

" EMF Concerns"

Modiin, Israel, 25 March 2019

Dr. Haim Mazar (Madjar)

ITU-D, R and T intersectoral activities on RF-EMF;
co-chair ITU-D Question 7/2.

Vice Chair ITU-Radio Study Group 5 (terrestrial services)

<http://mazar.atwebpages.com/>

צוות ארגון גמלאי צה"ל

TZEVET-ISRAEL DEFENCE FORCES VETERANS ASSOCIATION



held workshop on modern policies, guidelines, regulations and assessments of human exposure to RF-EMF, including 5G and Radio human hazards. Dr. Mazar served as convener.



ITU, Geneva
10 Oct. 18

ITU Workshop on "5G, EMF & Health" (Warsaw, Poland, 5 December 2017)

The presentation is found at ITU website

https://www.itu.int/en/ITU-T/Workshops-and-Seminars/20171205/Documents/S3_Haim%20Mazur.pdf

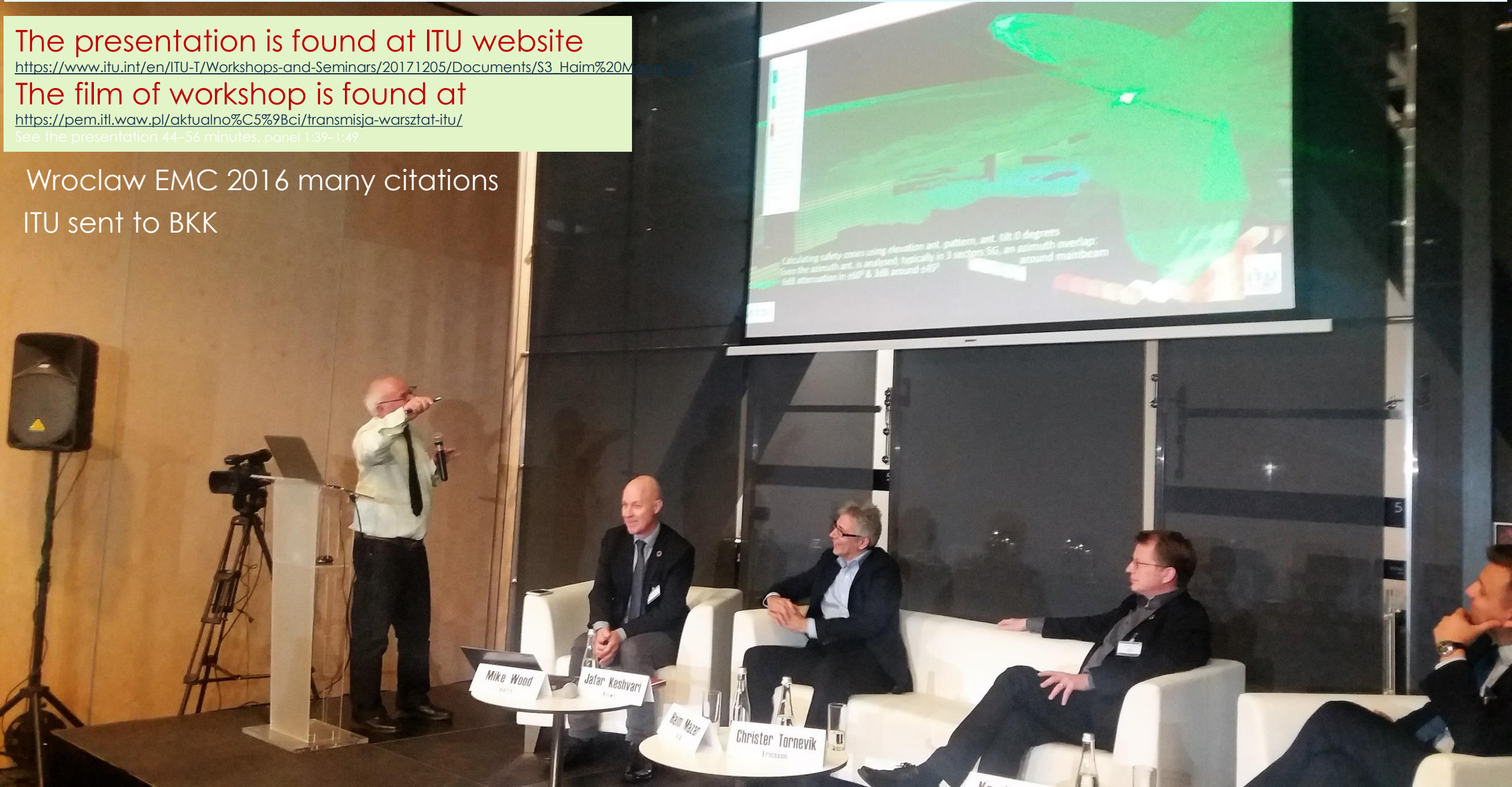
The film of workshop is found at

<https://pem.itl.waw.pl/aktualno%C5%9Bci/transmisja-warsztat-itu/>

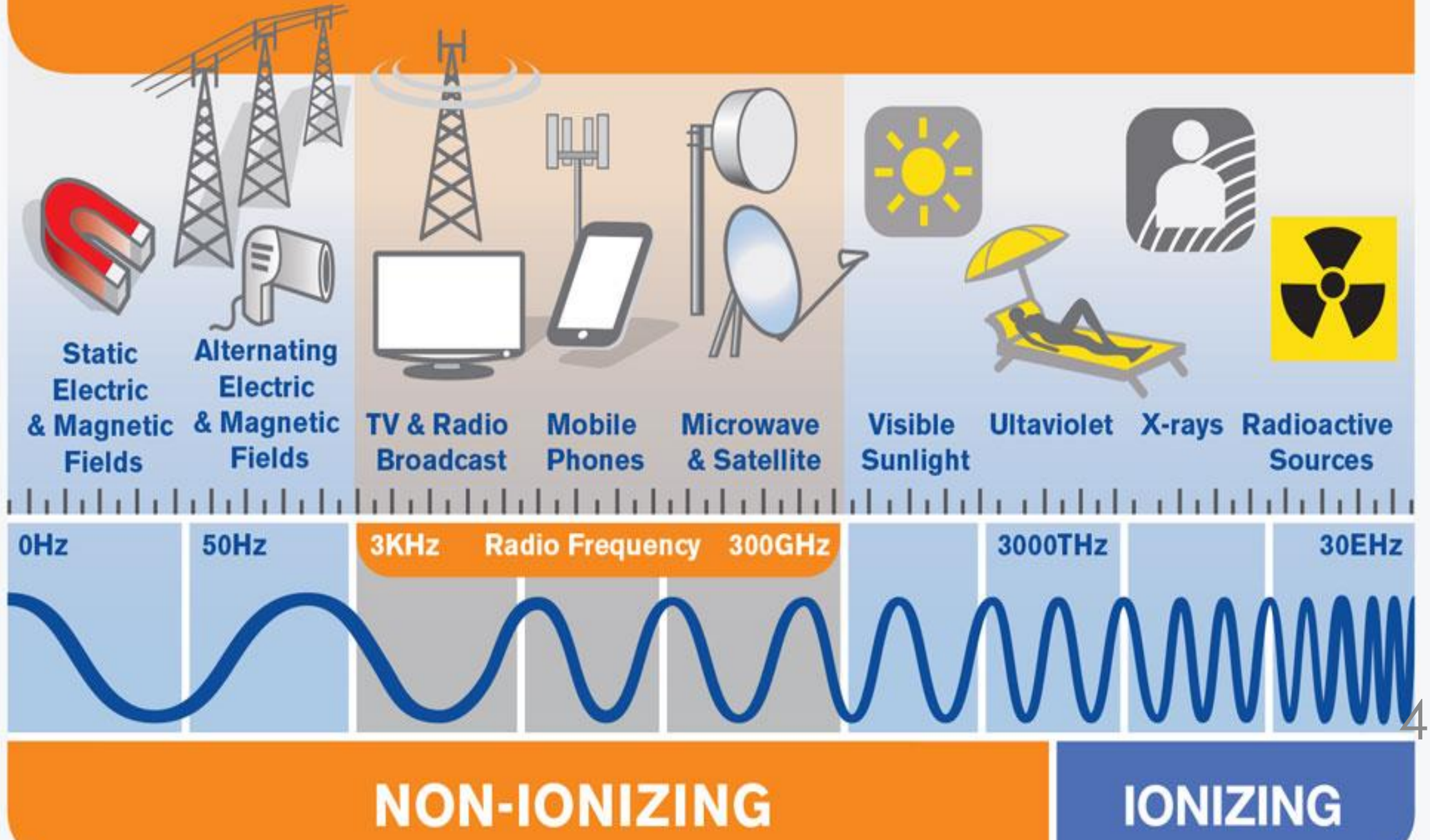
See the presentation 44–56 minutes, panel 1:39–1:49

