IIREC

International Institute for Research on
Electromagnetic Compatibility

Biophysical testing of effect and stress resistance of the product «Phone Balancer Hologram» against magnetic field distortions

Test report and opinion

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Contents

page

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The scope of this report is exclusively the documentation and evaluation of effects that were assessed by objective physical measurement. Neither the investigation of composition, manufacturing and mode of operation of the product, nor disclosure of information on the product to third parties was contracted. It is up to the manufacturer to care for constant product quality.

! by IIREC

1. Subject of testing

IIREC International Institute for Research on Electromagnetic Compatibility was instructed by Lakosa Handels GmbH to investigate by objective measurements (with physical meters, independent of the individual sensitivity of persons) effects of cell phone stickers **«Phone Balancer Hologram»** developed by the contractee.

Evidently, the Phone Balancer consists of several layers of a foil, with a LAKHOVSKY **antenna** (consisting of concentric, circular, open elements with alternating opposite mouth) showing up on one layer. The product is designed to improve the bio-compatibility to phoning persons of electromagnetic fields produced when using a cellular phone. The Phone Balancer is applied on the rear side of a cell phone (cf. title photograph: iPhone).

The investigation was conducted by magnetic field measurements in the **DC (static field) and ELF (extremely low frequencies) range** for the application with **cellular telephone**. For compliance with the criteria of IIREC test seals, test were conducted for:

a) the effectiveness of the product as such, i.e. the ability of the product to level out magnetic field distortions in the ambience of a transmitting cell phone,

b) the resistance of effectiveness of the product against adverse magnetic field conditions.

2. Testing of magnetic field effects

The magnetic field has a peculiar biological relevance, because it permeates the human body, its shielding is not easily accomplished, and it has an impact on all phenomena of life. Particularly on ions, i.e. particles in our body carrying electric charge (e.g. sodium, potassium, calcium, magnesium, zinc and several others in our body cells, iron in hemoglobine etc), the magnetic field has an immediate impact. Signals imprinted to our cell water and body water are magnetic in nature.

Therefore, testing of magnetic field effects was the first option for an investigation of coherent effectiveness of the Phone Balancer Hologram.

2.1 Method of investigation

Test measurements were conducted according to the **grid measurement procedure** of IIREC in the static and low frequency magnetic field (up to 15 Hz). The magnitude measured was **vertical magnetic induction** in Microtesla (μT).

The measurement array of 0,5 m x 0,5 m comprised 11 x 11 = 121 measuring points at a distance of 5 cm. In the first run, measurements are conducted with transmitting cell phones without a Balancer stuck on them. After sticking a Balancer, measurements were repeated. The comparison of results indicates the effectiveness of the Balancer.

Complete test runs were repeated after a 72 hours' exposure of the Balancer test sample to a strongly inhomogeneous magnetic field. This kind of stress test is designed to find out if the effectiveness of the Balancer would resist even most challenging magnetic field conditions. Some products tested earlier lost or reverted their effect when undergone this type of exposure.

2.2 Experimental procedure and assessment

The **meter** applied for magnetic induction in the DC and ELF range (up to 15 Hz) was the digital precision Teslameter 05/40 by Projekt Elektronik (Berlin). As a data logger, a VC-960 Multimeter by Voltcraft was applied. Some characteristic data of the meter are compiled in **table 1**.

Teslameter	05/40
intensity range	± 100 μT
digital resolution	0,1 μT (adding data logger 0,01 μT)
deviation	± 0,5 % of measured value @ 40 μT
frequency range (3 dB)	0 Hz to 18 Hz (max.)
sensor system	fluxgate, sensitive to orientation

Table 1: Characteristic technical data of the meter applied

The **measurement setting** is characterized in the sections to follow. The measuring array is constructed as a wooden tablet with holes marking the position of measuring points. A probe holder is mounted on a cursor which glides on a carriage covering one row of measuring points. This construction guarantees a maximum of measuring precision. Below the measuring tablet there is a drawer to hold a cellular phone (fig. 1). When the drawer is shut, the cellular is found in the precise center of the measuring field.

