Personal Magnetic Field Exposure by Electronic Article Surveillance (EAS) Devices

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EAS Systems
EAS Systems
EAS Technologies (1)

Electromagnetic (EM)
typ. up to 20 kHz

Low-frequency (LF):
typ. 58 kHz

Radio-frequency (RF):
typ. 8.2 MHz

Survey in Germany and Austria

n = 492
EAS Technologies (2)

Low Frequency (LF):
typ. 58 kHz,
pulsed magnetic field

Radiofrequency (RF):
typ. 8.2 MHz
„pulse-listen“ or
„sweep“ (typ. 7.5-8.7 MHz, pulsed or CW)
Numerical computations of induced current density and electric field strength inside the tissues
Computational Results (1)
comparison with ICNIRP 1998 Basic Restrictions

**LF- Systems**
- Duke, lateral, 20 cm
- Duke, dorsal, 10 cm
- Roberta, dorsal, 3.5 cm

**RF-Systems**
- ICNIRP 1998 Limits (RMS)
  - Occup. = 82 A/m²
  - Occup. = 16.4 A/m²
Computational Results (2)
comparison with ICNIRP 2010 Basic Restrictions

LF-Systems

RF-Systems

<table>
<thead>
<tr>
<th>LF-M1</th>
<th>LF-M2</th>
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Concerning Implants

- Potential of functional interference for Pacemakers and ICDs known
- What about concentration of induced currents close to metallic parts?

![Deep Brain Stimulator](image1.png)

![Spinal Cord Stimulator](image2.png)

![Hip Joint](image3.png)

![Cochlea Implant](image4.png)
Concerning Implants
Thank You!

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Measurement Results (1)

LF-Systems

![Graph showing measurement results for LF-Systems. The graph compares peak and RMS values at different distances from the systems (max @ 10cm, max @ 20cm, max @ 35 cm, max @ 50 cm) and includes the ICNIRP 1998 limits for occupational and general public exposure.]
Measurement Results (2)

RF-Systems


PEAK

RMS

max @ 10cm
max @ 20cm
max @ 35 cm
max @ 50 cm
avg. acc. to EN 62369-1
Measurement Results (3)

LF-Systems

Variations between different installations:
measured at reference point h=85 cm, d = 20 cm
Measurement Results (4)

RF-Systems

Variations between different installations: measured at reference point h=85 cm, d = 20 cm