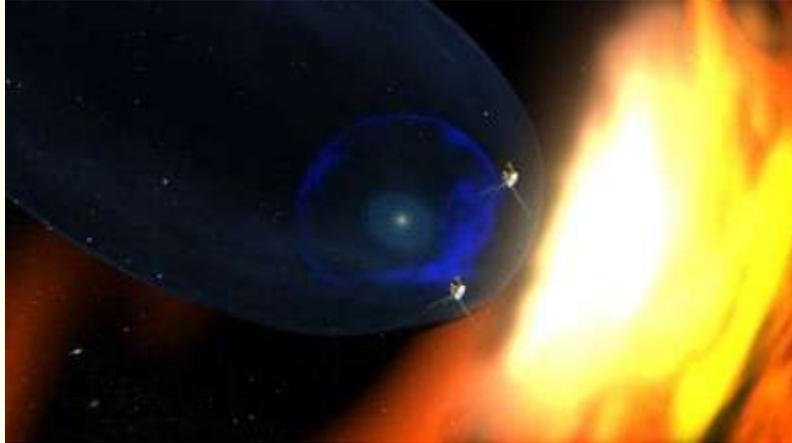


# VOYAGER AND ATOMIC MASS VERSUS ATOMIC WEIGHT



Voyager approaching the heliopause (from NASA).

The Voyager spacecraft, launched in 1977, are still going and making new discoveries. They are after all the man-made objects that are furthest away from the center of the solar system, beyond the orbit of Pluto, and are now approaching interstellar space.

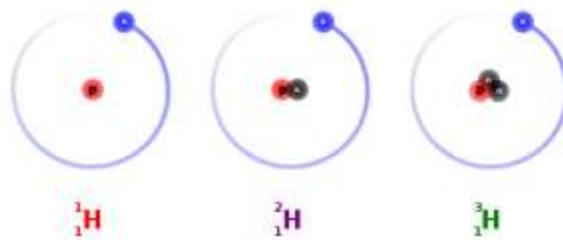
Where does the solar system end and interstellar space begin? Well, the Sun gives off light, but it also emits a plasma of charged particles (protons and electrons typically) that's called the solar wind. These charged particles are launched from the Sun pretty fast, but as they get to the edge of the solar system they start to slow down, because the solar system is moving through a magnetic cloud, and, as we all know, charged particles are affected by magnetic fields.

The solar wind, assisted by the Sun's magnetic field, pushes against the interstellar magnetic cloud, creating a bubble, called the heliosphere (helio=sun, sphere=sphere) that is pretty much the edge of the solar system.

Both Voyager spacecraft are approaching the heliosphere, and we've recently discovered that as the solar system moves through the interstellar magnetic cloud, the heliosphere is pushing against the cloud and the cloud is pushing back quite a bit. As a result, the heliosphere is shaped like the bow wave of water around a speeding boat.

It is difficult not to personify these two lonely spacecraft as they get further and further away from home, with no way to get back, but sending signals that tell of their discoveries and ensure their immortality.

### *Atomic mass versus atomic weight*



Isotopes of hydrogen: hydrogen, deuterium and tritium.

I have been told by reliable sources that the difference between atomic mass and atomic weight is that the atomic mass is the mass of a single atom (number of protons plus the number of neutrons), while the atomic weight is the averaged masses of all the different isotopes you would find in a natural sample.

This obviously requires a discussion of isotopes, which may be a topic best left for high school. However there are a number of interesting hooks that could capture the imagination.

Source: <http://montessorimuddle.org/2009/12/06/atomic-mass-versus-atomic-weight/>