Fig. 1: Drawer with cell phone below the measuring tablet

Measurements were conducted a. with a conventional cell phone of Nokia brand, and b. with an iPhone (representing the class of smart phones that are the favorite cellulars of contemporary users, which offer, besides phoning, several additional features e.g. transmission of text files, movies and music files, and computer applications (apps). A complete measurement run comprises a measurement of magnetic distortion by operation of a non-protected cellular in the center of the measuring field, and a measurement of the compensating effect, with a test sample of the product stuck on the cellular. During measurement, the cellulars were operated in transmission mode. Before and after these measurements with a cellular, the magnetic background was monitored (without a cell phone). Thus, eventual shifts in magnetic background during measurement runs were grasped.

For evaluation of measurement results, the magnetic distortion by the unprotected cellular against the background was assessed, and the effect of the test sample stuck on the cellular, as well. The assessment yields the compensating effect of the Balancer, if there is any. Assessment was restricted to measurement points where the background exhibited a reasonable stability.

2.3 Results of effects testing

It is a solidified experience from dozens of test runs by IIREC that in the ambience of a transmitting cell phone (with its radio frequency carrier wave and low frequency modulation), there is a distortion of the DC and ELF magnetic field, a distortion being highly relevant for the biological system because it occurs in sensitive regions of the head (inner ear, brain, eyes, mouth hole etc.) when phoning with a cellular.

Measurement and assessment of the effect of the Phone Balancer according to section 2.2 yielded an **average compensation of magnetic field distortion in the ambience of the cellular by 114 % in case of the Nokia phone, and by 138 % in case of the iPhone**.

What does this result tell us? The alterations registered in the measuring field when a cellular is operated consist of a. background variations of natural origin or from marginal variations in the technical ambience, b. from strong magnetic field alterations immediately above the cellular (brought about by its magnetic equipment e.g. speaker and DC magnetic field of accumulator DC surges), and c. distortion effects brought about in the ambience of the cellular by its radio transmission. The investigation reported here is focused on effects according to c. – Regular background measurement and statistical criteria outlined below render a distinction of the three constituents of effects measured. Yet, a certain ambiguity remains in overlapping ranges of values. Thus, if a protective device would exhibit an optimal efficacy, a compensation rate of more than 100 % might occur. This may also be due to a certain excessive effect of the sample being tested.

Assessment details will be derived clearly from statistical data of measurement runs, providing the basis for the evaluation presented in section 3.

2.4 Results of stress testing

With a compensation rate of 138 %, effects testing with the cellular had a very ambitious result. For this reason, stress testing was conducted with this very type of smart phone. Testing consisted of a precise repetition of the test run conducted before: distortion measurement without a Balancer on the cellular + effect testing with Balancer + background monitoring (before, after and in between test measurements). Yet this time, the test sample of the Phone Balancer had undergone a 72 hours' exposition to a stressing (strongly inhomogenous) magnetic field before being tested on the cellular. The stressing magnetic field challenging the resistance of the Balancer was produced from two room speakers with their permanent magnets in a rectangular array. Thus, a realistic every-day-situation was simulated which might cause failure of the product, deterioration or reversion of its effect.

The assessment of results thus measured yielded, for the Balancer sample stressed before, an **average compensation rate of 143 %** of magnetic field distortions by the iPhone. This means, within the restrictions of measurement precision, a precise reproduction of the result previously found with a sample that had not been stressed in a strongly inhomogeneous magnetic field. In other words: **The sample put to test under stressing conditions had not declined in efficacy.**

3. Opinion

From the obvious results outlined so far it can be seen without any doubt that a Phone Balancer Hologram on a cellular phone would improve the magnetic condition in the ambience of the transmitting phone. **For the person phoning, this indicates an effective protection from biological impact by distortions of DC and ELF magnetic field**. This would particularly imponder for frequent users and for phone talks of long duration.

Some basic statistic criteria from the array of 121 measuring points each were collected in the following tables.

