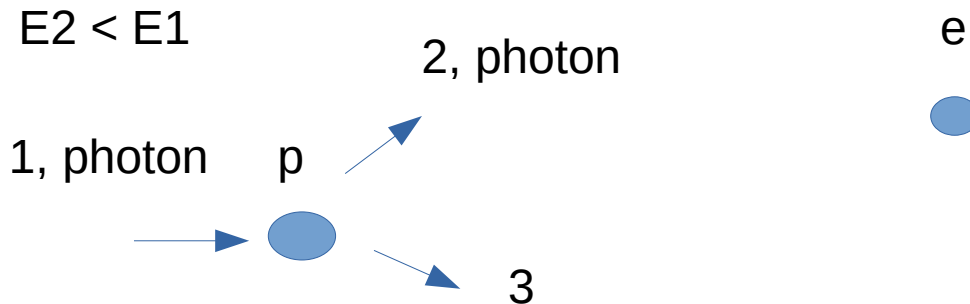


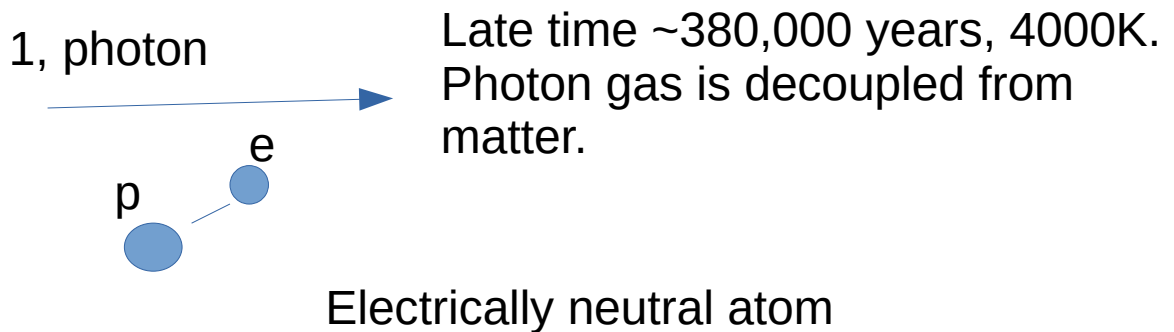
How can photons lose energy?

They must scatter off electrically charged particles.



Plasma, a sea of electrically charged particles that are independent from each other, p and e are separated. In the Plasma the photons are always scattering off charged particles.

↑ Early time in plasma



Photon 1, largely passes by the electrically neutral atom and does not lose any energy. It is decoupled from matter.

The photon gas wave lengths now get stretched by the changing scale factor. Whatever their wave lengths were when the neutral atoms formed these wave lengths get red shifted.