Wroclaw EMC 2016 many citations

ITU sent to BKK

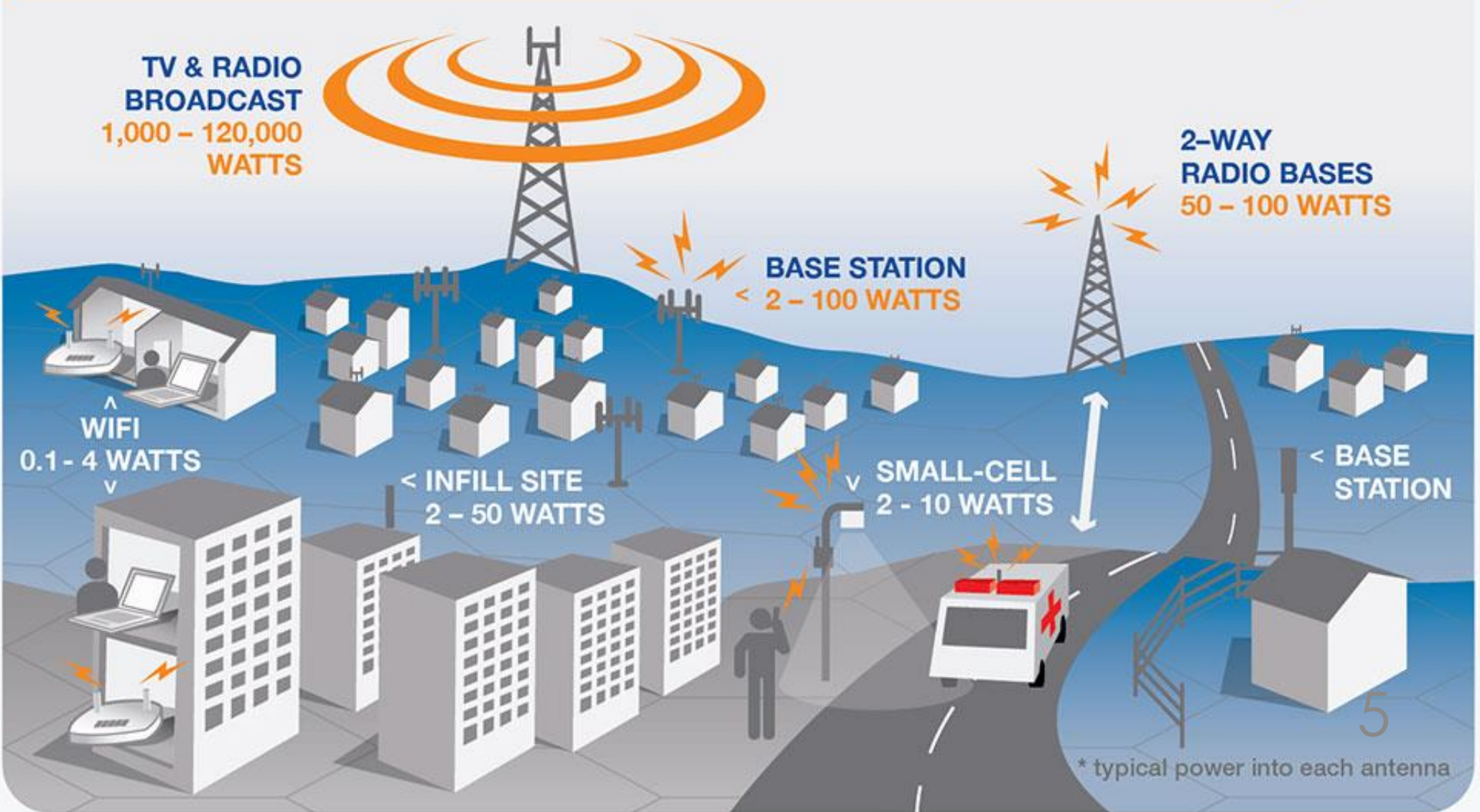


THE ELECTROMAGNETIC SPECTRUM



Source: ITU-T Report 2014 EMF Considerations in Smart Sustainable Cities

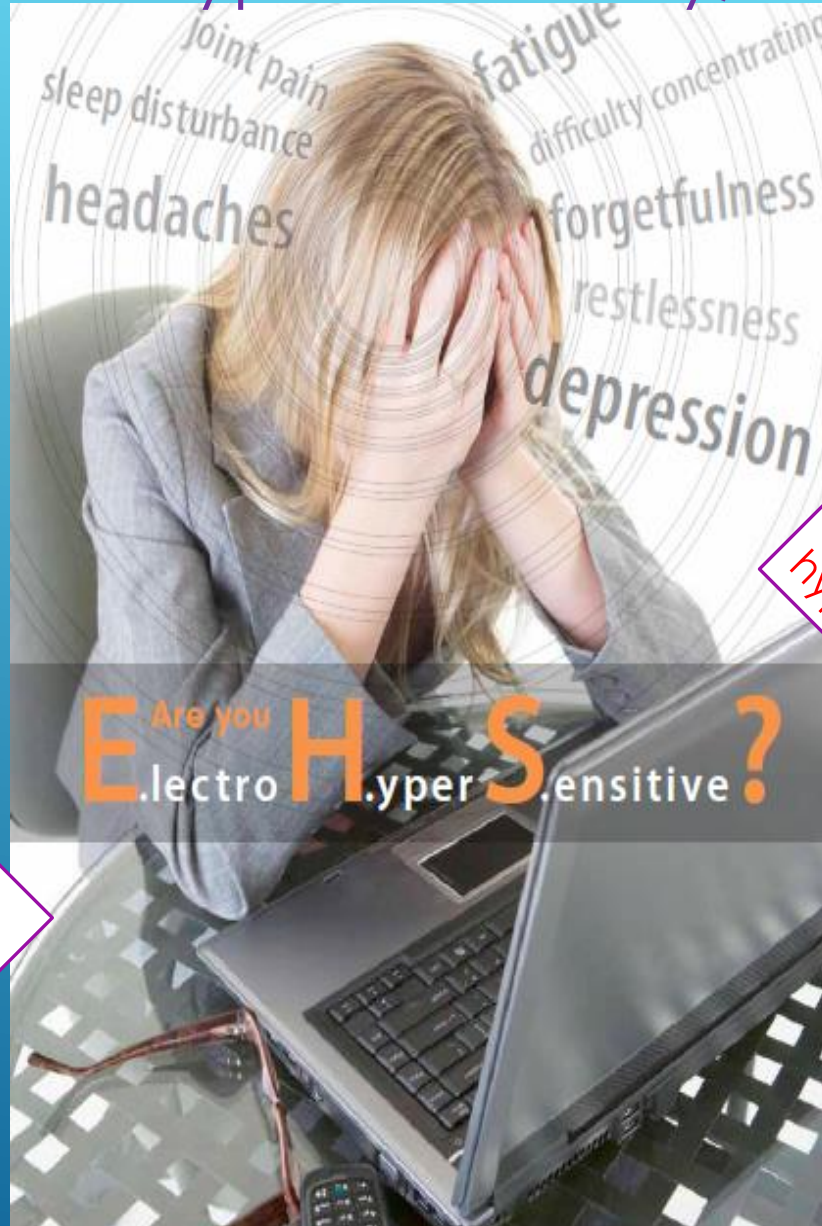
RADIO COMMUNICATIONS IN THE COMMUNITY



Electromagnetic Hyper-Sensitivity; electro-phobia

Subjective phobia, phantom risk (?!)

Precautionary Principle: billions of cellular users phones and millions of base-stations worldwide



Type I error imposes regulatory restrictions on factors that turn out to be harmless

