

Swiss TPH



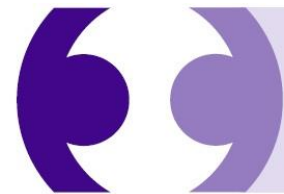
Swiss Tropical and Public Health Institute
Schweizerisches Tropen- und Public Health-Institut
Institut Tropical et de Santé Publique Suisse

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Department of Epidemiology and Public Health
Environmental Exposures and Health
Physical Hazards and Health

Integrated electromagnetic field exposure assessment: modelling, personal measurements, questionnaires, mobile phone traffic data and apps

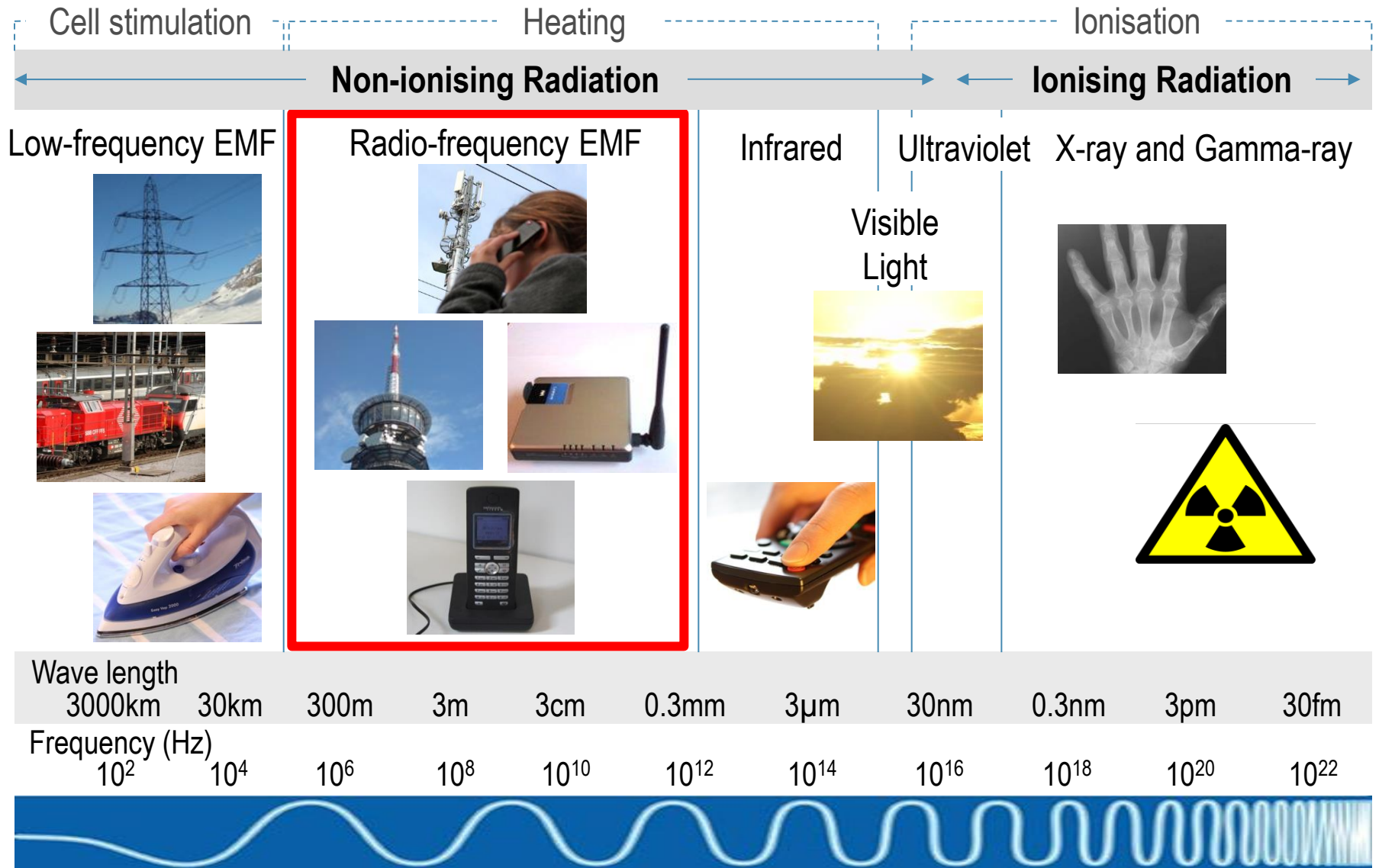
Anna Schöni / Katharina Roser



**SWISS PUBLIC HEALTH
CONFERENCE 2013
ZURICH**



