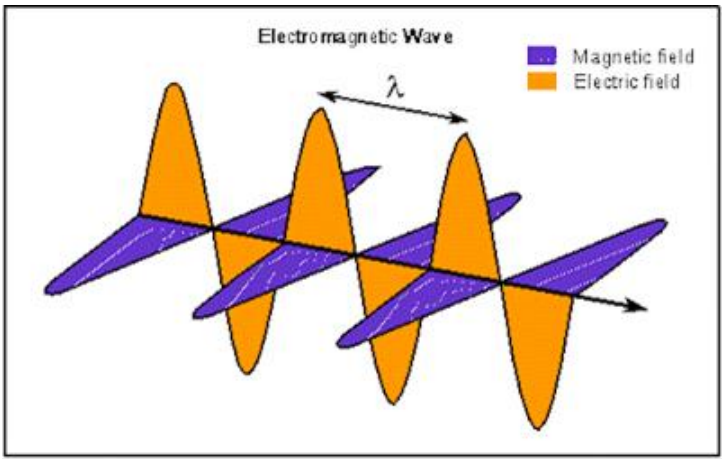
EMF - What is EMF ?

Electromagnetic Radiation (EMR) is energy in waves (like visible light), emitted from a source. It travels at the speed of light.

This energy is both electric and magnetic. The waves alternate rapidly, from positive to negative in electrical terms, and from North to South pole in magnetic terms.



Electricity and magnetism are very closely related in nature. For example, when an alternating magnetic wave penetrates a body (including yours!) an alternating electric current will flow inside that body. As an electric current or EMR (a component of the electromagnetic spectrum) travels, it generates both an Electric Field and a Magnetic Field. Both can be detected and measured.

Electromagnetic Radiation from a source penetrates the surrounding area, creating an electromagnetic field (EMF). This EMF is strongest at the source, and it weakens with increasing distance until it becomes too small to measure.

<u>The Powerful Effect of Distance</u>:

A strong EMF can be due to a powerful source of radiation far away, or a weak radiation source very close by.

That is why the EMF your body experiences from your cellphone (when you make a call) is much stronger than the EMF you experience from the cell phone tower. (Although the cell phone is a weak radiation source, it is located very close to your person, whereas the much more powerful cell tower is located thousands of times further away).

<u>EMR Penetration</u>:

Some forms of Electromagnetic Radiation (EMR) are more penetrating than others.

- **Visible light for example, can penetrate certain materials (like air, water and glass) but will not penetrate brick walls or metal sheets. It doesn't penetrate far into human flesh.**
- **X-rays will penetrate human flesh and leave an image on a photographic plate. Gamma rays will travel straight through that photographic plate!**

- **Some common electromagnetic radiation found in everyone's home, is very penetrating.**
- **Extremely Low Frequency (ELF) radiation (such as from a major electrical appliance) will actually penetrate concrete pillars, metal sheets, and of course, human flesh and bone.**
- **But, radiation from a small electrical appliance is relatively weak, so the measurable EMF extends for a short distance only, usually just a few feet.**
- **Penetration is a key issue when it comes to EMR health effects.**

Some important properties of electromagnetic radiation are:

Frequency

The frequency of a wave tells us how fast the wave oscillates in cycles per second; also called Hertz (or Hz). A cycle is one oscillation of the wave (one peak and one trough, or one cycle). It is designated by the Greek letter Lambda (shown in the diagram at the top of this page).

The range of all frequencies of Electromagnetic Radiation is collectively known as the Electromagnetic Spectrum.

Frequency (F) = Speed of Light (C)/Wavelength (Lambda).

Wavelength

The wavelength of a wave is the distance between two successive wave crests. Wavelength is inversely proportional to frequency; the higher the frequency, the shorter the wavelength.

Electromagnetic wavelengths of interest to us span a huge range; from about 5000 km (long wave) to less than a billionth of a meter (short waves, such as gamma rays).

Intensity

In practical terms, the intensity or strength of an electromagnetic field at any point depends upon:

- **the amount of electrical and magnetic energy radiating from its source**
- **the distance from that source**
- **the extent to which the radiation has been absorbed (or blocked or shielded).**