Type II error: acceptance of a null hypothesis that turns to be false

There is no evidence of causality between pains and RF exposure

Hillel (ex) Radio
Antenna: Closed
due to
hypersensitivity



Yehuda Halevi, TelAviv; Israel



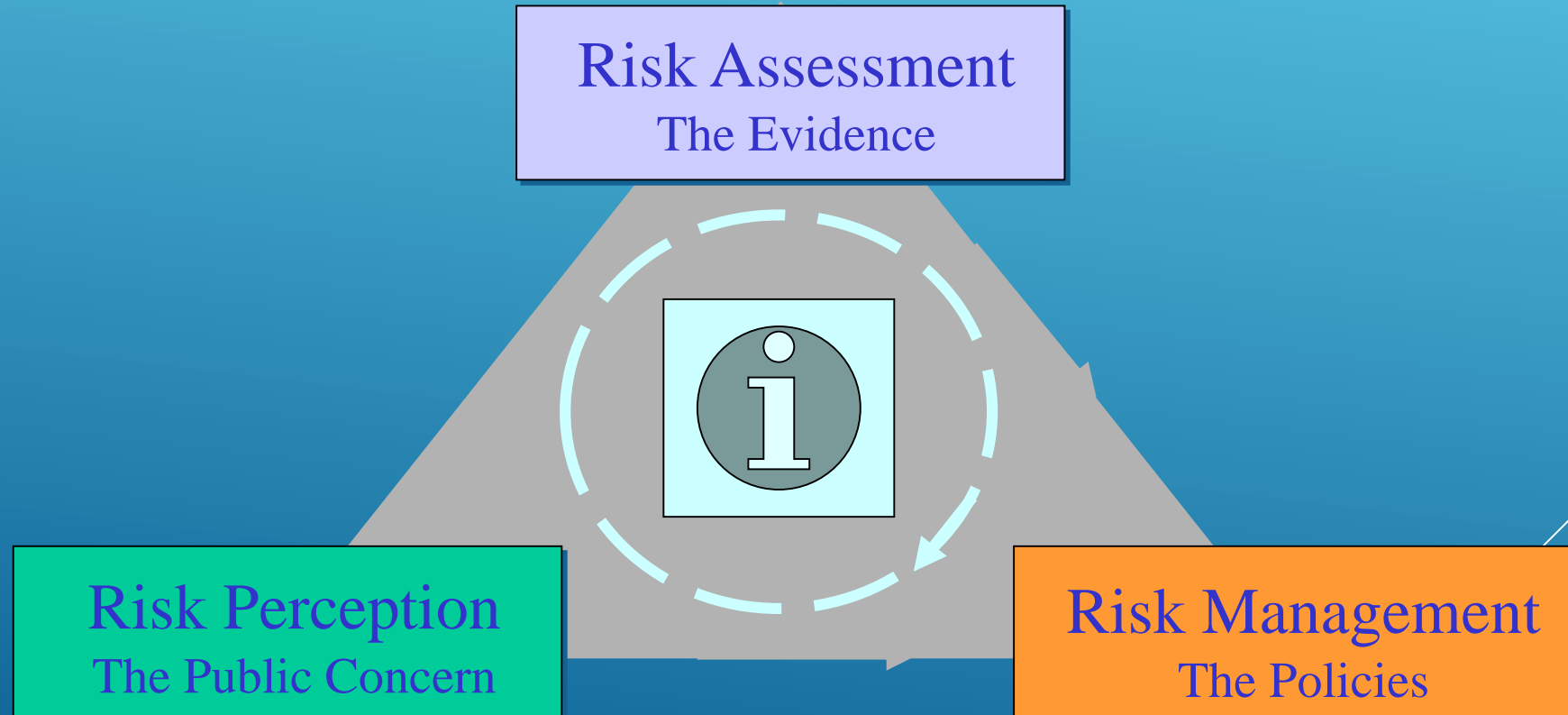
11 antennas →

Antenna ↓

0.75 m antennas

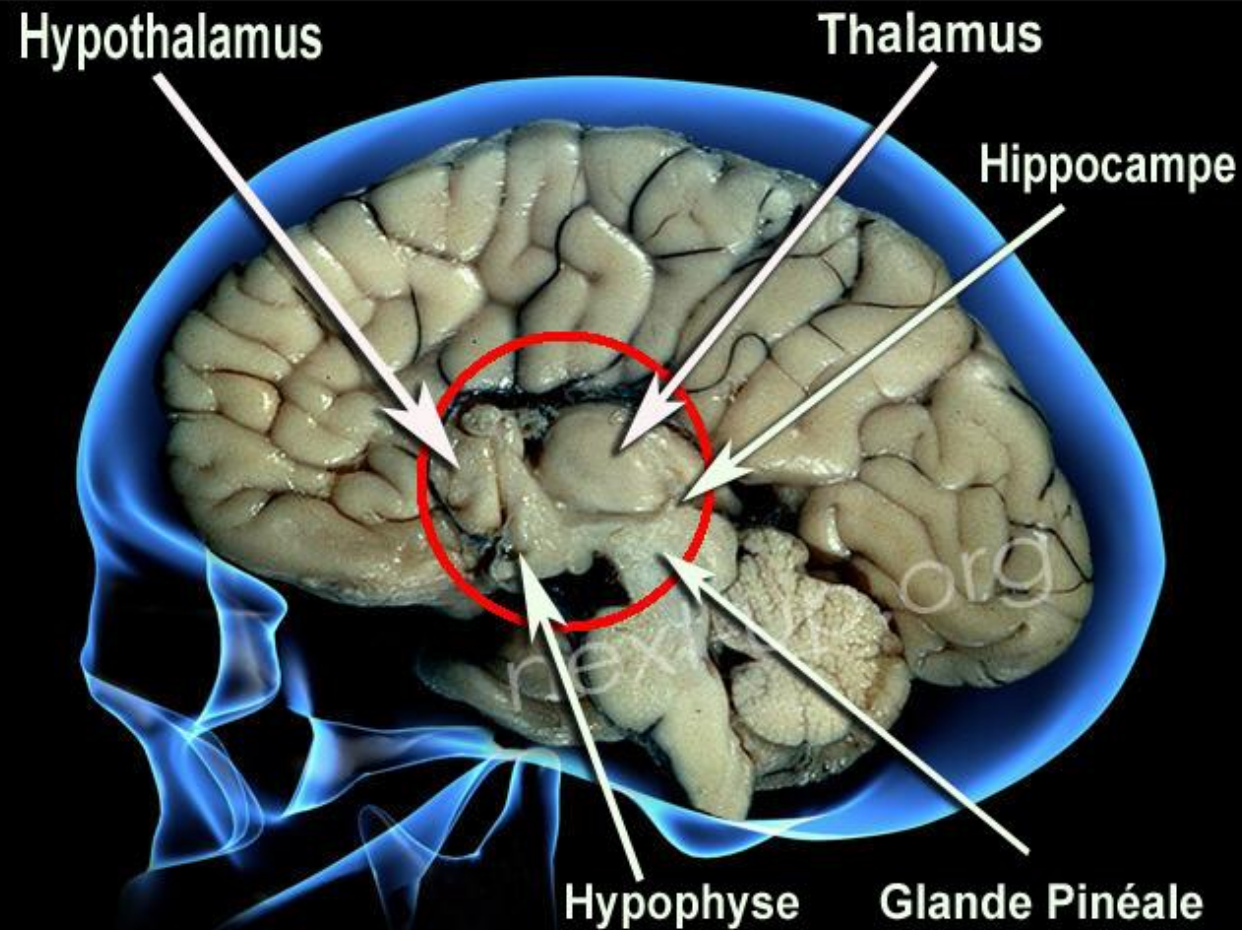
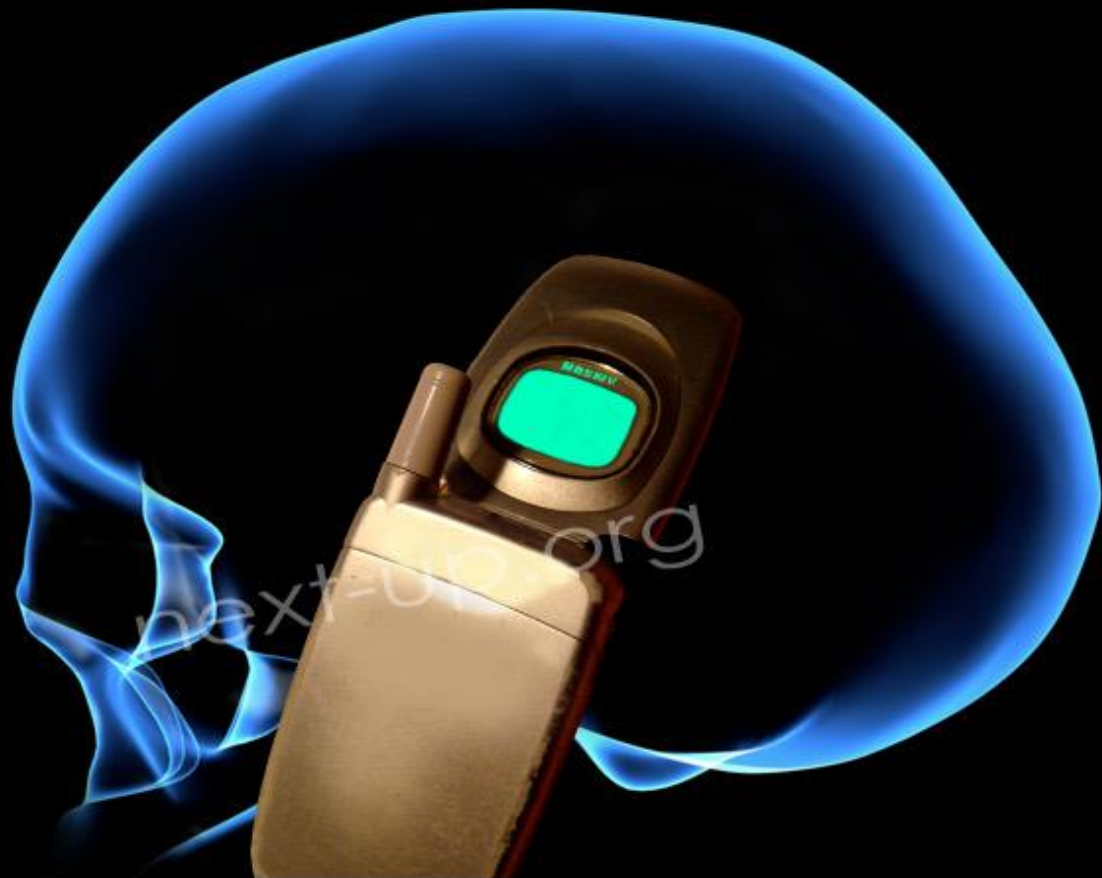
Electromagnetic Radiofrequency Fields; National Management and Regulatory Approaches

- **Mobile phone use is ubiquitous with an estimated 4.6 billion subscriptions globally**
- **To date, no adverse health effects have been established from RF fields exposures**
- **Studies are on-going to assess potential long-term effects of wireless technologies**



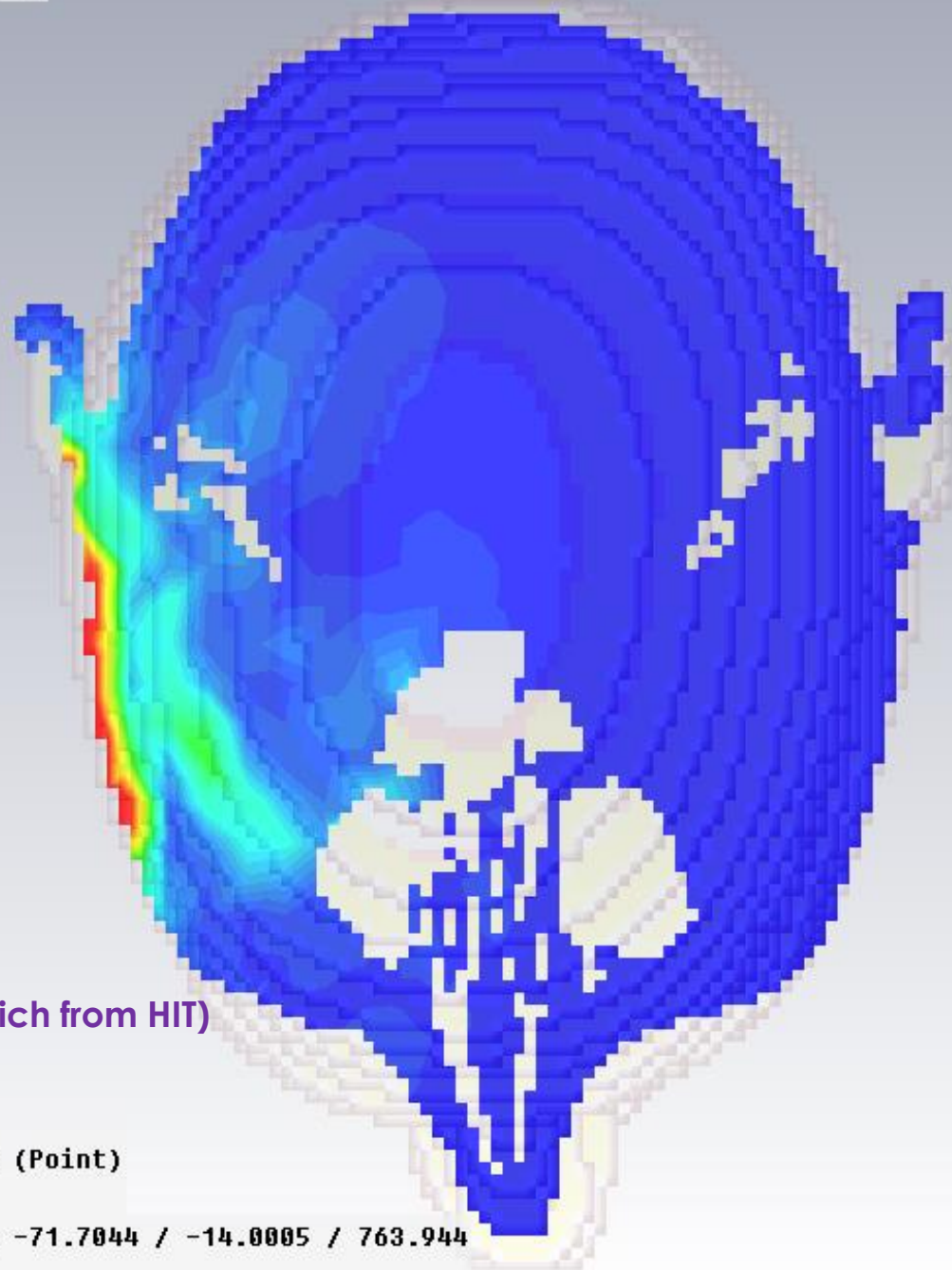
Base Station Antenna Pattern: azimuth
& elevation (Dr. Zamir Shalita)





