

Astronomy Finds Magnetism Attractive

By Jürgen Hilmer July, 2021

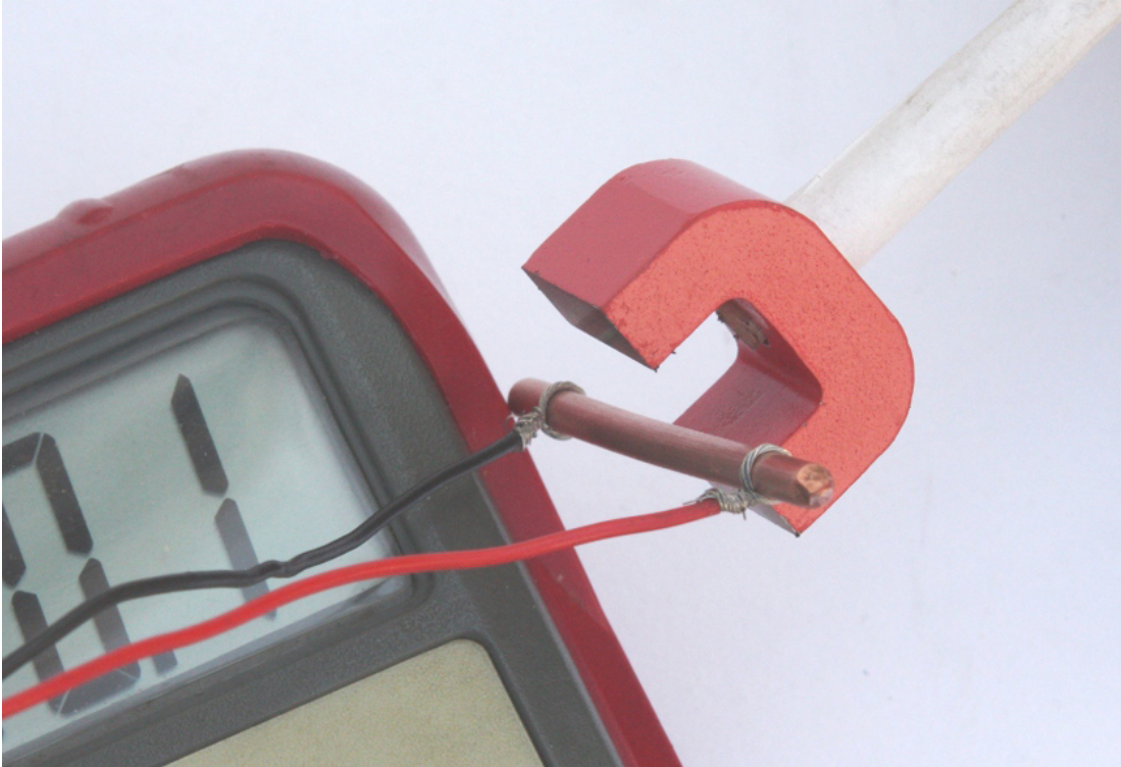
James Clerk Maxwell wrote 4 equations in 1874 that unified electricity, magnetism, and in turn the Electromagnetic Spectrum. The electric and magnetic fields that interact, and the combining of these fields is the Electromagnetic Spectrum.

Astronomy (like the SBAU kind) depends on the visual part of the spectrum. We see the light of the stars in our telescopes. Our eyes are photon detectors and work well around 5000 Angstrom, the wavelengths of the visual part of the Electromagnetic Spectrum. Astronomy around the globe is involved in research using different parts of the Electromagnetic Spectrum (the long and short wavelengths) to achieve their goals. See the very informative article [Observatories Across the Electromagnetic Spectrum](#)