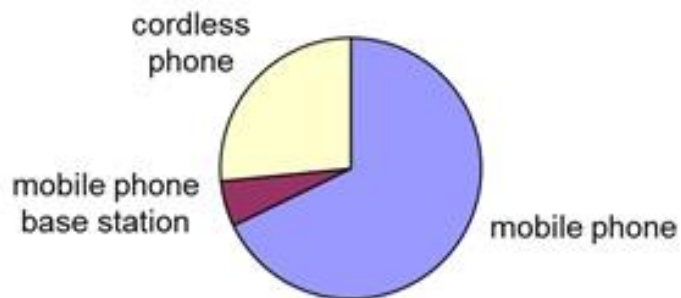
Background I



Background II

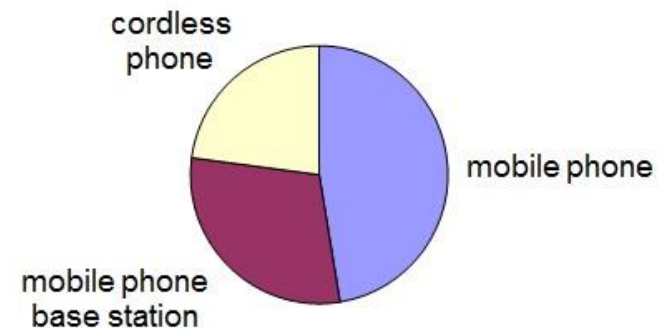
Near-field:

- Mobile phones
- Cordless phones (DECT)



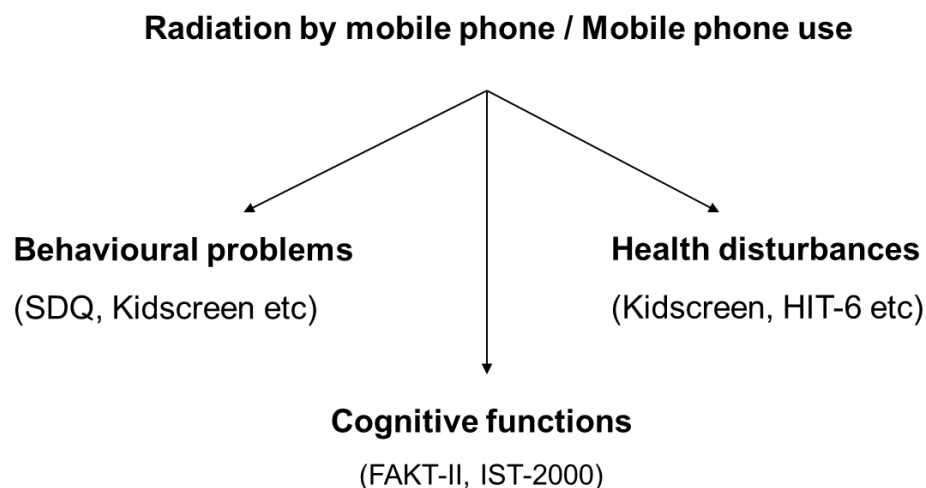
Far-field:

- Broadcast transmitters (radio (FM), TV)
- Mobile phone base stations
- W-LAN



HERMES

(Health Effects Releted to Mobile phonE use in adolescentS)



- prospective cohort study
- baseline investigation (June – December 2012), N = 439
- follow-up investigation (June – December 2013)
- Personal measurements in 100 adolescents

Aims

1. *Differentiation* between radiation and mobile phone training effects.