Brain is Exposed to Cellphone Radiation (Dr. Shalita)

Clamp to range: (Min: 0/ Max: 1)



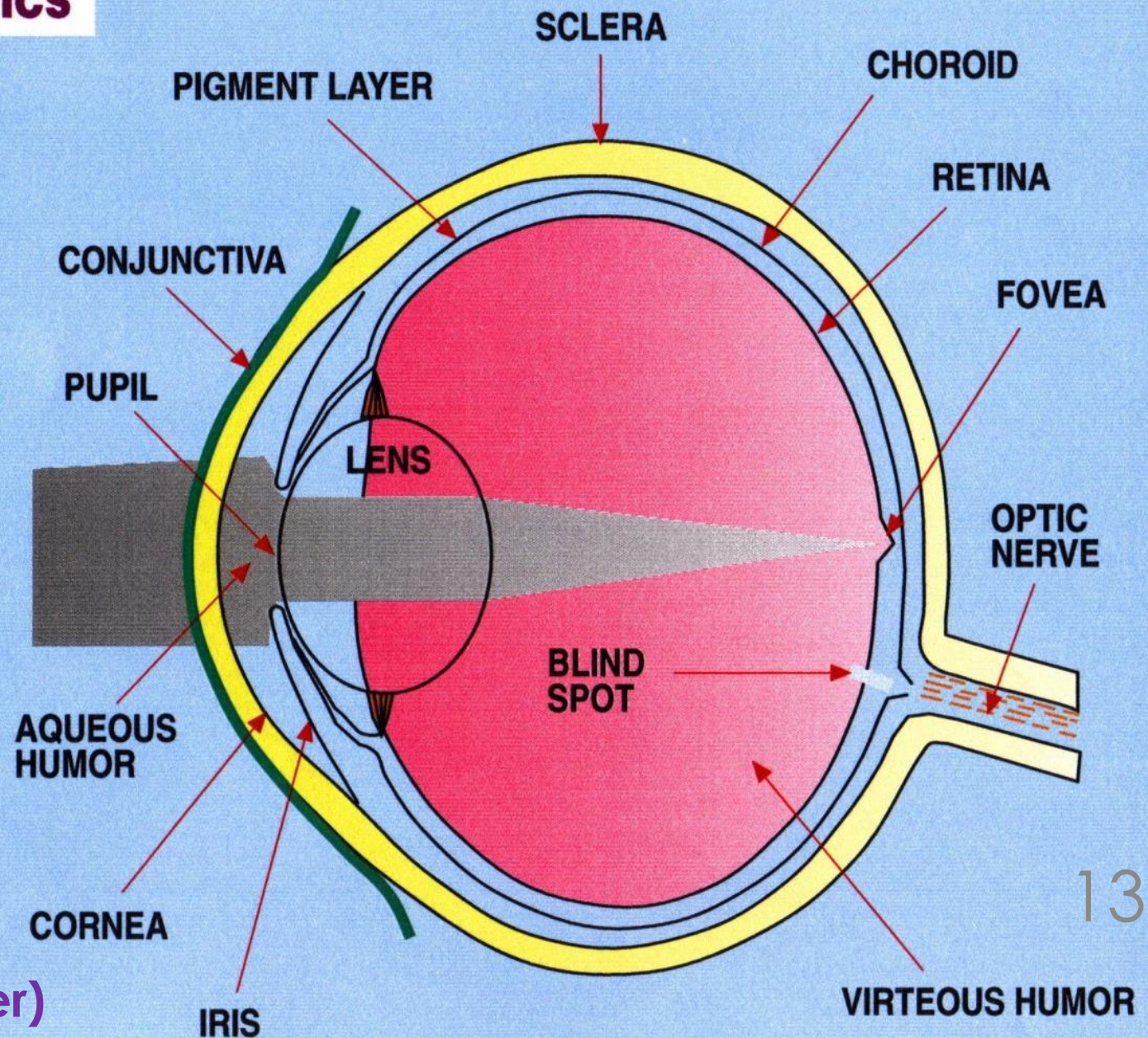
SAR phantom simulation
(Stefan Chulski & Stav Revich from HIT)

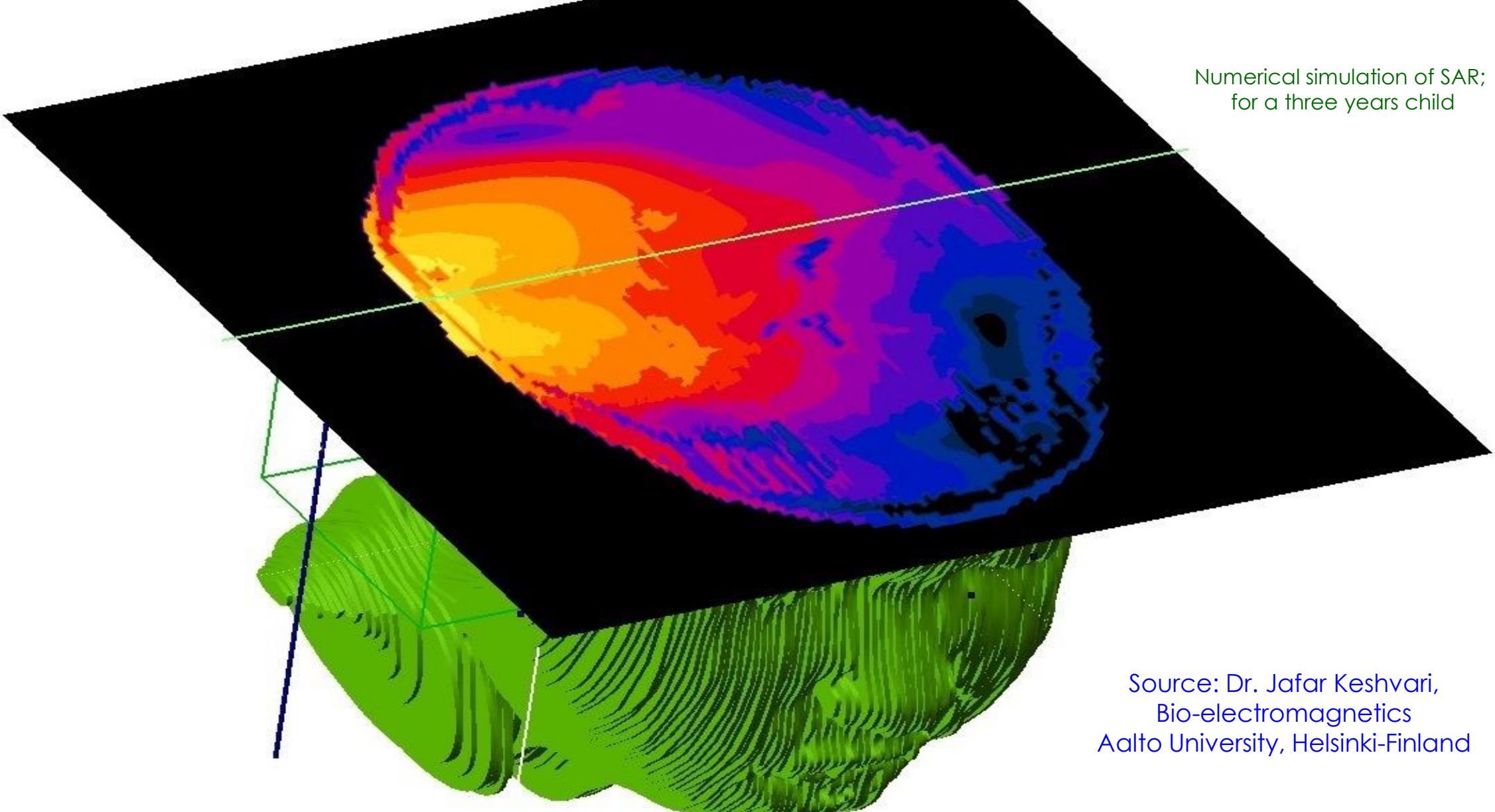
Type	SAR (rms)
Monitor	SAR (f=0.9) [1] (Point)
Plane at z	763.944
Maximum-2D	8.02639 W/kg at -71.7044 / -14.0005 / 763.944
Frequency	0.9



