is the Reduced Planck constant ( $\frac{h}{2\pi}$ ) in eV with full precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@eV@full@PlanckReduced
\makeatother
```

Resulting in

The value is  $6.582\,119\,57 \times 10^{-16}$  eV s

`\k@SI@short@Gravity` `\k@SI@short@Gravity` is Newton's gravitational constant in SI units with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@short@Gravity
\makeatother
```

Resulting in

The value is  $6.67 \times 10^{-15}$  N kg<sup>-2</sup> m<sup>2</sup>

`\k@SI@full@Gravity` `\k@SI@full@Gravity` is Newton's gravitational constant in SI units with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@full@Gravity
\makeatother
```

Resulting in

The value is  $6.674\,30 \times 10^{-15} \text{ N kg}^{-2} \text{ m}^2$

`\k@cgs@short@Gravity` `\k@cgs@short@Gravity` is Newton’s gravitational constant in cgs units with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@short@Gravity
\makeatother
```

Resulting in

The value is  $6.67 \times 10^{-8} \text{ dyn g}^{-2} \text{ cm}^2$

`\k@cgs@full@Gravity` `\k@cgs@full@Gravity` is Newton’s gravitational constant in cgs units with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@full@Gravity
\makeatother
```

Resulting in

The value is  $6.674\,30 \times 10^{-8} \text{ dyn g}^{-2} \text{ cm}^2$

`\k@SI@short@StefanBoltzmann` `\k@SI@short@StefanBoltzmann` is the Stefan-Boltzmann blackbody constant  $\left(\frac{2\pi^5 k_B}{15h^3 c^2}\right)$  in SI units with reduced precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@short@StefanBoltzmann
\makeatother
```

---

Resulting in

The value is  $5.67 \times 10^{-6} \text{ J K}^{-4} \text{ m}^{-2} \text{ s}^{-1}$

`\k@SI@full@StefanBoltzmann` `\k@SI@full@StefanBoltzmann` is the Stefan-Boltzmann blackbody constant  $\left(\frac{2\pi^5 k_B}{15h^3 c^2}\right)$  in SI units with full precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@full@StefanBoltzmann
\makeatother
```

Resulting in

The value is  $5.670374 \times 10^{-6} \text{ J K}^{-4} \text{ m}^{-2} \text{ s}^{-1}$

`\k@cgs@short@StefanBoltzmann` `\k@cgs@short@StefanBoltzmann` is the Stefan-Boltzmann blackbody constant  $\left(\frac{2\pi^5 k_B}{15h^3 c^2}\right)$  in cgs units with reduced precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@short@StefanBoltzmann
\makeatother
```

Resulting in

The value is  $5.67 \times 10^{-5} \text{ erg K}^{-4} \text{ cm}^{-2} \text{ s}^{-1}$

`\k@cgs@full@StefanBoltzmann` `\k@cgs@full@StefanBoltzmann` is the Stefan-Boltzmann blackbody constant  $\left(\frac{2\pi^5 k_B}{15h^3 c^2}\right)$  in cgs units with full precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@full@StefanBoltzmann
\makeatother
```

Resulting in



The value is  $5.670\,374 \times 10^{-5} \text{ erg K}^{-4} \text{ cm}^{-2} \text{ s}^{-1}$

`\k@SI@short@Radiation` `\k@SI@short@Radiation` is the radiation constant,  $a \left( \frac{8\pi^5 k_B^4}{15c^3 h^3} \right)$  in SI units with reduced precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@short@Radiation
\makeatother
```

Resulting in

The value is  $7.57 \times 10^{-16} \text{ J m}^{-3} \text{ K}^{-4}$

`\k@SI@full@Radiation` `\k@SI@full@Radiation` is the radiation constant,  $a \left( \frac{8\pi^5 k_B^4}{15c^3 h^3} \right)$  in SI units with full precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@SI@full@Radiation
\makeatother
```

Resulting in

The value is  $7.565\,733 \times 10^{-16} \text{ J m}^{-3} \text{ K}^{-4}$

`\k@cgs@short@Radiation` `\k@cgs@short@Radiation` is the radiation constant,  $a \left( \frac{8\pi^5 k_B^4}{15c^3 h^3} \right)$  in cgs units with reduced precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@short@Radiation
\makeatother
```

Resulting in

The value is  $7.57 \times 10^{-15} \text{ erg cm}^{-3} \text{ K}^{-4}$

`\k@cgs@full@Radiation` `\k@cgs@full@Radiation` is the radiation constant,  $a \left( \frac{8\pi^5 k_B^4}{15c^3 h^3} \right)$  in cgs units with full precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@cgs@full@Radiation
\makeatother
```

Resulting in

The value is  $7.565\,733 \times 10^{-15} \text{ erg cm}^{-3} \text{ K}^{-4}$

`\k@short@FineStructure` `\k@short@FineStructure` is the fine structure constant with reduced precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@short@FineStructure
\makeatother
```

Resulting in

The value is  $7.30 \times 10^{-3}$

`\k@full@FineStructure` `\k@full@FineStructure` is the fine structure constant with full precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@full@FineStructure
\makeatother
```

Resulting in

The value is  $7.297\,352\,57 \times 10^{-3}$

`\k@short@FineStructureReciprocal` `\k@short@FineStructureReciprocal` is the reciprocal of the fine structure constant with reduced precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@short@FineStructureReciprocal
\makeatother
```

Resulting in

The value is  $1.37 \times 10^2$

`\k@full@FineStructureReciprocal` `\k@full@FineStructureReciprocal` is the reciprocal of the fine structure constant with full precision. (Calculated)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@full@FineStructureReciprocal
\makeatother
```

Resulting in

The value is  $1.370\,359\,99 \times 10^2$

`\k@short@Avogadro` `\k@short@Avogadro` is Avogadro's Number (the number of particles in a mole) with reduced precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@short@Avogadro
\makeatother
```

Resulting in

The value is  $6.02 \times 10^{23}$

`\k@full@Avogadro` `\k@full@Avogadro` is Avogadro's Number (the number of particles in a mole) with full precision. (CODATA 2018)

The macro can be invoked by (e.g.)

```
\makeatletter
The value is \k@full@Avogadro
\makeatother
```

Resulting in

The value is  $6.022\,407\,60 \times 10^{23}$

## Change History

|                                   |   |                               |   |
|-----------------------------------|---|-------------------------------|---|
| v1.0.0                            |   | fix formatting. . . . .       | 1 |
| General: Initial version. . . . . | 1 | v1.0.2                        |   |
| v1.0.1                            |   | General: External changes for |   |
| General: Add options section and  |   | distribution. . . . .         | 1 |

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