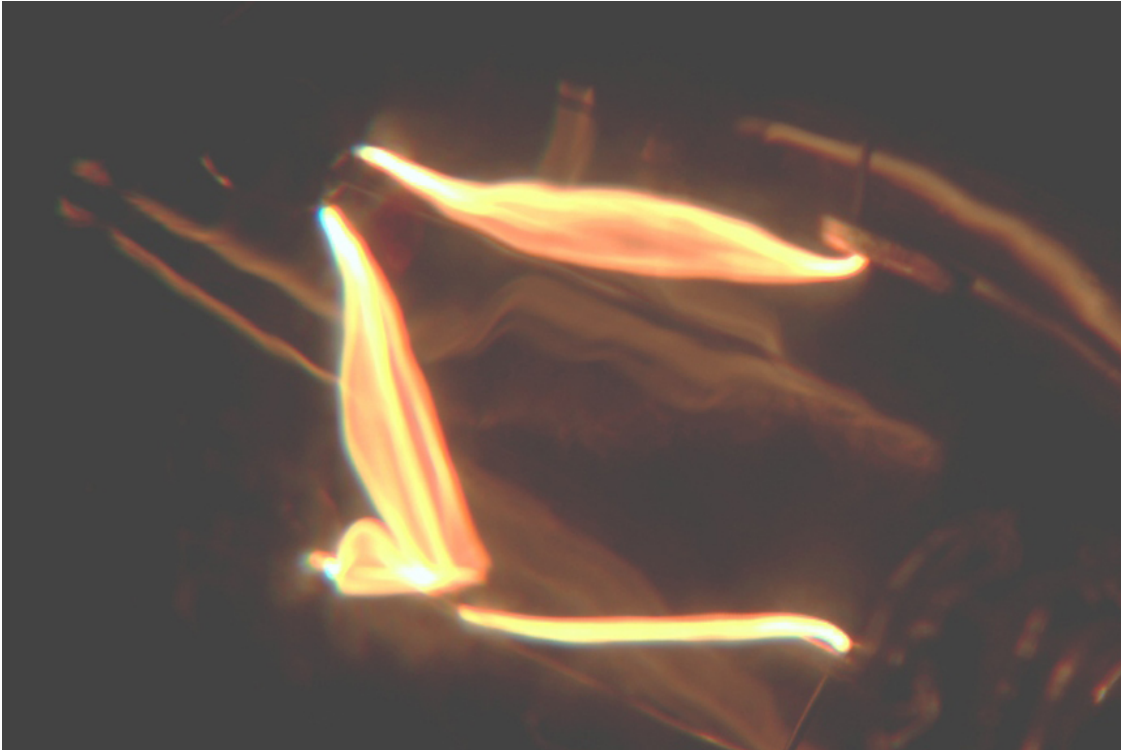
Parts like a horseshoe magnet, iron filings, copper wire, a light bulb, and voltmeter set the stage and help explain in a simple way Maxwell's Electromagnetic Spectrum. The same spectrum is also valid and working in the Cosmos.



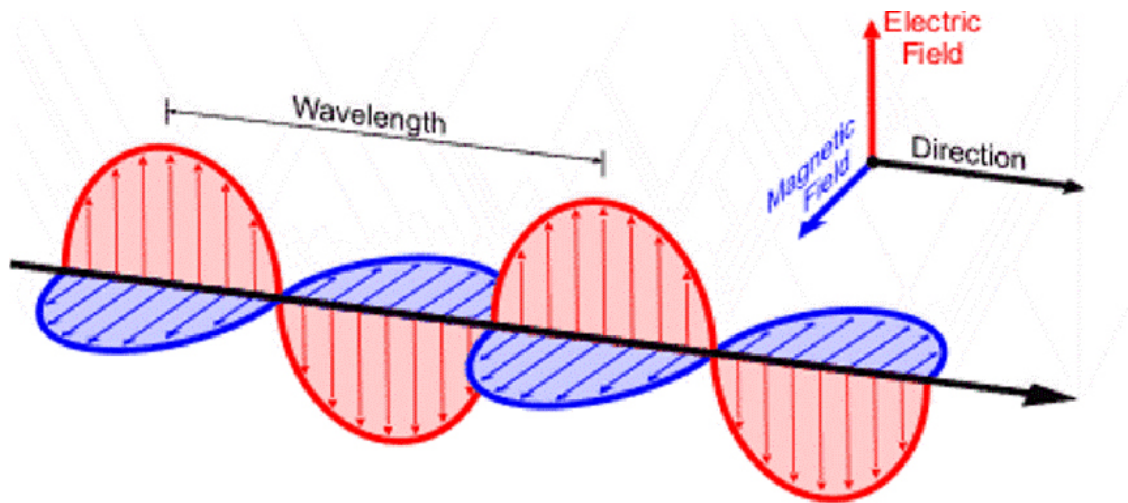
Iron filings suspended on a piece of glass over a horseshoe magnet align themselves and create a line like pattern. Like a compass needle in Earth's magnetic field, the needle aligns itself to that field. In both cases, they respond to the magnetism of the magnetic field.



