

Electromagnetic Spectrum

Electromagnetic (EM) waves carry energy and comprise transverse vibrations in electric and magnetic fields, not vibrating particles. They can travel through empty space (vacuum), without requiring any material to carry them. In vacuum, all EM waves travel at $299\,792\,458\text{ ms}^{-1}$ (the fastest possible speed). When passing through matter (e.g. air or glass), speed is reduced, though seldom less than half that when moving in a vacuum. Wave speed, frequency and length are related by the equation: **speed = frequency × wavelength**

The higher the frequency, the higher the energy.

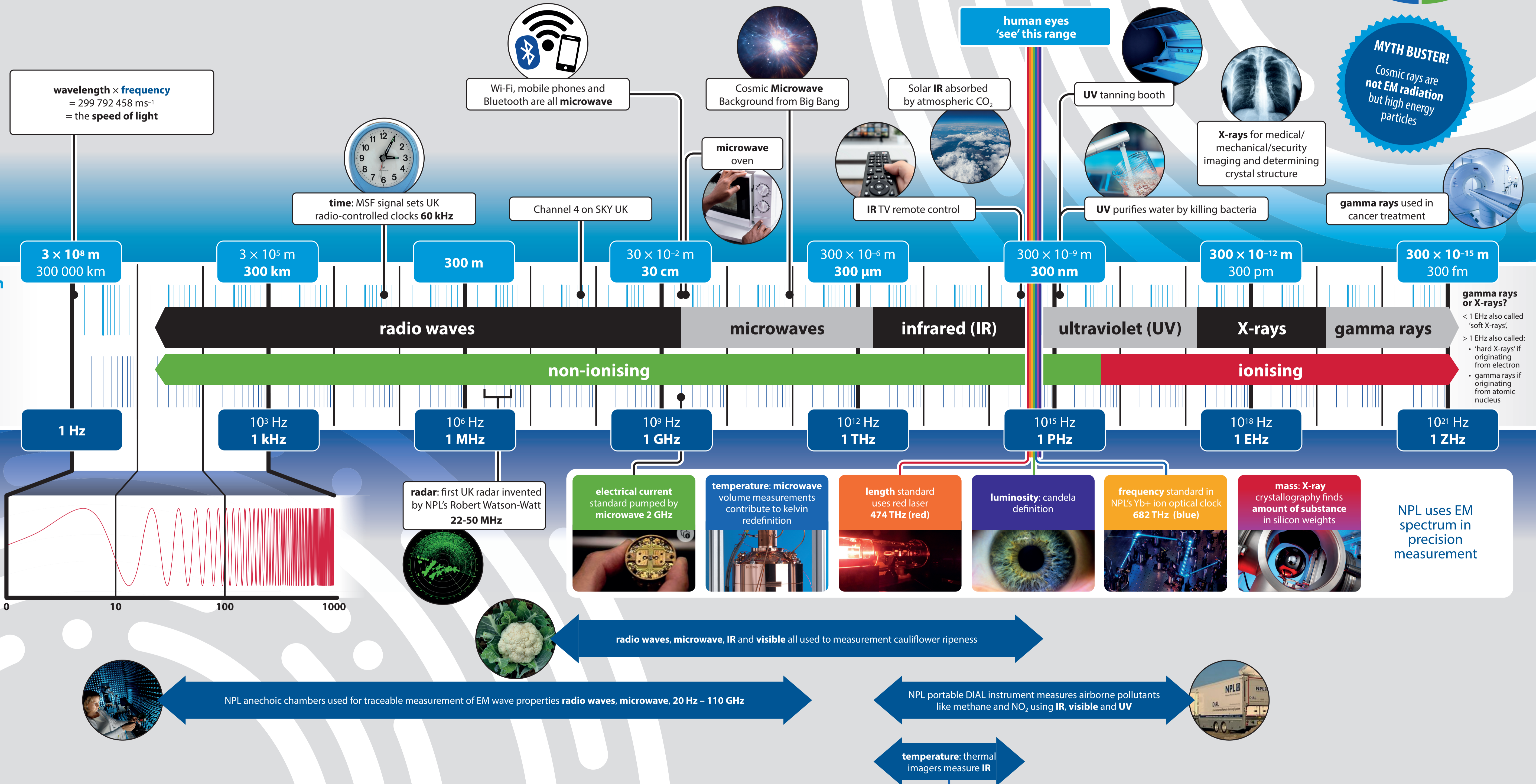
The graphic below shows how the spectrum has been divided into seven 'types' according to use.



EM Spectrum
USING IT

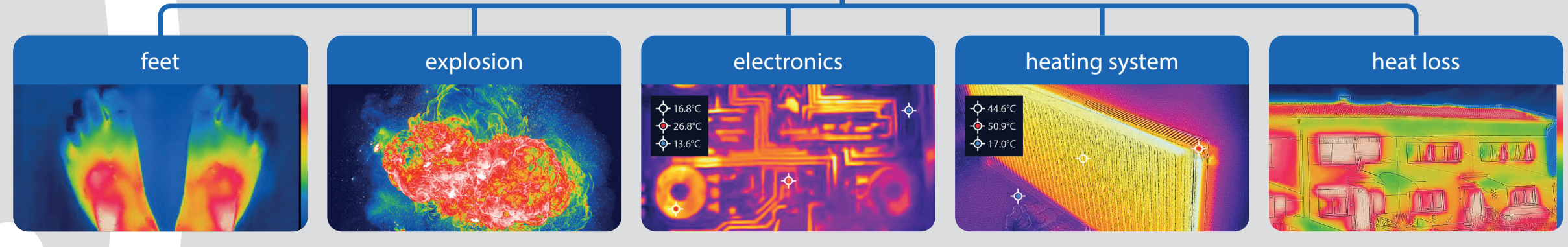
wavelength
(to 1 sig. fig.)

EM Spectrum
MEASURING WITH IT



Did you know? The National Physical Laboratory (NPL) evaluates the power of EM sources, the responsivity of EM detectors and uses many forms of the spectrum in high precision measurement.

The values used are correct at the time of going to press



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