Introduction to EE 217

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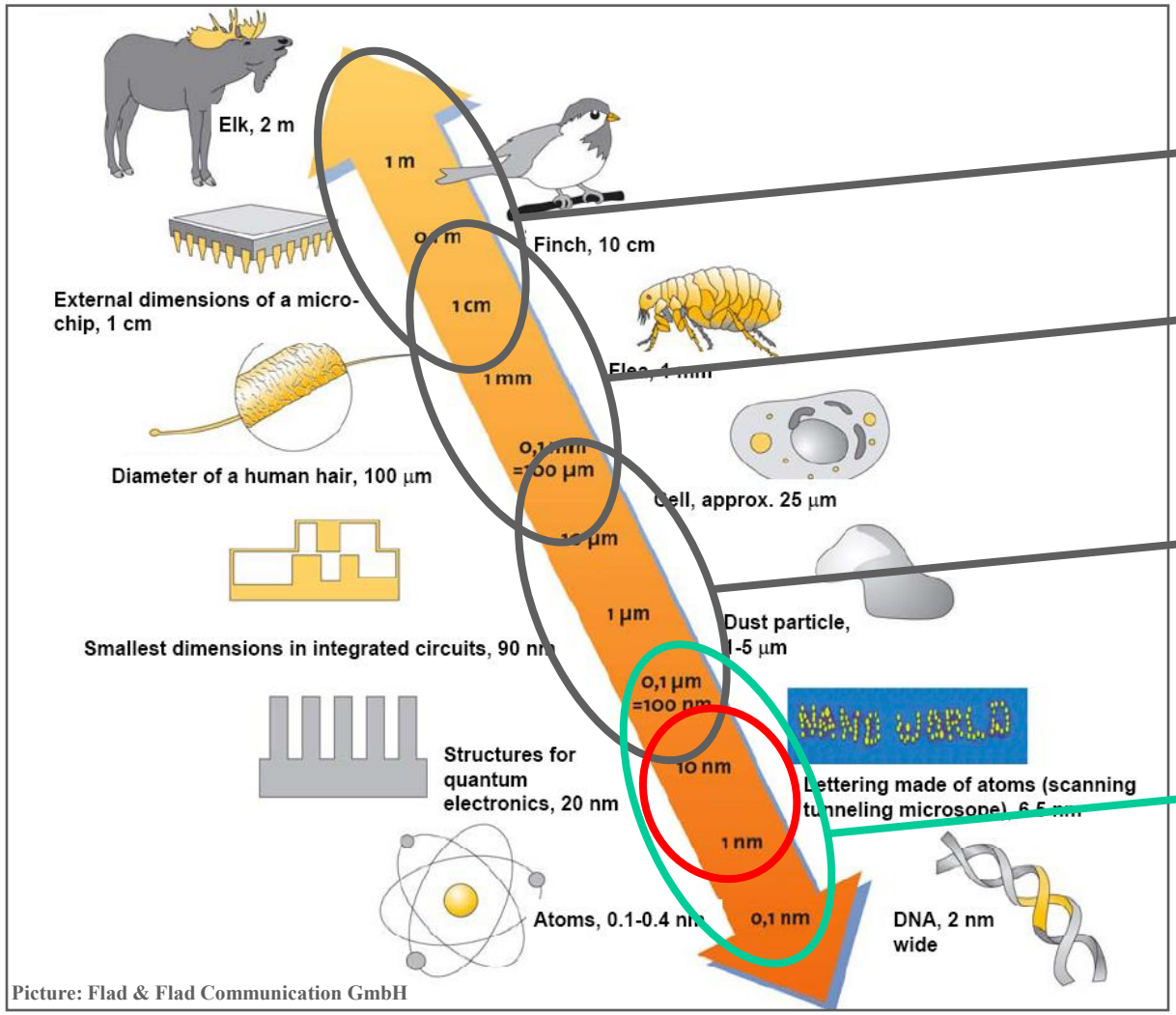
Imaging & Diagnostics at different scales need different tools