2. *Prediction* of the mean RF-EMF exposure for the study population.

Mobile phone networks

Differentiation

- 3 different mobile phone networks in Switzerland →

- GSM (Global System for Mobile Communications), 2G
- UMTS (Universal Mobile Telecommunications System), 3G
- LTE (Long Term Evolution), 4G



→ Average output power and thus exposure to its radiofrequency electromagnetic fields (RF-EMF) for mobile phones working on the GSM network is 100-500 times higher than on the UMTS network.


→ Exposure of RF-EMF does not only depend on duration but also on the network being used.

Mobile phone traffic data (N=199)

Differentiation

- Recording of data: 9.9 months per participant

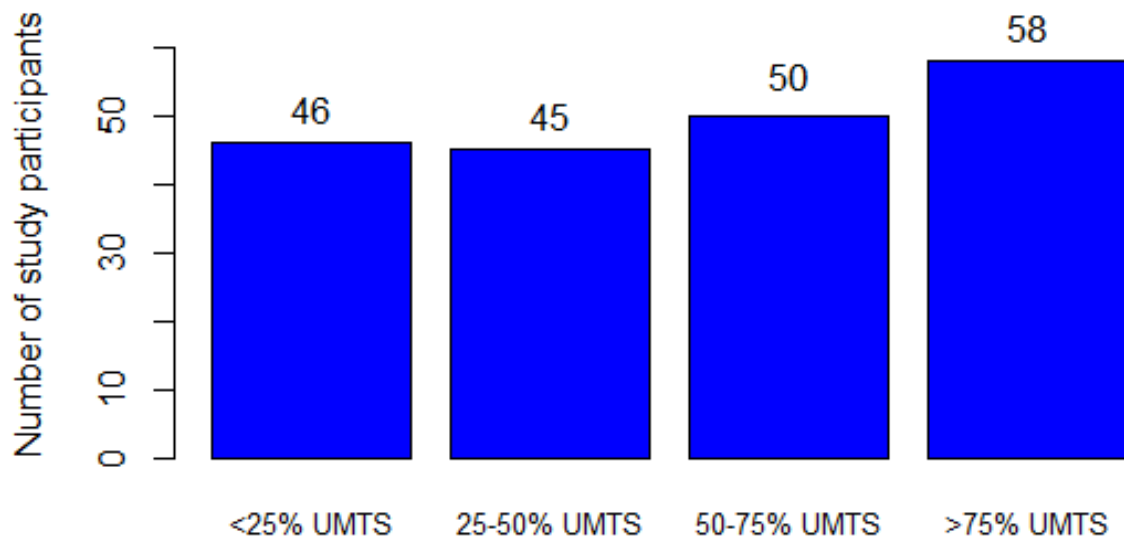
	Number per month	Mean	Percentiles			Max
			25%	50%	75%	
	Incoming calls	11.3	2.6	6.5	14.4	107.9
	Outgoing calls	14.4	3.1	6.4	17.1	128.7
	Total calls	25.6	6.6	14.1	32.8	210.1
	Incoming SMS	99.2	38.9	66.2	110.6	1235.6
	Outgoing SMS	69.6	20.7	36.1	76.9	777.7
	Total SMS	168.8	65.9	108.9	188.3	1385.1

	Minutes per month	Mean	Percentiles			Max
			25%	50%	75%	
	Duration of incoming calls	47	3	11	30	2869
	Duration of outgoing calls	29	2	6	21	689
	Duration of total calls	76	7	19	57	2922

3000 minutes = 50 hours

Distribution of the network being used

Differentiation



N=199

→ Average output power of mobile phones working on the UMTS network is lower than on the GSM network.

Conclusions

Differentiation

- Considerable interindividual differences in the network being used → ideal situation to differentiate between radiation and mobile phone training effects.

