

# The DimPy physical quantity package for Python

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- ▶ A `Unit` contains a `Dimension`, a unit name (“meter”) and a unit symbol (“m”). Meter, mile, second are units.
- ▶ A `Quantity` contains a `Unit` and a scalar multiple. Variables such as `my_height` and `mass_of_moon` would be `Quantity` instances.

## Creating quantities and new units

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It is also possible to define new units from existing ones:

```
>>> Nm = newton*meter; Nm
m N
```

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>>> my_height.in_unit('foot')  
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Quantity functions such as `is_scalar_type`, `have_same_dimensions` and `is_dimensionless` are also available to compare Quantity instances.

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house flat
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>>> house = Flydim('house')
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```
>>> flat = Flydim('flat')
```

```
>>> house*flat
```

```
house flat
```

```
>>> house/flat
```

```
house flat-1
```

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```

```
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Similar comparison functions exist for Flyquants.

## Matrices containing physical quantities

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which represents the matrix:

```
1.0 m kg  2.0 m mol
3.0 s kg  4.0 s mol
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`DimPy` will then calibrate the base matrix so that the matrix is displayed in SI units (and only `Dimension` types are stored):

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>>> base_matrix = numpy.array([[1,2],[3,4]])
>>> vertical = [meter, second]
>>> horizontal = [mile, mole]
```

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>>> A = QuantMatrix(base_matrix, [vertical, horizontal])
```

	m	mol
m	1609.344	2.0
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```

The base matrix or quantities can be changed after creation using attributes, but `DimPy` will check that the new values are compatible (i.e. that the size of the new matrix matches that of the old one).

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Values are read from a `QuantMatrix` like a standard `numpy.ndarray`:

```
>>> A[0,0]
1609.344 m^2
```

## The shuffle function

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```
>>> A
   m  mol
m 1   2
s 3   4
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It multiplies each dimension in the horizontal dimensions by `shuffle_vector` and divides each vertical dimension by `shuffle_vector`:

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>>> A
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>>> shuffle(A, meter/second); A
      m2 s-1  m s-1 mol
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m-1 s2      3          4
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      s          1          2
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`shuffle_vector` may be a `Dimension`, `Unit` or `Quantity`.

# Requesting Conversions

DimPy contains an infix parser which can also handle requests involving quantities. This can be accessed using the interactive session or the parse function.

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```
---> 3 meters/(2 hours)*4 seconds  
3*meter/(2*hour)*4*second = 0.001666666666667 m
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---> 1.0/ten*million  
1.0/ten*million = 100000.0
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Therefore, the most general word is of the form:

---> 1e3millimeters2

$$1*10^3*(0.001*meter)^2 = 0.001 m^2$$

# History

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```
---> #0*2
```

```
(3*meter)*2 = 6.0 m
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new_variable = 3*meter
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To recall the value, use the variable name as for a regular variable:

```
---> new_variable*4  
new_variable*4 = 12.0 m
```

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