Overview of various imaging modalities

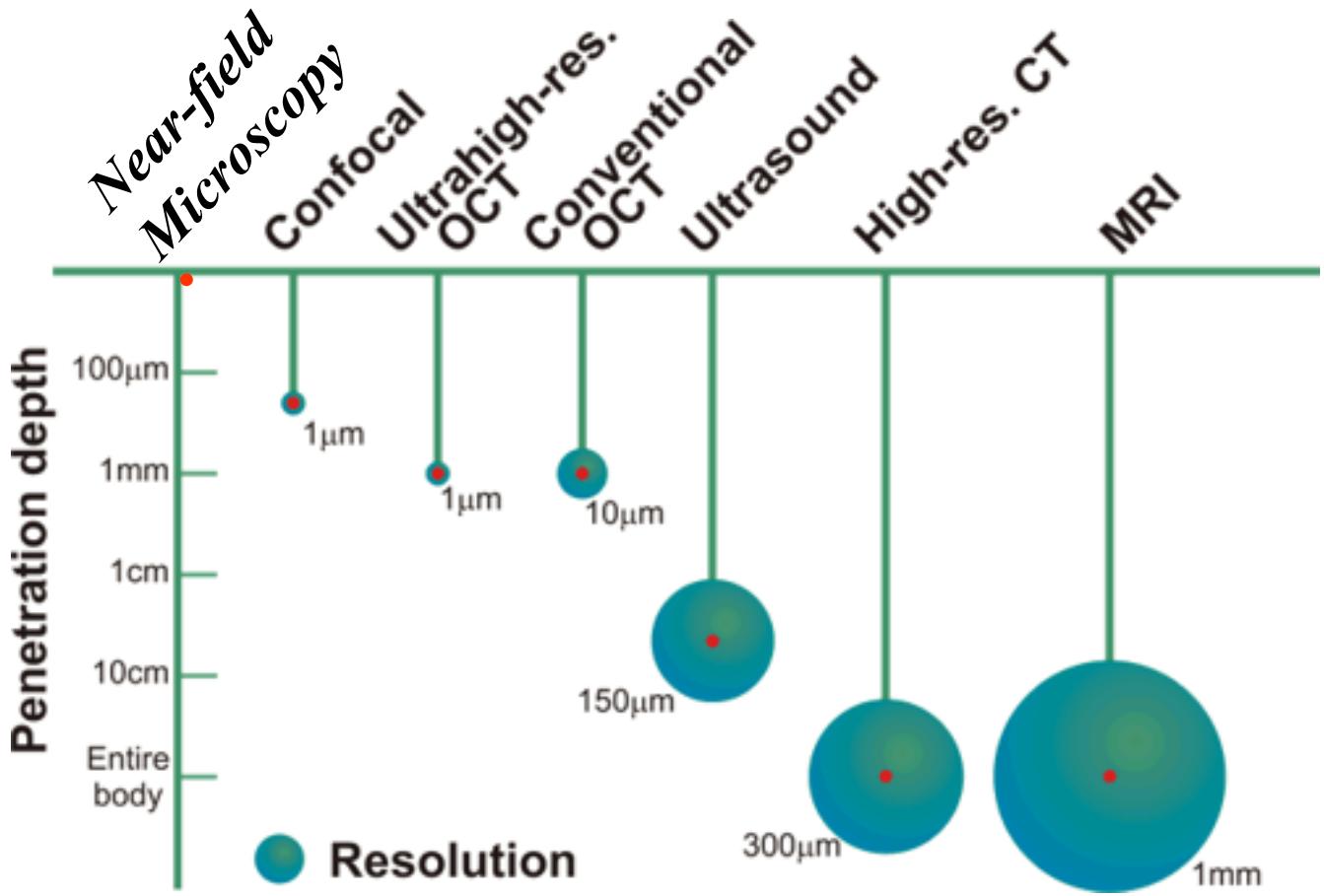
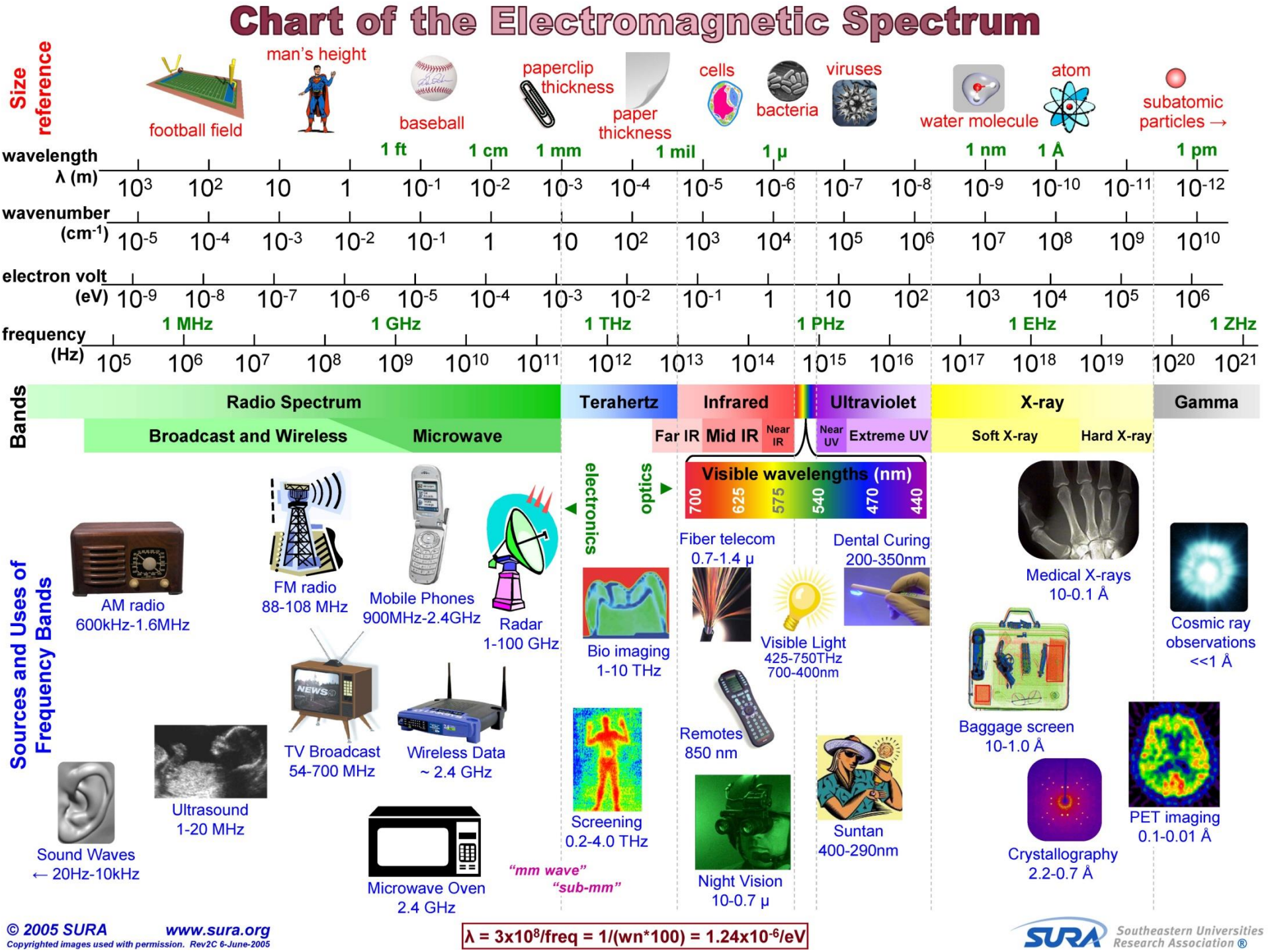