SUSCEPTIBILITY CHARACTERISTICS

- POOR BLOOD CIRCULATION
- LENSE OPACITY
- CORNEA DAMAGE
- RETINA RAPTURE





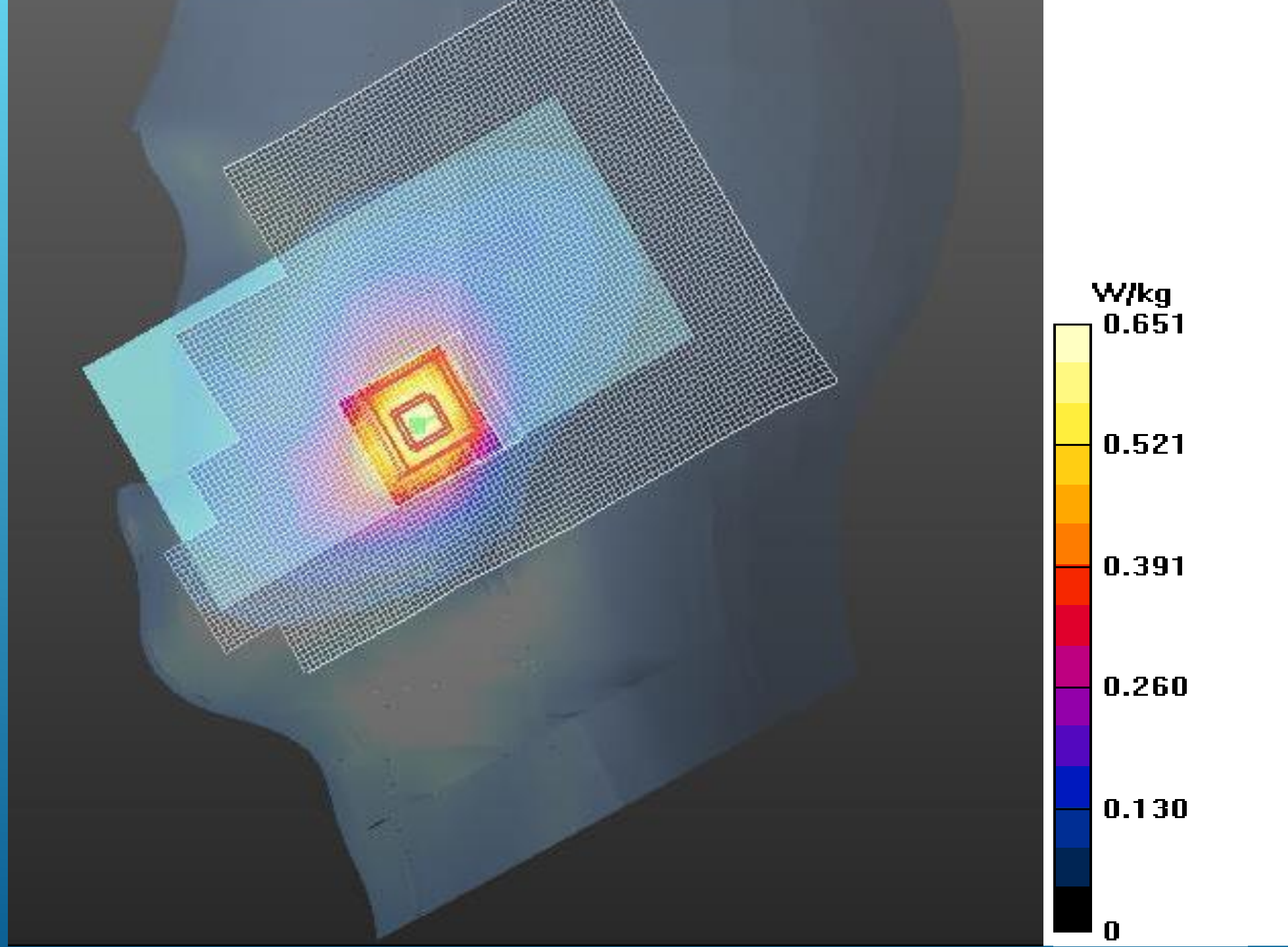
Numerical simulation of SAR;
for a three years child

Source: Dr. Jafar Keshvari,
Bio-electromagnetics
Aalto University, Helsinki-Finland

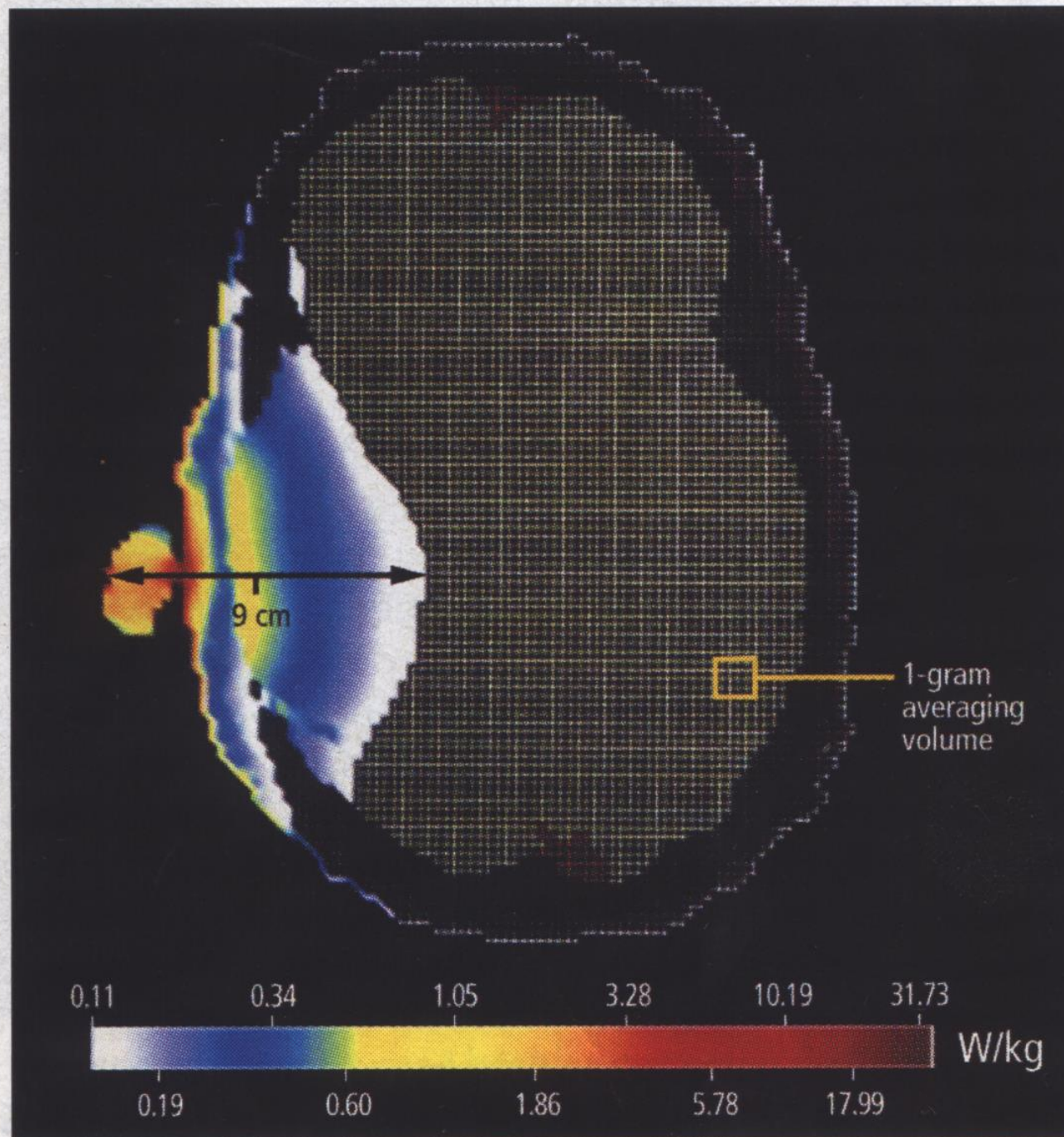
Peak SAR 0.096 W/kg; values are normalized dB below 0.096 W/kg

SAR real measurement for a commercial mobile phone

Source: Dr. Jafar Keshvari,



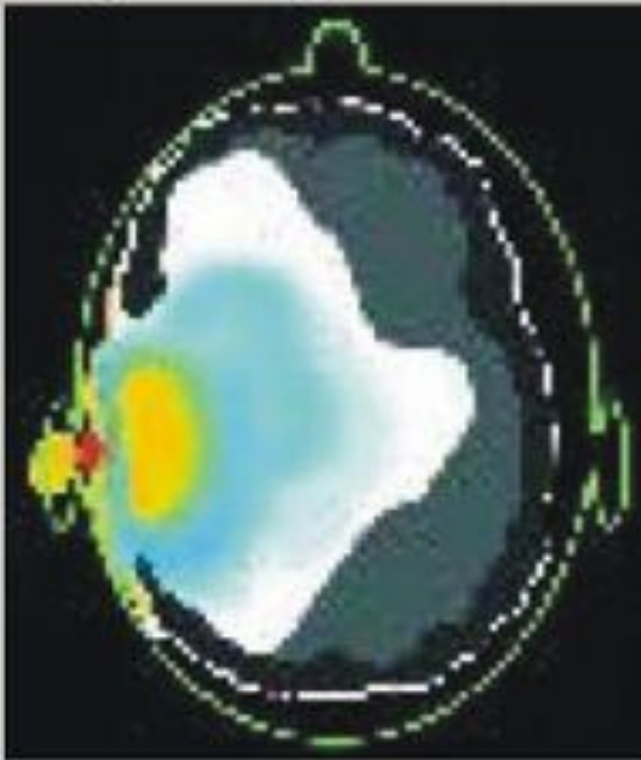
Typical Cell Phone
SAR
(Moshe Netzer)



(SOURCE: OM GANDHI, UNIVERSITY OF UTAH).