Table 2 (p. 8) and table 3 (p. 9): Statistical figures of measurement runs testing the effect of the Phone Balancer before and after stress test

Table 2: Effect of Phone Balancer (B.) upon magnetic field distortions by cell phones

Statistical characteristics of measurement runs

Measured in µT	Background[1]	Nokia					iPhone				
Characteristics:	without cell phone	Measured without B.	Distortion without B.	Measured with B.	Resid. dist. with B.	% average compensation	Measured without B.	Distortion without B.	Measured with B.	Resid. dist. with B.	% average compensation
Minimum	39,98	39,56	-0,66	39,39	-0,83		39,26	-0,88	39,23	-0,61	
Mean	40,81	40,96	0,15	40,73	0,07	114,09	40,72	0,06	40,63	0,03	138,44
Maximum	41,66	47,00	6,13	46,35	5,68		42,97	2,10	42,93	2,02	
p-fractiles:											
5-%	40,10	39,78	-0,46	39,63	-0,59	-160,81	39,73	-0,37	39,74	-0,36	-256,25
10-%	40,22	39,92	-0,40	39,78	-0,53	-76,82	39,83	-0,29	39,83	-0,27	-128,00
15-%	40,34	40,00	-0,38	39,86	-0,40	-64,05	40,00	-0,26	39,92	-0,23	-100,00
20-%	40,38	40,05	-0,34	39,99	-0,36	-41,00	40,19	-0,20	40,11	-0,19	-36,36
25-%	40,48	40,22	-0,31	40,05	-0,34	-37,50	40,25	-0,16	40,17	-0,15	-14,36
30-%	40,57	40,33	-0,29	40,11	-0,30	-10,53	40,39	-0,12	40,26	-0,13	1,90
35-%	40,67	40,52	-0,24	40,22	-0,26	5,20	40,45	-0,10	40,34	-0,10	23,56
40-%	40,72	40,69	-0,21	40,44	-0,22	20,00	40,52	-0,06	40,50	-0,06	30,77
45-%	40,76	40,86	-0,18	40,54	-0,19	25,51	40,61	-0,04	40,63	-0,03	46,98
50-% (Median)	40,80	40,89	-0,10	40,68	-0,16	34,07	40,78	-0,01	40,67	0,00	59,17
55-%	40,84	40,96	-0,05	40,78	-0,12	40,94	40,87	0,01	40,76	0,02	83,80
60-%	40,89	41,06	0,00	40,87	-0,09	52,49	40,99	0,04	40,85	0,03	96,55
65-%	40,98	41,10	0,05	40,95	-0,05	76,01	41,04	0,06	40,95	0,04	100,00
70-%	41,05	41,19	0,10	40,98	-0,02	97,60	41,07	0,09	41,01	0,07	130,08
75-%	41,11	41,28	0,13	41,06	0,03	115,79	41,16	0,15	41,07	0,13	172,75
80-%	41,17	41,35	0,19	41,08	0,09	128,89	41,20	0,21	41,08	0,17	186,67
85-%	41,33	41,44	0,30	41,20	0,41	247,00	41,28	0,27	41,12	0,19	243,33
90-%	41,38	41,61	0,55	41,33	0,53	353,41	41,34	0,43	41,25	0,24	512,73
95-%	41,53	42,93	2,34	42,99	2,34	740,00	41,51	0,80	41,42	0,72	712,50
100-%	41,66	47,00	6,13	46,35	5,68	1800,00	42,97	2,10	42,93	2,02	2900,00

[1] example from first background measurement

Table 3: Effect of Phone Balancer (B.) upon MF distortion by a cell phone

Statistical characteristics of a measurement run *after magnetic stressing of Balancer*

Measured in µT	Background[2]	iPhone				
Characteristics:	without cell phone	Measured without B.	Distortion without B.	Measured with B.	Resid.dist. with L.	% average compensation
Minimum	39,77	39,33	-0,59	39,23	-0,61	
Mean	40,66	40,57	0,08	40,60	0,06	142,8
Maximum	41,62	43,15	2,60	42,82	2,15	
p-fractiles:						
5-%	39,91	39,56	-0,38	39,77	-0,42	-350,0
10-%	39,98	39,66	-0,27	39,84	-0,28	-112,0
15-%	40,01	39,75	-0,23	39,90	-0,23	-63,1
20-%	40,17	39,84	-0,17	40,07	-0,19	-51,8
25-%	40,28	39,91	-0,15	40,12	-0,16	-21,2
30-%	40,33	40,31	-0,10	40,23	-0,15	-0,8
35-%	40,41	40,45	-0,05	40,28	-0,12	15,1
40-%	40,58	40,54	-0,03	40,39	-0,09	34,2
45-%	40,69	40,60	0,01	40,57	-0,06	46,8
50-% (Median)	40,74	40,67	0,03	40,65	-0,03	57,3
55-%	40,81	40,74	0,06	40,70	0,04	67,8
60-%	40,91	40,79	0,09	40,76	0,05	95,0
65-%	41,01	40,84	0,12	40,81	0,08	122,3
70-%	41,03	40,93	0,13	40,91	0,11	134,6
75-%	41,08	40,97	0,19	40,96	0,15	170,0
80-%	41,13	41,05	0,27	41,02	0,20	191,5
85-%	41,14	41,10	0,30	41,19	0,27	280,4
90-%	41,18	41,19	0,41	41,31	0,45	500,0
95-%	41,25	41,31	0,82	41,39	0,84	601,7
100-%	41,62	43,15	2,60	42,82	2,15	6000,0