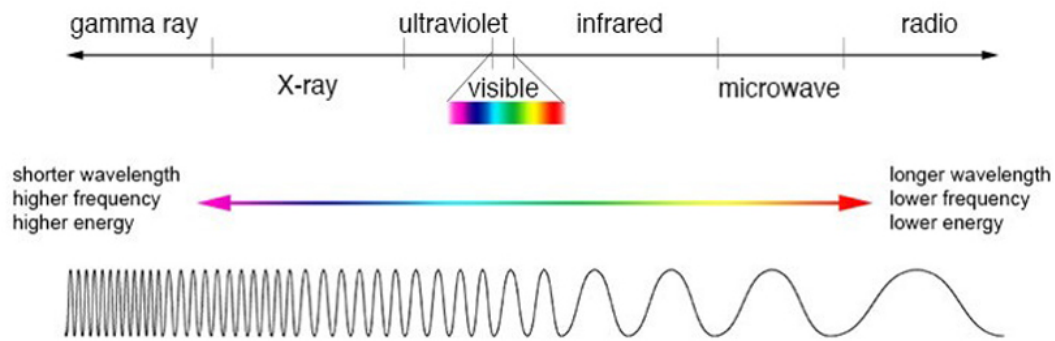
The copper wire between the horseshoe magnet is located in its magnetic field. Moving the wire quickly away from its location creates an electric flow. At the same time it also creates a magnetic field around the copper wire. The voltmeter shows the reading of the current flow. In this case the quick motion of the wire in the magnetism of the horseshoe magnet produces electricity.



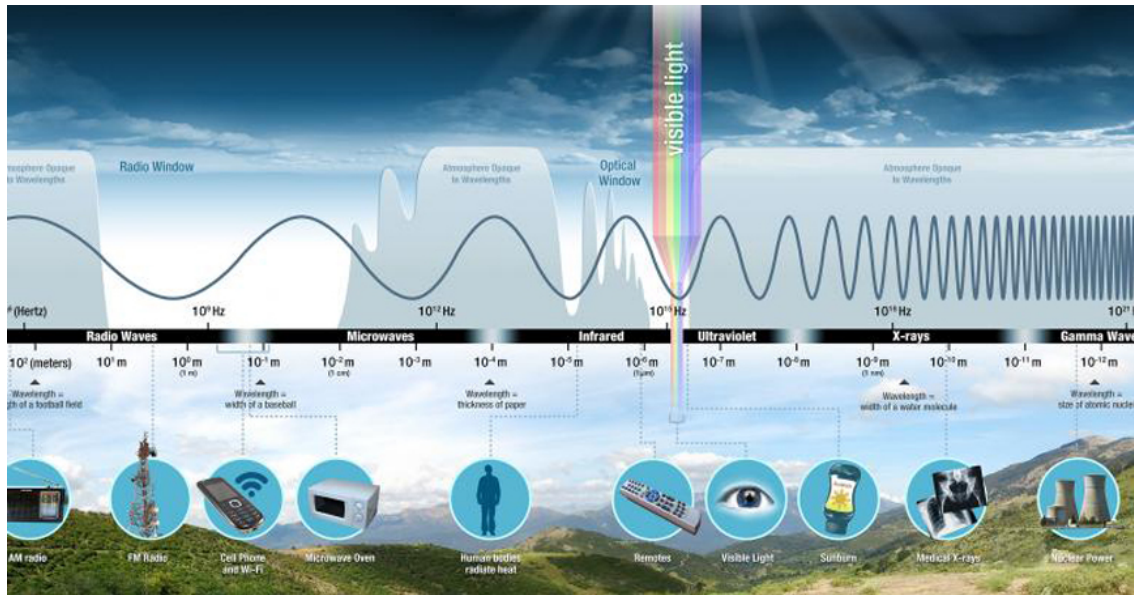
See the filament wire responding to the magnetism. The top and the left side vibrate. The bottom does not. The vibrating is happening because a horseshoe magnet is located near the filament wire segments outside the bulb. The turned on bulb makes an electric current flow in the filament wire, which produces a magnetic field around the wire. 60 cycles (110 Volt 60 Hz) flips the magnetism of the filament wire causing it to vibrate. It is this alternating of the opposing magnetic polarities located in the magnetic field of the horseshoe magnet that causes the filament wire to vibrate. We also have the fundamentals of a motor. In this case, the filament wire becomes the physical moving link and a mechanical advantage that creates the motor.



Light waves, the ones our eyes see, are an oscillating electromagnetic field. The long and short waves are also. The vertical (red) and horizontal (blue) magnetic fields all propagate through space at the speed of light. Maxwell's 4 equations are the vital mathematical formulas explaining and also proving the Electromagnetic Spectrum.



The Electromagnetic Spectrum is part of the laws of nature. This spectrum is the same on Earth as it is in our vast Cosmos. It is a truly remarkable achievement that our mind can comprehend this law of nature.



The multitude of frequencies in the Electromagnetic Spectrum has created a multitude of applications for mankind.