Introduction to scientific computing in Python

Examples from Cosmology

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Outline

1. **eg1.ipynb** Plot a straight line using matplotlib
2. **eg2.ipynb** Solve the equation for expansion rate of the universe.

$$\frac{H^2}{H_0^2} = \frac{\Omega_{R0}}{a^4} + \frac{\Omega_{M0}}{a^3} + \frac{\Omega_{K0}}{a^2} + \Omega_{\Lambda 0} \tag{1}$$

3. **eg3.ipynb** Scipy special functions, spherical harmonics. Use Healpix/healpy to take fourier transform of a function defined on the surface of a sphere.
4. **eg4.ipynb** Use astropy.cosmology to explore distances and temperature in an expanding universe.
5. **eg5.ipynb** Constrain the parameters of a model using emcee.
6. A look at Fortran90. Use Openmp to parallelize a for loop that finds the number of prime numbers between 1 and N.
7. Exercise: Repeat the previous example in python using joblib library in python. What is GIL?