[2] example from first background measurement

Table 4: Effect of Phone Balancer upon MF distortion by a cell phone

Statistical characteristics *of background (B.)*

Measured in µT	Effects test			Stress test		
Characteristics:	B. before cell phone	B. effect by cell phones	Resid. effect by phone+Balancer	B. before cell phone	B. effect by cell phone	Resid. effect by phone+Balancer
Minimum	39,98	**-0,33**	***-0,07***	39,77	-0,05	***0,00***
Mean	40,81	**-0,15**	***-0,05***	40,66	**-0,18**	***0,06***
Maximum	41,66	**-0,25**	***0,05***	41,62	**-0,38**	0,15
p-fractiles:						
5-%	40,10	**-0,13**	-0,21	39,91	**-0,10**	***0,05***
10-%	40,22	**-0,19**	-0,17	39,98	**-0,12**	***0,09***
15-%	40,34	**-0,19**	-0,18	40,01	-0,09	0,10
20-%	40,38	**-0,17**	-0,12	40,17	**-0,18**	0,13
25-%	40,48	**-0,23**	***-0,01***	40,28	**-0,10**	***0,04***
30-%	40,57	**-0,21**	***0,01***	40,33	-0,01	***-0,04***
35-%	40,67	**-0,15**	***-0,04***	40,41	-0,01	***-0,04***
40-%	40,72	**-0,16**	***0,00***	40,58	**-0,14**	***0,00***
45-%	40,76	**-0,12**	***-0,01***	40,69	**-0,18**	***-0,02***
50-% (Median)	40,80	**-0,11**	***0,01***	40,74	**-0,20**	***0,03***
55-%	40,84	**-0,09**	***-0,01***	40,81	**-0,24**	0,12
60-%	40,89	**-0,08**	***0,01***	40,91	**-0,28**	***0,09***
65-%	40,98	**-0,11**	***-0,01***	41,01	**-0,30**	***0,09***
70-%	41,05	**-0,14**	***0,00***	41,03	**-0,27**	***0,06***
75-%	41,11	**-0,11**	***0,00***	41,08	**-0,26**	***0,07***
80-%	41,17	**-0,10**	***0,01***	41,13	**-0,27**	***0,09***
85-%	41,33	**-0,16**	***-0,05***	41,14	**-0,25**	0,10
90-%	41,38	**-0,13**	***-0,09***	41,18	**-0,22**	***0,07***
95-%	41,53	**-0,23**	-0,10	41,25	**-0,23**	0,14
100-%	41,66	**-0,25**	***0,05***	41,62	**-0,38**	0,15

What do the statistical data offered in tables 2 to 4 tell us? First, there are the minimum, maximum, and arithmetic mean values of data series. For a more detailed insight into data structure, the next rows of data offer summation frequencies (p-fractiles). The 25% value of summation frequency (the so-called 0.25-fractile), e.g., is the value not exceeded by 25% of data of the respective data series. Vice versa: 75% of data exceed this value. The median being the 50% value of summation frequency is of particular significance. For a symmetrical distribution of data, the median matches the arithmetic mean. If the median differs from the mean, the distribution is non-symmetrical.

The opinion given here evaluates the **quantitative** results regarding the items of a. **metrological significance** and b. **biological relevance**.

3.1 Metrological significance of results

3.1.1 Significance criteria

The **effects registered by measurement**, i.e. distortion effects by cellular phones (as imported causes of distortion), as well as effects brought about by Phone Balancer Holograms, are in an order of magnitude which clearly exceeds measurement uncertainty. Therefore, they are regarded **significant**.