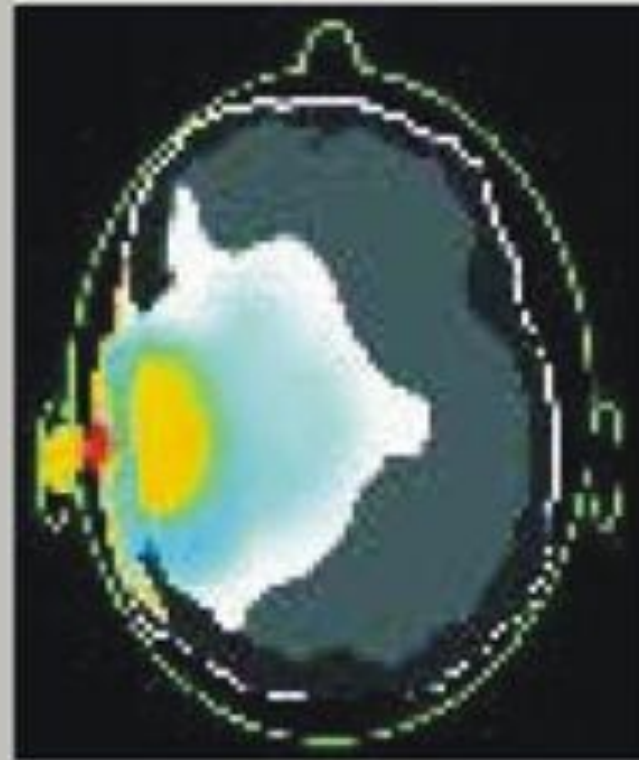
Gandhi O.P., Lazzi G., Furse C.M. (1996 vol.44, p1884-1897) :
Absorption des rayonnements électromagnétiques dans la tête et
le cou humain pour les téléphones mobiles de 835MHz /1900MHz

Degré de pénétration des Radiations du Portable dans le Cerveau



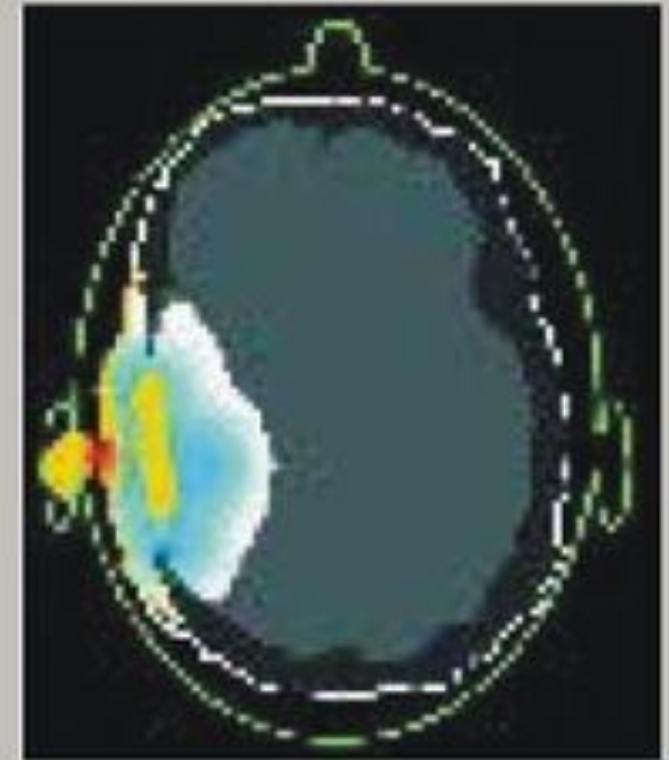
Enfant de 5 ans

Taux d'absorption: 4,49W/kg



Enfant de 10 ans

Taux d'absorption: 3,21W/kg



Adulte

Taux d'absorption: 2,93W/kg

www.next-up.org

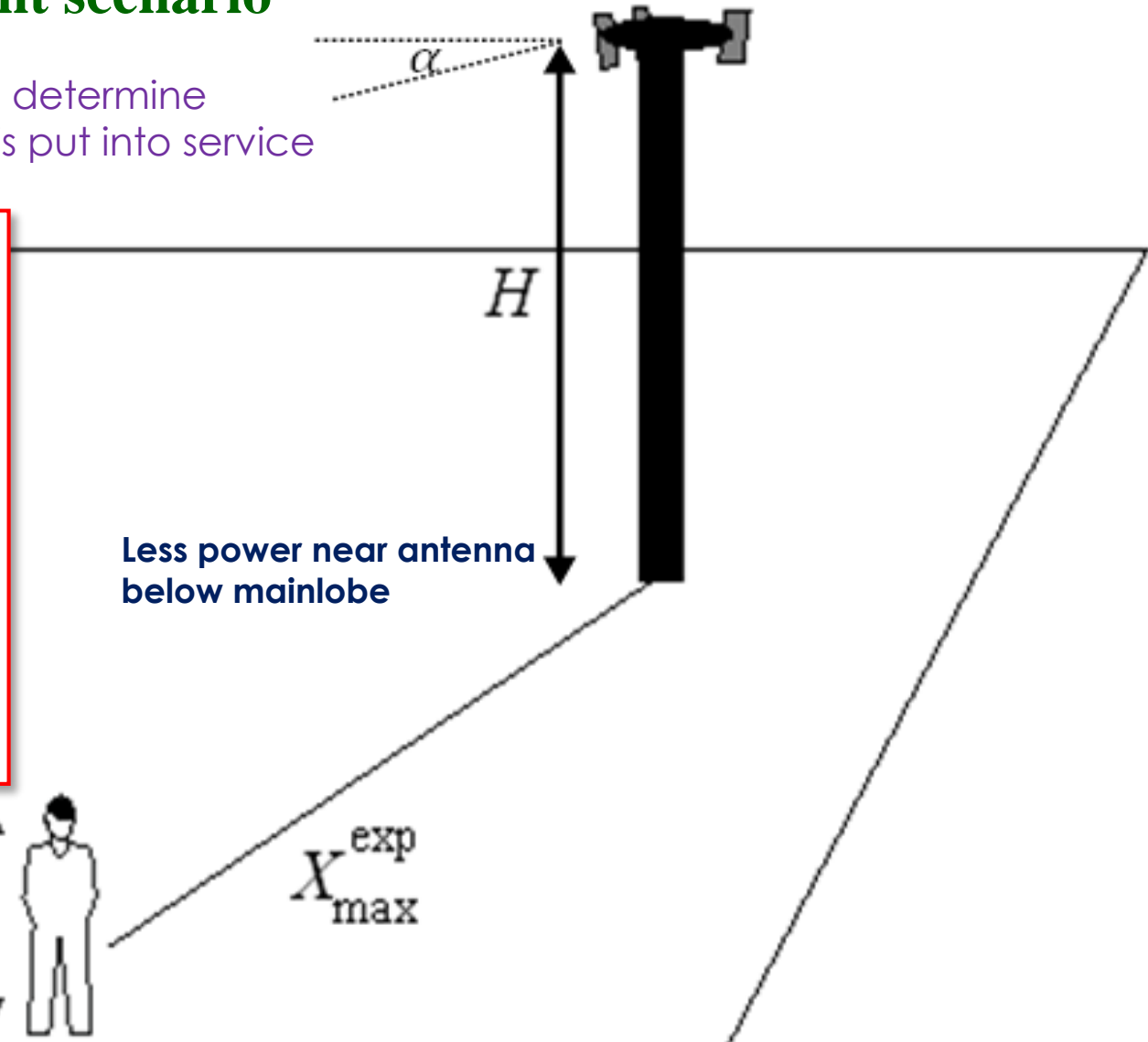
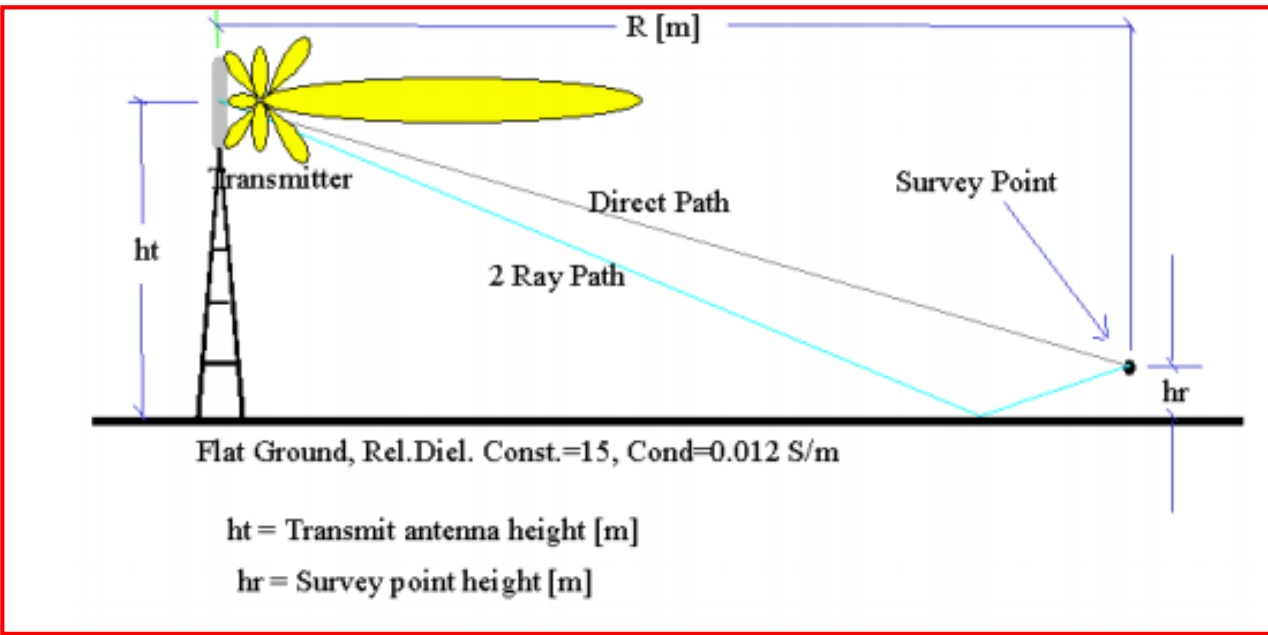
10 July 2015

Pour un taux d'absorption de 2,93 W/kg de puissance absorbée par un adulte, cette même puissance produira un Taux d'absorption de 3,21 W/kg pour un enfant de 10 ans et un Taux d'absorption de 4,49 W/Kg pour un enfant de 5ans.