Chart of the Electromagnetic Spectrum



$\lambda = 3\times10^{8}/\text{freq} = 1/(\text{wn}*100) = 1.24\times10^{-6}/\text{eV}$

Brief History of Microscopy

- 1611 **Kepler** suggests a way of making a compound microscope.
- 1655 **Hooke** uses a compound microscope to describe small pores in sections of cork he calls “cells”.
- 1674 **Leeuwenhoek** reports his discovery of protozoa. He sees bacteria for the first time nine years later.
- 1838 **Schleiden** and **Schwann** propose the cell theory, stating that the nucleated cell is the unit of structure and function in plants and animals.
- 1876 **Abbé** analyzes the effects of diffraction on image formation in the microscope and shows how to optimize microscope design.
- 1882 **Koch** uses aniline dyes to stain microorganisms and identifies the bacteria that cause tuberculosis and cholera.
- 1886 **Zeiss** makes a series of lenses, to the design of **Abbé**, that enable microscopists to resolve structures at the theoretical limits of visible light.
- 1898 **Golgi** first sees and describes the Golgi apparatus by staining cells with silver nitrate.
- 1932 **Zernike** invents the phase-contrast microscope.
- 1952 **Nomarski** devises and patents the system of differential interference contrast for the light microscope that still bears his name.
- 1984 **Agard and Sedat** use computer deconvolution to reconstruct *Drosophilia* polytene nuclei.
- 1988 Commercial confocal microscopes come into widespread use.
- 1994 **Chalfie** and collaborators introduce green fluorescent protein (GFP) as a marker in microscopy.