DC value reading from the precision Teslameter 05/40 (including ELF) exhibits variations of 0,05 μT in measured values. The precision statement for measured values, therefore, is 0,1 μT. Distortion and compensation effects are assessed as differences of measured values (between "distorted" and "undistorted" field conditions). According to generally accepted rules, the uncertainty of differences is calculated as 0,14 μT (i.e. 0,1 μT times square root of 2). DC effects from 0,15 μT upward are thus significant. Taking into consideration the excellent reproducibility of background between the two measurement runs (with "fresh" and "stressed" Balancer, the median of deviation being as low as -0,06 μT and the 0.80-fractile as low as -0,04 μT), effects of 0,1 μT are regarded significant, anyhow.

Table 4 (p. 10): Statistical figures of background variations during cell phone measurements

The fulfilment of significance criteria by the stated effects is proven for the measurement series as follows:

Magnetic distortions measured in the DC range (including ELF) in the ambience of cell phones applied (Nokia and iPhone, resp.) amount to 0,3 μT (tables 2 and 3.) This is judged from the 0.85-fractile. (Distortions measured immediately above the cell phone are excluded here, because they stem from the DC magnetic field of the cellular itself and cannot be prevented unless by a different mode of construction or operation of the phone, or by magnetic shielding.) From the fractile values of summation frequency compiled in the tables it can be seen that e.g. in the measurement series with the Nokia phone the lower 50% of measured distortions and the upper 30% of same are in a significant order of magnitude (at least ±0,10 μT). Of the residual effects (measured with Balancer on the cellular), the lower 55 % and upper 15 % amount at this significant order of magnitude. Similarly, significant effects are found from the iPhone data over a wide range of fractile summation frequencies.

Before evaluation of the compensation effect (i.e. the efficiency of reduction of magnetic distortion, measured at one point following application of the Balancer), the values from those points were discarded where there was no sufficient background stability. This was assumed when the background shift from one measurement to the next one at a single measurement point exceeded the median of shifts for more than ±0,2 μT.

3.1.2 Statistical data analysis

For a **comprehensive evaluation** of effects, it is necessary **to analyze the total collective of data**, including data from measuring points where effects remained below the threshold of significance.

In the previous section 2.3 we pointed at three ranges of values that make up the measurement data: a. values indicating no significant effect of the cellular or of the Balancer (i.e. the variation from the reference condition measured before remains marginal), b. values indicating a very strong effect (those are values measured in the center of the field, immediately above the cell phone in operation), and c. values indicating effects that are relevant for the evaluation in this opinion, i.e. significant field distortions in the *ambience* of the cellular phone and the respective effects of the Balancer.

Again, the discernment of the three ranges may be illustrated taking the measurements with the Nokia phone as an example: From table 4 it can be seen that during *measurement with the unprotected cellular* there is a background shift of -0,11 μT in the median. Distortions indicated in table 2 are of the same order of magnitude between the 35-% and the 55-% fractiles, which means that in the intermediate 20% of measuring points there was no more effect than the background shift. The lower 35 % and the upper
45 % of measuring points, in turn, show up with marked variations due to the operation of the cellular. Among those, the highest 15 % of values exhibit such a strong deviation from background that an immediate impact of the cell phone is concluded with certainty (i.e. those values were measured immediately above the cellular).

So, for effects to be evaluated here, values between 55 % and 85 % of summation frequency are relevant. *These indicate magnetic field distortions in the ambience of the transmitting Nokia phone, which are up to compensation by the Phone Balancer.* **In fact, in this fractile range of values the residual distortion found with the Phone Balancer turns out, in any fraction, to be less than the original distortion (without a Balancer). Thus, an effective compensation in this value range is proven!**

The extent of magnetic distortions in the relevant range from 55 % to 85 % of summation frequency amounts in the example chosen here (Nokia phone) at 0,0 μT to +0,3 μT (0,094 μT on the average). The respective residual distortions after application of the Phone Balancer Hologram are each -0,1 μT weaker than the original distortions, the average amount of compensation being -0,102 μT. So, **in the relevant value range, the compensation amounts, within the limitations of measurement precision, at 100 %** (calculated 108,5 %; the deviation from 100 % being insignificant). Note that these results are already corrected for background shifts, thus **the effect calculated here is in fact a net effect of the Balancer on the cell phone!**

The compensating effect calculated from this detailed analysis imponders, in the total data series, according to the number of measuring points (or fraction of summation frequency, resp.) and to the amount of single effects. Statistically, this yields as an average on the complete measuring field, the compensation rate of 114 % mentioned before. – From data analyses of the same kind, efficiency rates for the Phone Balancer on the iPhone (before and after stress test) were derived.