SAR
over
exposure
in the
brain

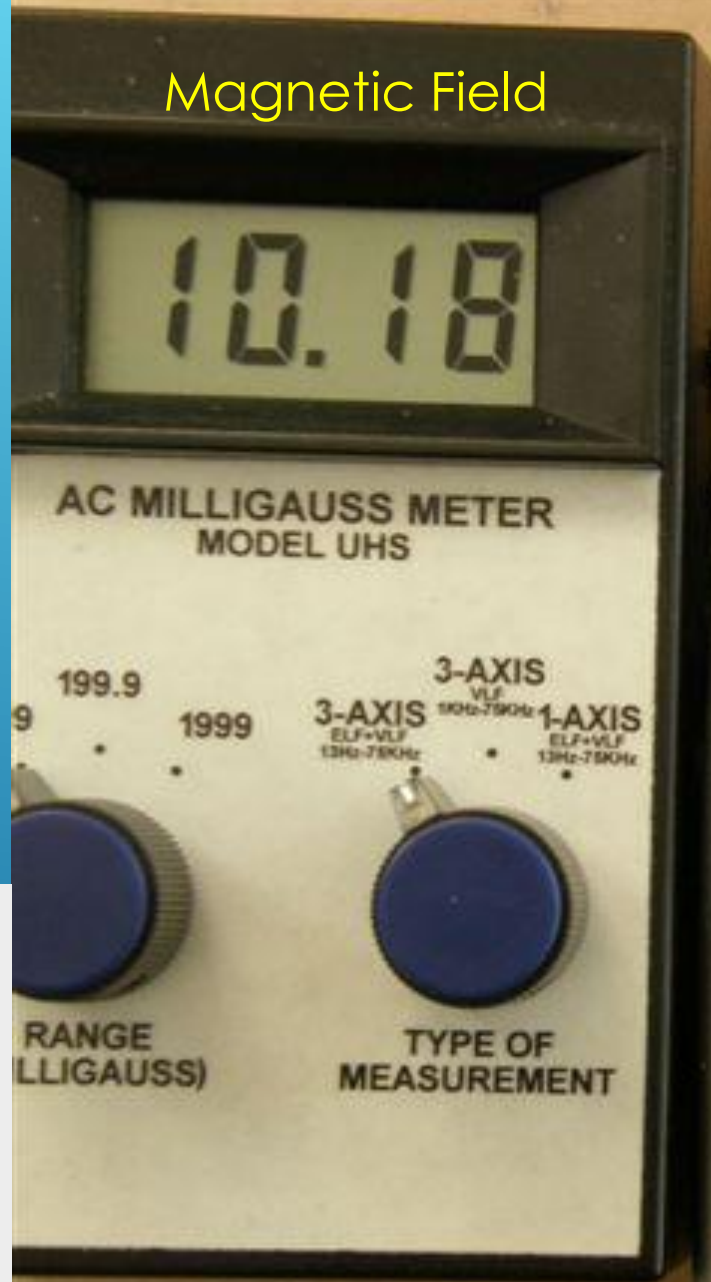
Figure III.1 – Geometry set-up for a line of sight scenario

Recommendation ITU-T [K.100](#) 7/2017 RF Measurement EMF to determine compliance with human exposure limits when a base station is put into service



Measurement of Radiation (partly Dr. Zamir Shalita, BS.1698)

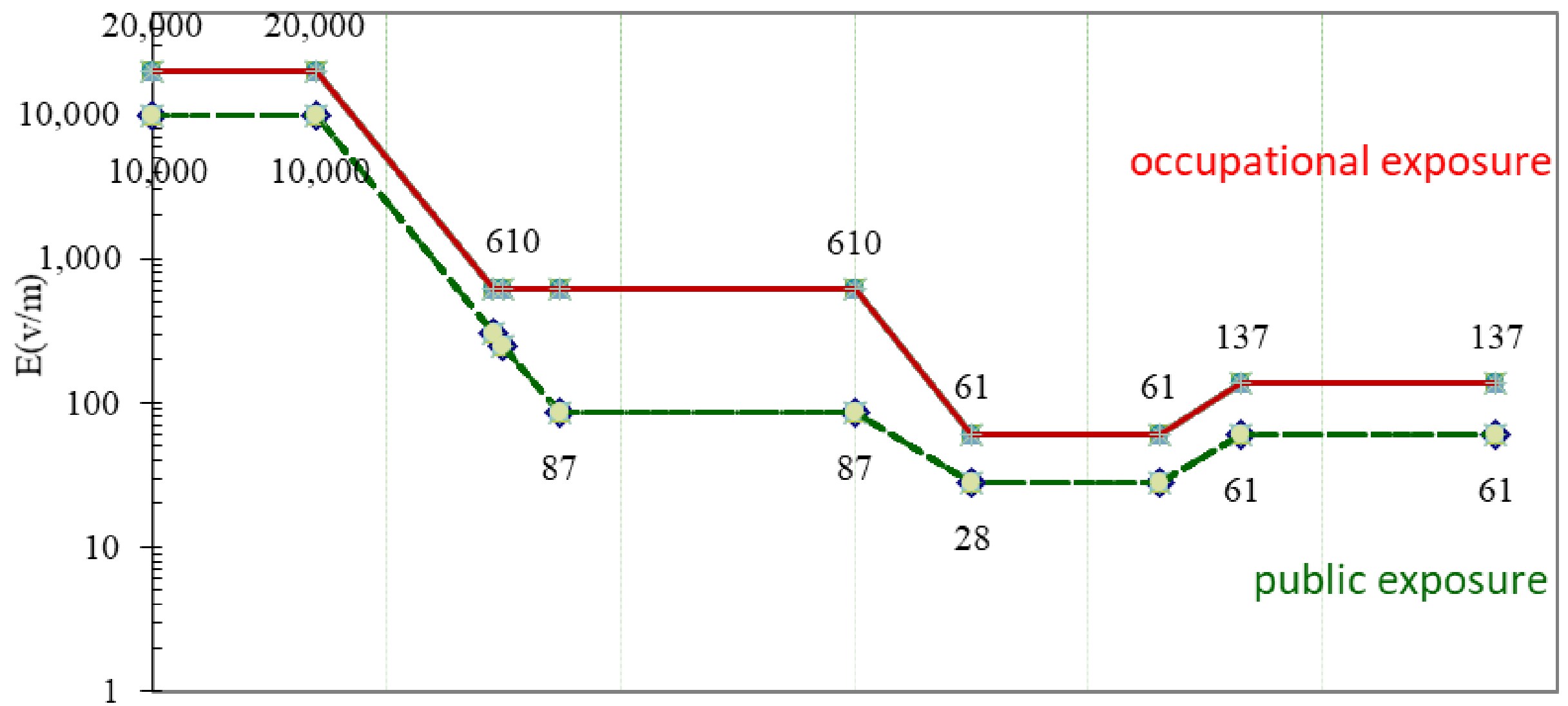
Magnetic Field



Electric Field



ICNIRP 1998 p.511 Reference levels for occupational & general public exposure- graphs



See 'Radio Spectrum Management: Policies, Regulations and Techniques' Chapter 9
 Fig.9.1; Wiley; Mazar; 2016

Frequency

Exposure distance assuming free-space, main beam

- P_t : transmitter power (watts),
 g_t : transmitter antenna gain (numeric)
 $eirp$: equivalent isotropically radiated power (watts)
 d : distance from transmitter (meter)
 e : electric field-strength (FS) Volt/meter (V/M)

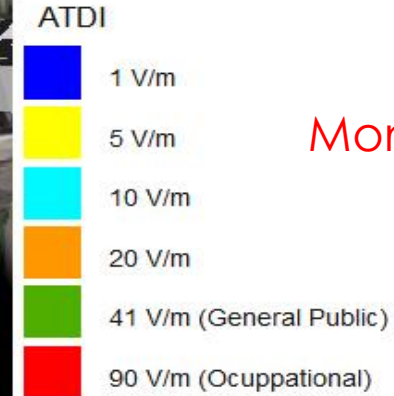
$$e = \frac{\sqrt{30 eirp}}{d} \quad \text{and} \quad d = \frac{\sqrt{30 eirp}}{e}$$

At 900 MHz, max downlink power 100 W, ant. gain (including losses) 17 dBi, $eirp$ is 5 Kw.
ICNIRP 1998 general-public reference-level is 41 V/m. Therefore, the exposure distance d

$$d = \frac{\sqrt{30 eirp}}{e} = \frac{\sqrt{30 \times 5,000}}{41} = 9.5 \text{ m.}$$