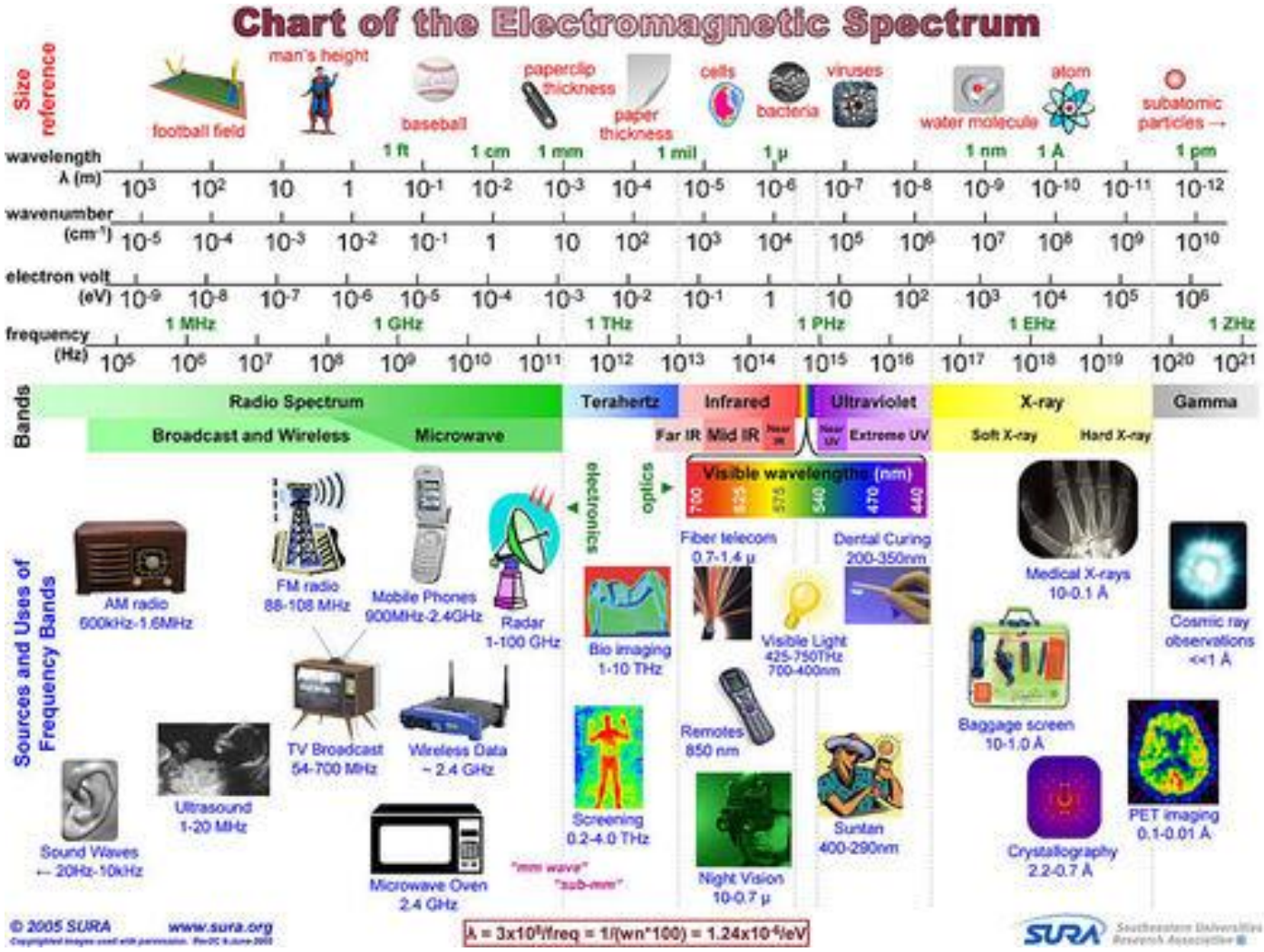
EMF Measurement

The electric field and magnetic field components of the EMF can be separately measured.

1. **Electrical field strength can be measured in volts per metre (V/m) or as power density in milliwatts per square centimeter (mW/cm2).**
2. **Magnetic fields can be quantified in milligauss (mG) or microTesla (1 microTesla = 10 milliguass).**
3. **The energy of ionizing radiation (explained below) is often quantified in electron volts (eV) but the absorbed radiation dose is measured in grays (Gy).**
4. **The expected biological effect of a dose of absorbed radiation is measured in sieverts (Sv) or, more usually, millisieverts**

(mSv). Different kinds of ionizing radiation have more or less effect on human tissue, depending upon the type and the dosage.

