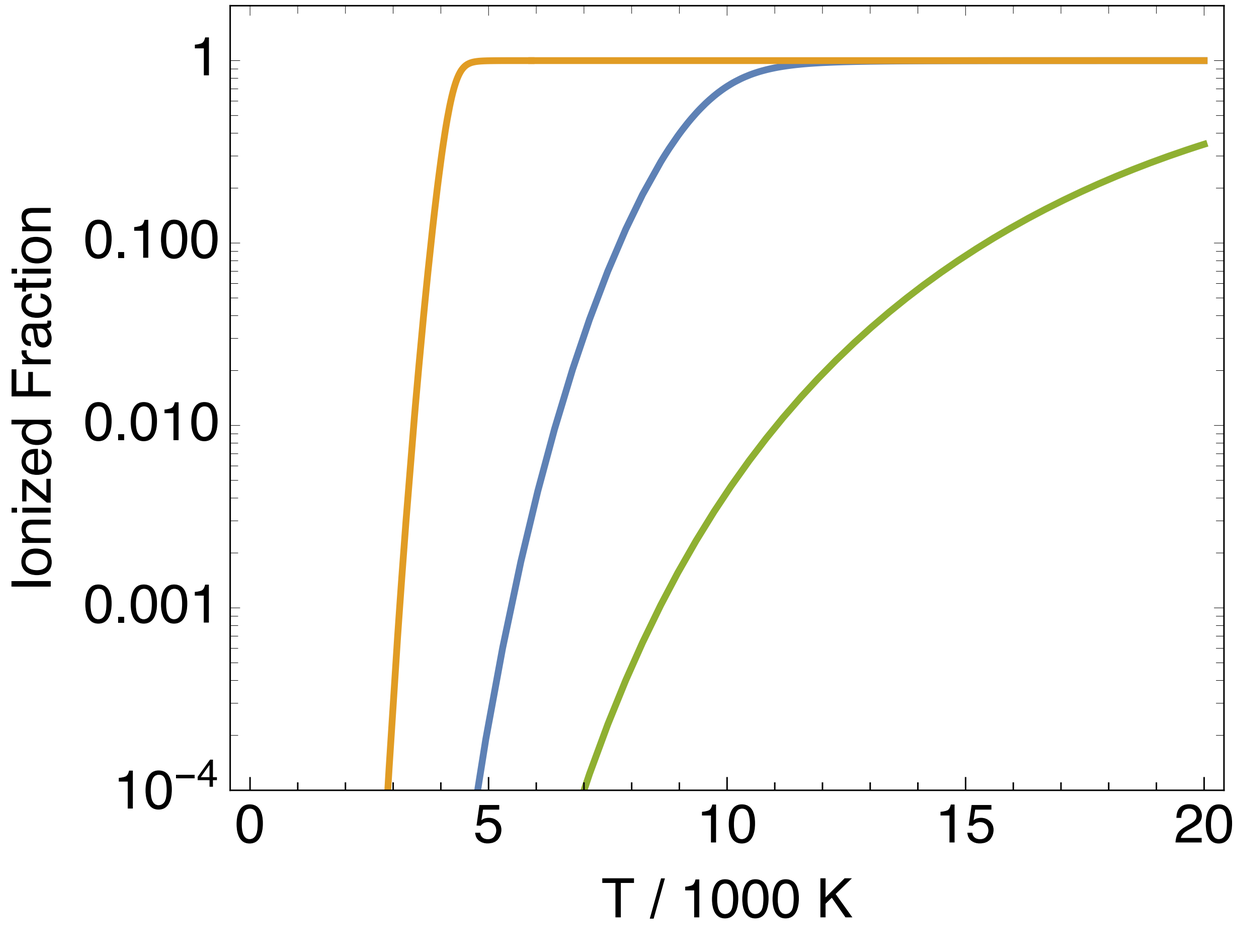
The Saha Equation



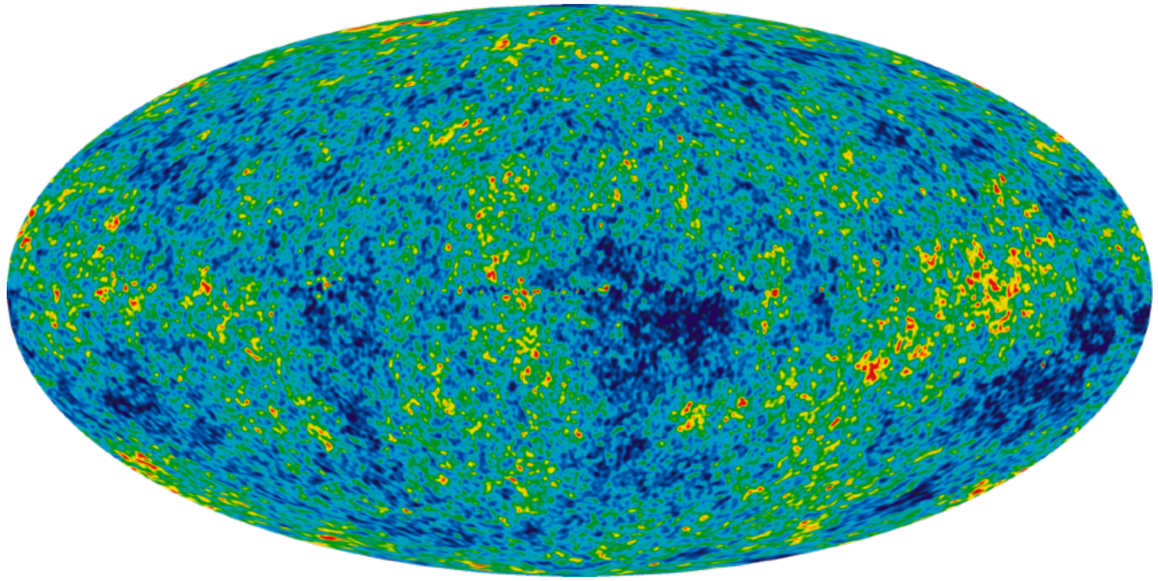
$$n_p + n_H \simeq 10^{20}\mathrm{m}^{-3}$$

The ionized fraction is

$$\frac{n_p}{n_p + n_H}$$

Cosmological Story:

Spectrum of cosmological light, reflecting a temperature of 10,000 Kelvin many years ago



13.6 Billion Years ago the universe was approximately 10,000 Kelvin

Then at this time the electrons and protons recombined, making neutral hydrogen. Since then, the light has been traveling freely, but becoming redshifted, to a lower effective temperature. We measure light at temperature of $2.7\,^{o}\mathrm{K}$ everywhere in the sky, reflecting $10{,}000^{o}\mathrm{K}$ from 13.6 billion years ago.