Mobile Composite Coverage

Buildings impacted in 3D view



Monaco

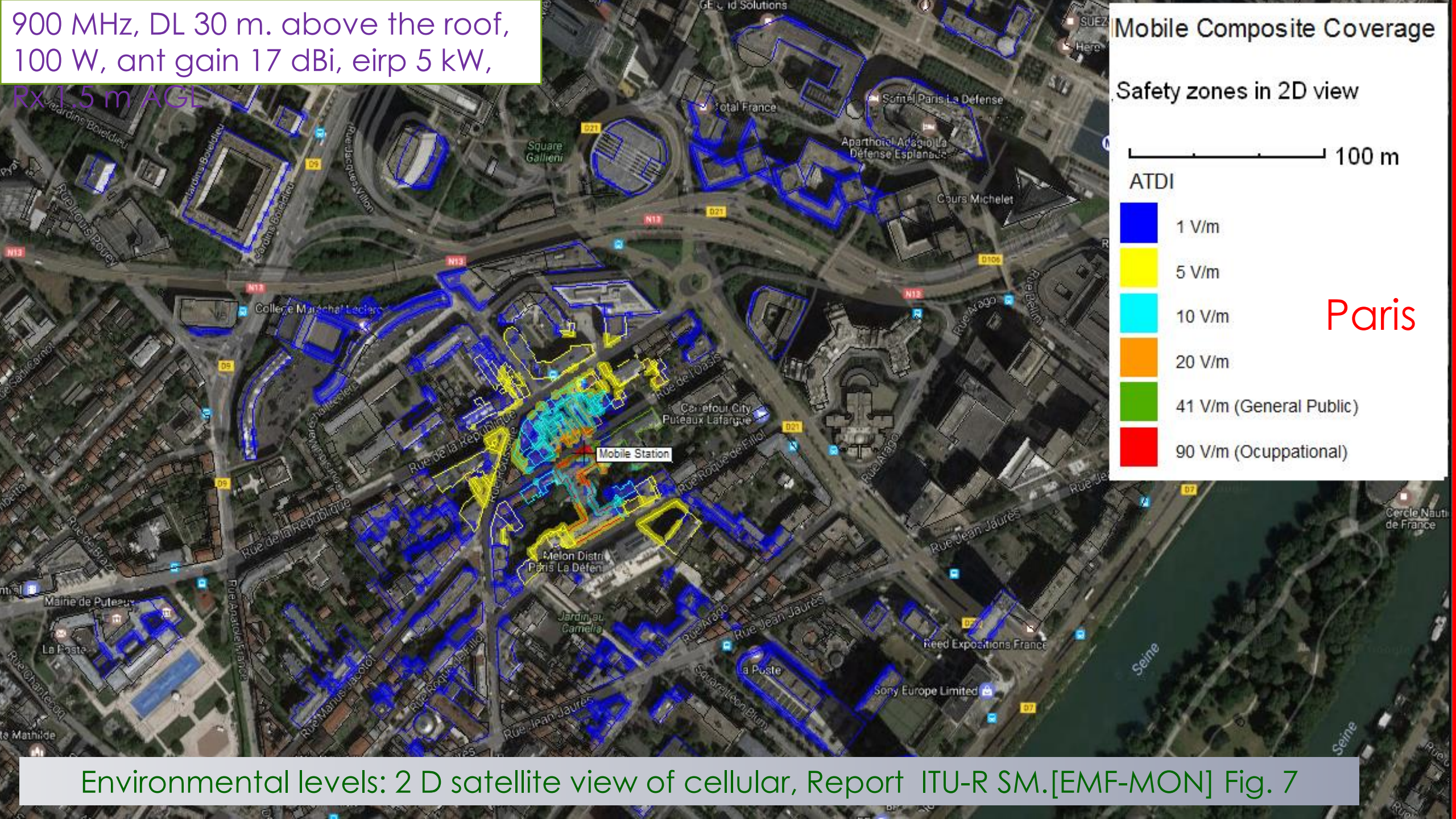
considering also wall attenuation
Tx 30 meters above roof; Rx mobile 1.5m above ground

900 MHz, ICNIRP general-public reference-level 41 V/m & occupational $3f^{1/2}$ (MHz) = 90 V/M. See scales

Environmental levels: 3D cellular contours, showing buildings impacted; preliminary draft new Report ITU-R SM.[EMF-MON] 'EMF measurements to assess human exposure' Fig. 6

900 MHz, DL 30 m. above the roof,
100 W, ant gain 17 dBi, eirp 5 kW,

Rx 1.5 m AGL



Mobile Composite Coverage

Safety zones in 2D view

100 m

- ATDI
- 1 V/m
 - 5 V/m
 - 10 V/m
 - 20 V/m
 - 41 V/m (General Public)
 - 90 V/m (Occupational)

Paris

Environmental levels: 2 D satellite view of cellular, Report ITU-R SM.[EMF-MON] Fig. 7

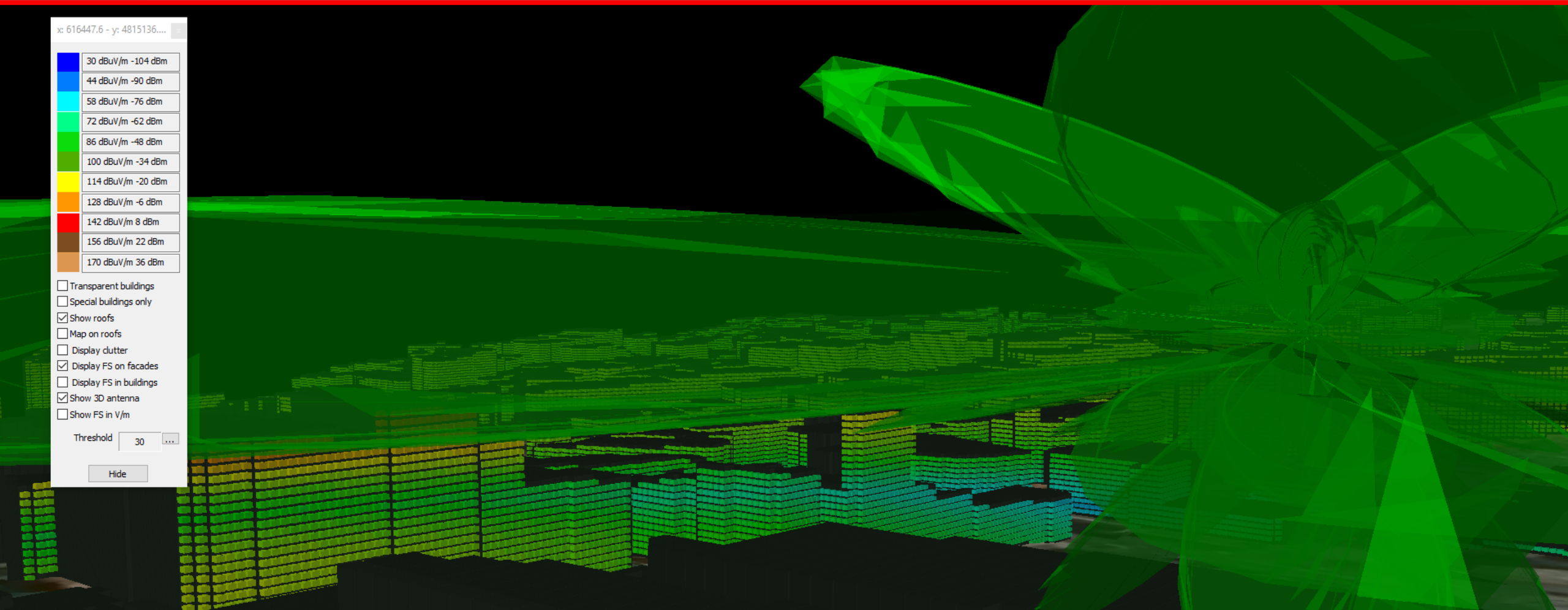
x: 616447.6 - y: 4815136....

30 dBuV/m -104 dBm
44 dBuV/m -90 dBm
58 dBuV/m -76 dBm
72 dBuV/m -62 dBm
86 dBuV/m -48 dBm
100 dBuV/m -34 dBm
114 dBuV/m -20 dBm
128 dBuV/m -6 dBm
142 dBuV/m 8 dBm
156 dBuV/m 22 dBm
170 dBuV/m 36 dBm

- Transparent buildings
- Special buildings only
- Show roofs
- Map on roofs
- Display clutter
- Display FS on facades
- Display FS in buildings
- Show 3D antenna
- Show FS in V/m

Threshold ...

Hide



Calculating safety-zones using elevation ant. pattern, ant. tilt 0 degrees
 Even the azimuth ant. is analysed; typically in 3 sectors 5G, an azimuth overlap:
 6dB attenuation in $\pm 60^\circ$ & 3dB around $\pm 45^\circ$ around mainbeam

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<http://mazar.atwebpa...>



Acknowledge
the presentation

"צוות" ארגון גמלאי צה"ל



סניף מודיעין מכבים רעות שוהם ויישובי הסביבה

תעודת הוקרה והערכה

מוענקת בזאת ל:

ד"ר חיים מזר

על העברת הרצאה במועדון הסניף :

בנושא: "ריכוזי קרינה משידורים אלקטרומגנטיים (רדיו)"

תאריך: 25 מרץ 2019


יעקב (יענקל'ה) לבקוביץ
יו"ר הסניף

RELATED AUTHOR'S PRESENTATIONS ON EMF

- ▶ A Global Survey and Comparison of Different Regulatory Approaches to Non-Ionizing RADHAZ and Spurious Emissions, IEEE TelAviv, COMCAS, November 2009. Hyperlink to the slides presentation; 9 November 2009
- ▶ A Comparison Between European and North American Wireless Regulations, presentation at the 'Technical Symposium at ITU Telecom World 2011' www.itu.int/worl2011 on 27 October 2011; hyperlink to the slides presentation, 27 October 2011
- ▶ Technical limits of Human Exposure to RF from Cellular Base Stations and Handsets, Jerusalem, 11 April 2013. Professional presentation of the Ministry of Communications to the experts of Ministry of Environmental Protection, human-exposure monitoring laboratories and cellular operators
- ▶ Technical limits of Human Exposure to RF from Broadcasting Emitters, Cellular Base Stations and Handsets, at 'Holon institute of technology', 30 January 2014
- ▶ Smart Cities RF Human Exposure Ministries of Comms Energy.pdf; intra-ministerial commission, on 21 January 2015
 - January 2016, presentations in Singapore, Beijing, Chengdu and Shenzhen
 - January2016 Human Hazards Mazar SRTC in Chinese.pdf
 - Human Hazards Mazar AsiaPacific BKK 25April16.pdf
 - EMC Europe2016 Wroclaw Sep 2016 Mazar 20April16 EMF.pdf
 - 5 December 2017, this presentation is found also in the ITU workshop link. The workshop' video is found at <https://pem.itl.waw.pl/aktualno%C5%9Bci/transmisja-warsztat-itu/>; See the presentation 44–56 minutes, panel 1:39–1:49

שאלות? Questions?

U may visit my website <http://mazar.atwebpages.com/>, Dr. Haim Mazar (Madjar) h.mazar@atdi.com