Aims

1. *Differentiation* between radiation and mobile phone training effects.

1. *Prediction* of the mean RF-EMF exposure for the study population.

Exposimeter

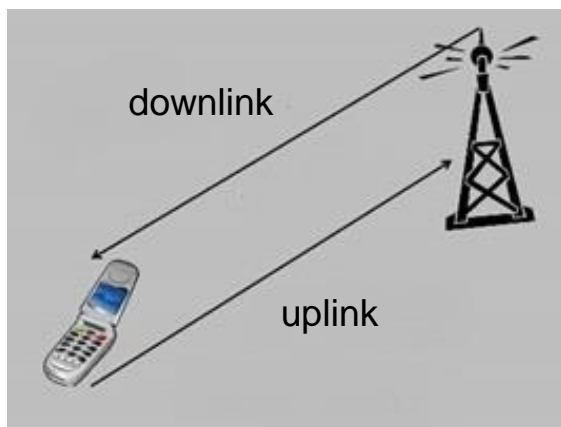
Prediction

How radiofrequency electromagnetic fields (RF-EMF) are measured



Exposimeter: portable measurement device

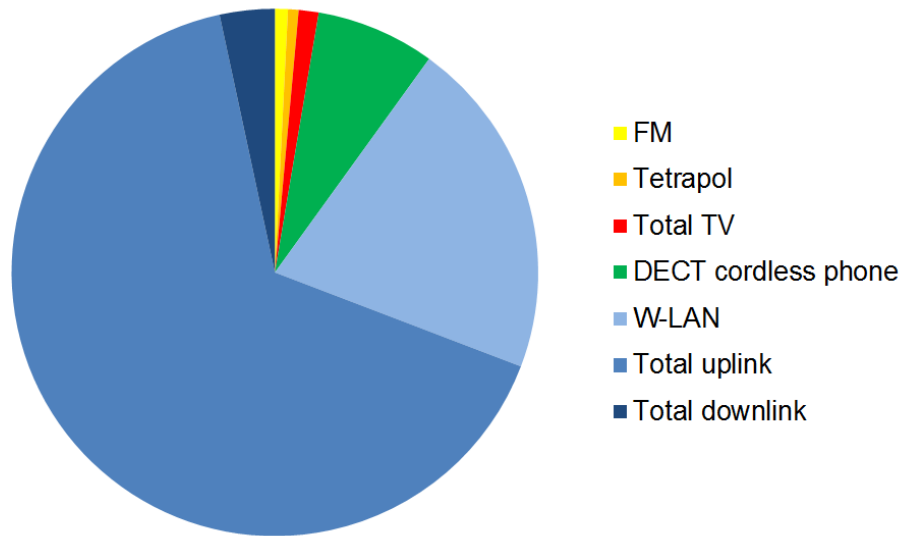
- DECT (cordless phone)
- W-LAN (wireless local area network)
- broadcast transmitters
 - radio (FM)
 - TV
- uplink (mobile phone handset to base station)
- downlink (base station to mobile phone handset)



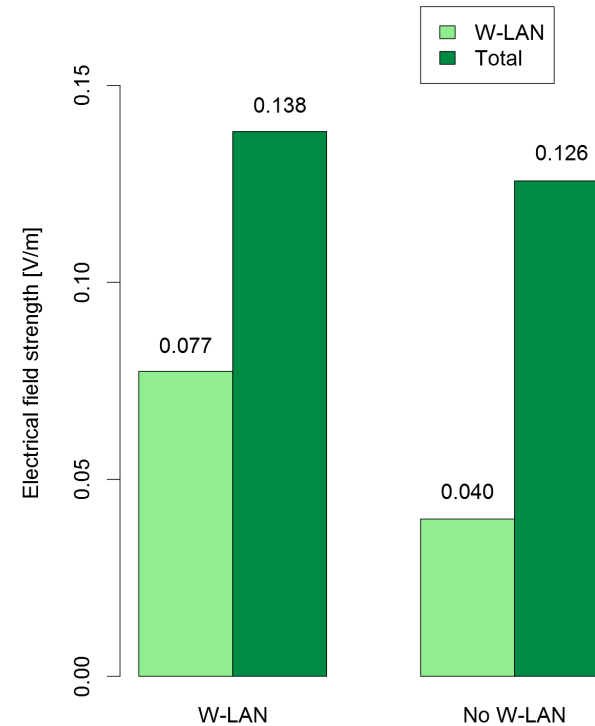
RF-EMF measurements in the school buildings