The Electromagnetic Spectrum

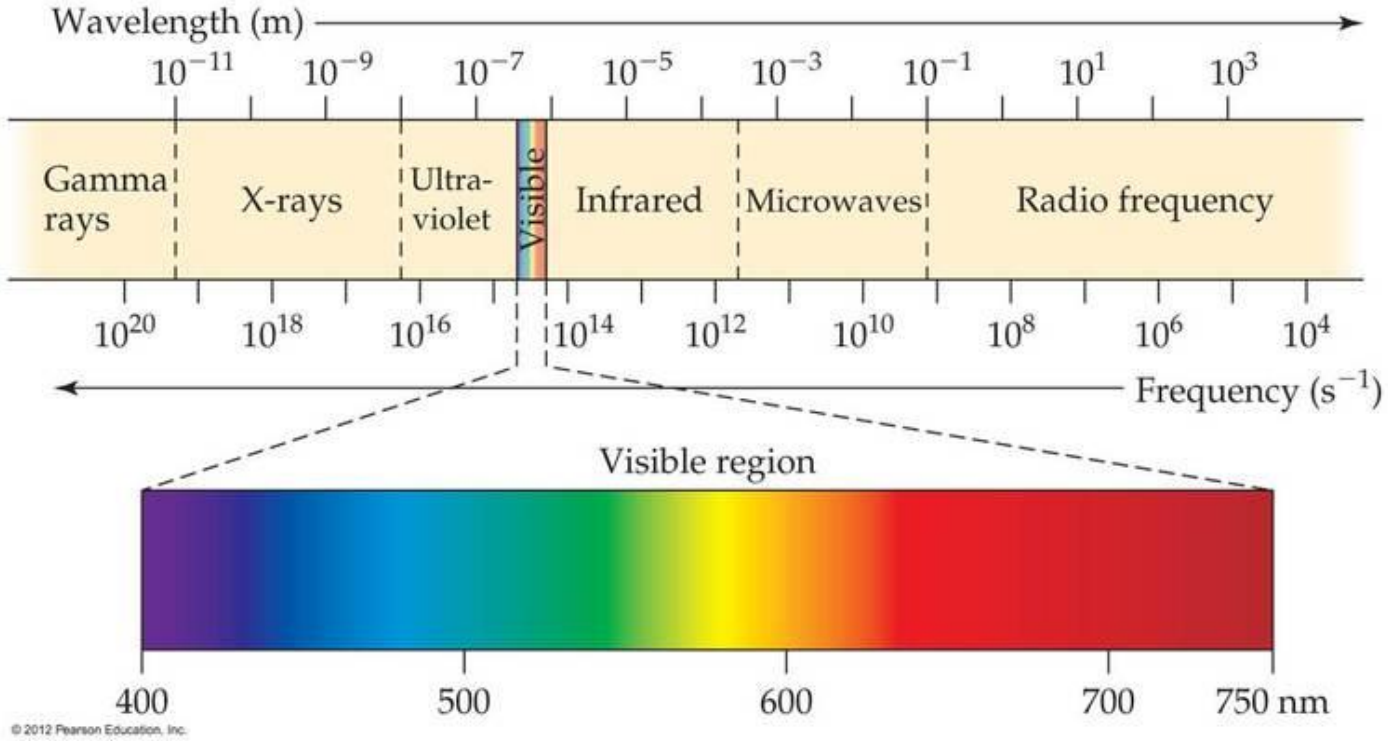


The chart above is a great visual comparison with good comparisons & examples about the Electromagnetic Spectrum.

In the Electromagnetic Spectrum, frequencies range from less than 20 Hz at the low end to over 1,000,000,000,000,000,000,000,000 Hz at the high end. As a form of shorthand, and to save time, scientists use the number 10 to the 24th {with a 24 as an exponent}; to signify there are 24 zeros after the number 1.

The Visible Light Spectrum is a very narrow portion of the Electromagnetic Spectrum

It is a very tiny portion of the entire spectrum. It is the only part of the spectrum in which the human eye [and we] can "see". Most of Reality is invisible to us without technological aids. Even then, the results are only representations or approximations. Visible Light [Visible Wavelengths] ranges from 10 to the 14th Hz to 10 to the 15th Hz.



Below is the complete spectrum [numerically] with approximate frequency ranges for each of the main subdivisions:

Type of Radiation Frequency Range (abbrev) and Range in Hz:

- **Extremely Low Frequency (ELF) 0 -100**
- **Very Low Frequency (VLF) 100 - 10,000**
- **Radio Frequency (RF) 10,000 - 3*10 to the 8th**
- **Microwaves (MW) 3*10 to the 8th - 10 to the 12th**
- **Infra-red (IR) 10 to the 12th - 10 to the14th**
- **Visible Light (from red to violet) 10 to the14th - 10 to the 15th**
- **Ultra-violet (UV) 10 to the 15th - 10 to the 16th**
- **X-Rays 10 to the 17th - 10 to the 19th**
- **Gamma Rays 10 to the 20th - 10 to the 24th**

Although we divide it up into different divisions and give them names (based on their properties), the electromagnetic spectrum is continuous. As the frequency increases, waves gradually change their properties, just as the colors of a rainbow gradually blend from one color to the next.

A good way of visualizing the EM spectrum is to think of all these types of rays as different colors, of which we can only see a few (those in the visible light range). The other "colors" are all invisible to us.

They are all just different forms of the same stuff – raw energy riding on a wave. They can all be harmful to a person's health because they penetrate your body and interact with molecules in your cells.

The Extremely Low Frequency (ELF) band includes the important power-line frequency (60 Hz in US and 50 Hz elsewhere) which contributes greatly to our electromagnetic pollution. Power transmission lines, house wiring, and electrical appliances all create this kind of EMF.

An electrical appliance may emit electromagnetic radiation at more than one frequency. For example, a washing machine on spin cycle could emit an EMF of 60 Hz (the supply frequency) as well as an EMF related to the speed of the electric motor driving the spinning drum. At these low frequencies it is still possible to separate the electrical and the magnetic components of the EMF (at the higher frequencies, it can't be done). This lower frequency type of EMF is easily detectable by most EMF Meters that are used by Paranormal Teams, as well as Electrical Engineers and/or Technicians.