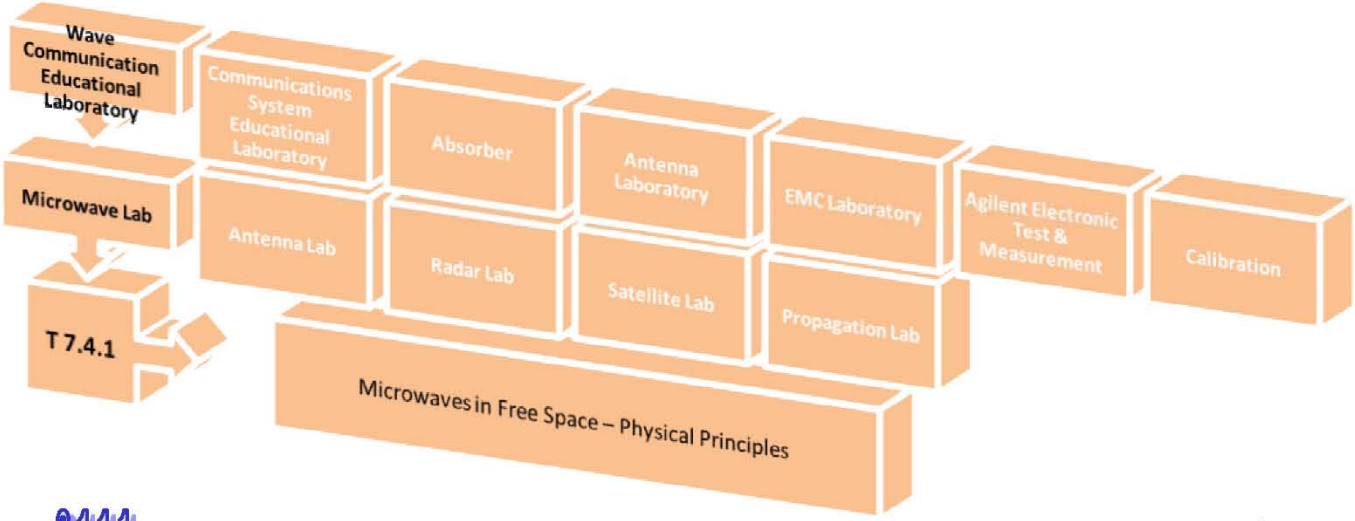
The propagation of microwaves in air takes place according topseudo-optical laws. The free-space experiment illustrated here is typical for this equipment set. It consists of a microwave transmitter and receiver and sometimes an element which influences the beam's transmission (in this case a polarizer).

Topics

- Characteristics of the Gunn element
- The E-field probe
- The selective measuring amplifier
- Measuring polarization
- Field in front of a horn antenna
- Interference and standing waves
- Reflection and transmission
- Absorption
- Diffraction
- Flexible waveguide
- Doppler effect



Microwaves – almost like light...

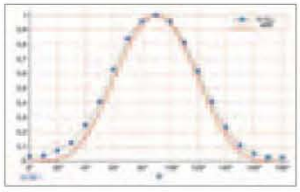
Microwaves in free space exhibit optical properties. This course investigates known phenomena like e.g. polarization, diffraction, reflection.

In detail: the E-field probe

A good RF field probe may not interfere with the field being measured. This is why metall conductors are not permitted in the vicinity of the detector. In particular, expansive reflectors are a total RF sin. Reflections caused there would immediately distort the original field. Therefore our E-field probe operates with metal-free feeds made of highly-resistive graphite.

Commercial free-space transmission with microwaves

Cellular networks are conquering the world. Their air interfaces depend strongly on microwave and antenna technology.



Polarizing microwaves

Malus's law describes intensity distribution in conjunction with the polarizer's orientation. Since the E-field probe itself is directionally sensitive in its operation, a dependency approximating $\approx \sin^4 \vartheta$ results.

EQUIPMENT SET LIST

Microwaves in Free Space – Physical Principles

QUANTITY	CAT. NO.	DESCRIPTION
1	737 01	Gunn Oscillator
1	737 021	Gunn Power Supply with SWR Meter
1	737 05	PIN Modulator
1	737 06	Isolator
1	737 21	Large Horn Antenna
1	737 27	Physics Microwave Accessories I
1	737 35	E-Field Probe
1	524 010SUSB	CASSY-Starter USB
1	568 722	Book: Microwaves in Free Space – Physical Principles