

Create a custom cosmology object

```
>>> from astropy.cosmology import FlatLambdaCDM
>>> cosmo = FlatLambdaCDM(H0=70, Om0=0.3)
>>> cosmo
FlatLambdaCDM(H0=70, Om0=0.3, Ode0=0.7)
```

Compute the comoving volume to  $z=6.5$  in cubic Mpc using this cosmology

```
>>> cosmo.comoving_volume(6.5)
1074707289417.6837
```

Compute the age of the universe in Gyr using the pre-defined WMAP 5-year and WMAP 9-year cosmologies

```
>>> from astropy.cosmology import WMAP5, WMAP9
>>> WMAP5.age(0)
13.723782349795023
>>> WMAP9.age(0)
13.768899510689097
```

Create a cosmology with a varying 'w'

```
>>> from astropy.cosmology import Flatw0waCDM
>>> cosmo = Flatw0waCDM(H0=70, Om0=0.3, w0=-1, wa=0.2)
```

Find the separation in proper kpc at  $z=4$  corresponding to 10 arcsec in this cosmology compared to a WMAP9 cosmology

```
>>> cosmo.kpc_proper_per_arcmin(4) * 10 / 60.
68.87214405278925
>>> WMAP9.kpc_proper_per_arcmin(4) * 10 / 60.
71.21374615575363
```