Prediction

- Measurements in 22 schools



- W-LAN: 10 schools

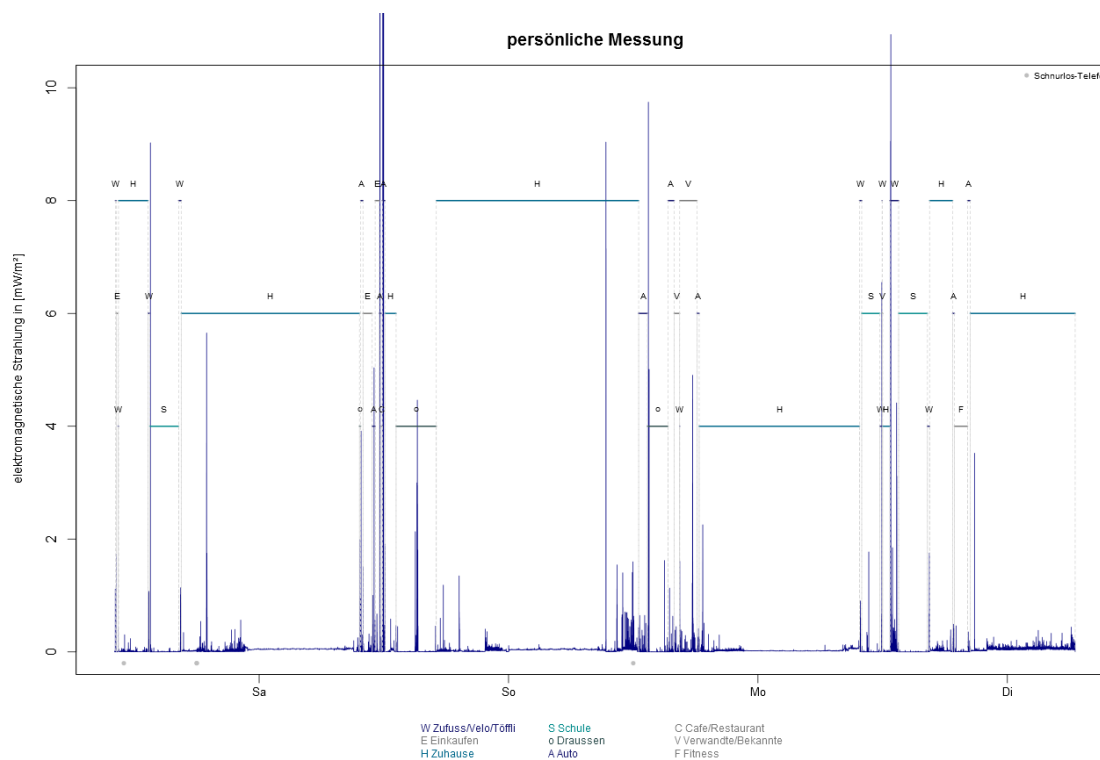


a lot of uplink although mobile phones should be switched off during school time

Personal measurements

Prediction

- Exposimeter (three days)
- time-activity diary app: location, activities and position (GPS)



Conclusions

Prediction

- Presence or absence of W-LAN in the school may be relevant for the total RF-EMF exposure.
- Exposure from the uplink plays a major role in the total RF-EMF exposure, although in most of the schools the mobile phones should be switched off during school time.



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Thanks for your attention!