

# Living in the Past

*Historical perspective*



## The discovery of radio waves

In 1864, Scottish mathematician and theoretical physicist [James Clerk Maxwell](#) proposed a comprehensive theory of the interaction between electricity, magnetism, and their associated invisible fields, often thought to be well beyond his time. He predicted that not only were they and visible light different manifestations of the same thing, but that they can also exist as changing fields, or waves, yet nobody had found a way to prove their existence.

When [Heinrich Hertz](#), a budding student of science and engineering, applied for his doctorate (22 years old) at the University of Berlin, professor [Hermann von Helmholtz](#), known for his work in physics and physiology, took Hertz under his wing, to research and demonstrate proof of Maxwell's theories. At one point in 1886, Hertz somewhat accidentally discovered that a Leyden jar discharging into a coil resulted in a spark at another coil several feet away. This was his first evidence that Maxwell's theories could be demonstrated, and so he created his first crude radio "transmitter," (and therefore, *the first antenna*), part of which is shown here. The "receiver" was nothing more than a metal loop, but paved the way for Hertz to better explore the phenomenon.



*A young Heinrich Hertz*

### Further research

By 1889, after refining his equipment and his observations, Hertz was able to conclusively prove that the effects he was observing really were the results of Maxwell's predictions. Because of Hertz's published findings, many began to call these electric—magnetic wave combinations *Hertzian waves*, which today we refer to as *radio waves*. Hertz further demonstrated that Maxwell predicted correctly, that these electromagnetic waves can be manifested as radio waves and visible light, both with the same speed, polarization, and reflection properties.



While we credit Hertz as the first to demonstrate or detect radio waves, there might have been [another who did the same](#) earlier, but never published his findings. Even Hertz himself declared, *It's of no use whatsoever...this is just an experiment that proves Maxwell was right*. When asked about the possible applications of these waves, Hertz replied, *Nothing, I guess*. Today, our entire wireless (cell phone, television, wifi, bluetooth, satellite, and yes, amateur radio) empire is built on the application of those Hertzian waves. In honor of Hertz and his contribution to the science of electrodynamics, the SI unit of frequency, *Hertz* (abbreviated Hz) is named after him, and means *cycles per second*.

