Photons and gravity

Hydrogen atoms in the Sun's atmosphere adsorb light and when the white light from the sun is seen through a sensitive spectrometer, hydrogen's spectrum can be seen as black lines. The wavelength of light can be measured very accurately showing that the spectral lines are red shifted. A simple explanation would be that the photons of sunlight have lost energy doing work against gravity as they climb through the sun's gravitational field to earth. Einstein used this as part of his argument in developing general relativity.

However, the general theory of relativity, once established, predicted that "time is slowed down" by the sun's gravitational potential. This alone can account for the red shift. (The author would say that 'time dependent processes are slowed') This leaves us with a problem because we now have two independent mechanisms each able to explain the red shift. We should expect twice the observed effect, but this is not the case. Either there is no slowing of time dependent processes, or the photons do not do work against gravity. We know the slowing of clocks is real because atomic clocks must be re-calibrated for their particular height above sea level after shipment from the factory. The only conclusion is that photons do not loose energy against gravity in the same way as does a ball thrown in air.

In the author's theory of gravity, the concentration of matter in a planet or star causes a concentration of the electric fields of the elementary charged particles from which matter is built. This concentration results in a minute squeezing effect on the ability of the electric fields to store energy. As a ball falls, energy is squeezed from it through this process. If we gently lower the ball allowing its weight to do work, we can recover this energy. Otherwise it is mostly turned into kinetic energy as the ball gathers speed. The key thing to understand is that the kinetic energy is stored in the magnetic fields surrounding the elementary charged particles from which the ball's atoms are built.

When a ball is thrown in the air, we impart kinetic energy stored in the magnetic fields surrounding its elementary charged particles. As it climbs, so the electric fields of its elementary charged particles regain the energy which was stored as kinetic energy. Photons are like charged particles in that they consist of electric and magnetic fields. They are unlike charged particles in that a photon has exactly the same amount of energy in its electric field as it does in its magnetic field. This means that a photon is all kinetic energy.

As a photon climbs through the sun's gravitational field, it is in effect recycling its kinetic energy. The kinetic energy it should loose doing work against gravity is stored back into it as its electric and magnetic fields store the potential energy it has gained.

So photons do not feel the force of gravity. But they are affected by gravitational potential which reduces their speed through Euclidean space. A photon moving "horizontally" through a gravity field experiences a velocity gradient across its width. The side further form the source of gravity is moving slightly faster causing its path to curve.