This kind of data analysis illuminates the result briefly commented in section 2.3 telling that in the overall average, an efficiency rate of > 100 % may result.

Summing up, results found with Phone Balancer Hologram on cell phones of different types before and after exposition to a strongly inhomogeneous magnetic field indicate **an excellent ability of the Balancer to compensate for magnetic field distortions in the ambience of a transmitting cell phone**.

3.1.3 Analysis of background data

An additional peculiar trait of the Phone Balancer Hologram is derived from the analysis of **background data**, which were compiled in **table 4**. Remember that during measurement series with the Nokia phone / iPhone and a fresh Phone Balancer, and with iPhone and a test sample of Balancer having undergone the stress test, as well, the magnetic background was monitored before the import of the cell phone in the test setting, after measurement with the operating cell phone, and after application of the Balancer on the cell phone, once more. For variations of the statistical characteristics from each of these background measurements to the next one, cf. table 4.

From the table it can be seen that **after finishing measurements with the cell phone in the field (and extraction of the phone), a magnetic variation is remaining in the background field which amounts at a significant value of 0,1 μT or more**. In the table, values meeting this criterion are printed in **bold** letters. On the opposite, **when the cell phone being operated is protected by a Phone Balancer, there are no significant variations remaining in the background**; the ***amount of variations being for most of the data less than the threshold of 0,1 μT***. Data meeting this criterion are printed in ***bold Italics*** in the table.

In other words: The Balancer does not only compensate for magnetic distortions brought about by a transmitting cell phone during its operation, but, moreover, **prevents a sustained alteration of magnetic background that would remain, like a phantom in space (!), after removal of the cellular if not protected with a Phone Balancer.**

3.2 Biological relevance of effects

Distortions measured in the DC range in the ambience of transmitting cellulars amounted at 0,3 μT in the relevant value range or at the measuring points relevant for the effect, resp. Compare this to natural variations of magnetic induction which amount, during time intervals from 0,5 to 2 hours, at a specified location, to approximately 0,2 μT. So, **distortions measured here** are of the same order of magnitude as natural variations and, for this reason, **are biologically critical!**

Humans as receivers are, from a biological point of view, particularly receptive to signals imitating the characteristics, or variation, of natural electromagnetic fields. This is why **distortions registered in this study are highly relevant to biology**. Vice versa, **any mitigation of those distortions** (ideally by a 100% compensation) **is of utmost biological relevance if it reduces the amount of distortion to the normal amount of natural variations. This kind of effect was unambiguously proven for the Phone Balancer**; it would particularly imponder for frequent users and for phone talks of long duration.

The **background effect** found with the Balancer is of additional biological relevance: When a cell phone is operated at the ear (or, generally speaking, in the vicinity of the body), its transmitting or receiving operation causes a prolongued magnetic field distortion in its ambience (e.g. in the head region of the phoning person), that would remain even after dropping the cellular. **The Phone Balancer**, as a protective (but not shielding) device, **prevents this kind of sustained distortion in the biological ambience**.

Over all, the biologically risky exposure is not only reduced in intensity, but also abbreviated by the Phone Balancer.

3.3 Stress resistance of effects

The precise reproducibility (within the boundaries of measurement precision) of average compensation rate after the test sample of the Balancer being put to the stress test (exposition in a strongly inhomogeneous magnetic field) confirms the **resistance of its effect to most adverse magnetic field conditions. Thus, all testing criteria for awarding the test seal of IIREC were met.**

Authorized summary

Test measurements conducted by IIREC as contracted with Lakosa Handels GmbH regarding a physical effect of the product **«Phone Balancer Hologram»** evidenced beyond doubt **the ability of the product to reduce and abbreviate magnetic field distortions of biological relevance** that would occur in the ambience of a transmitting or receiving cell phone, even after its operation was stopped and the phone itself removed.

Moreover, clear evidence was found that **the effect of the Phone Balancer persists even after exposure to most unfavorable magnetic field conditions**. This test being passed, in addition to completely positive test results found with cellular phones of different types and brands, confirms a **reliable effect of the Balancer**.

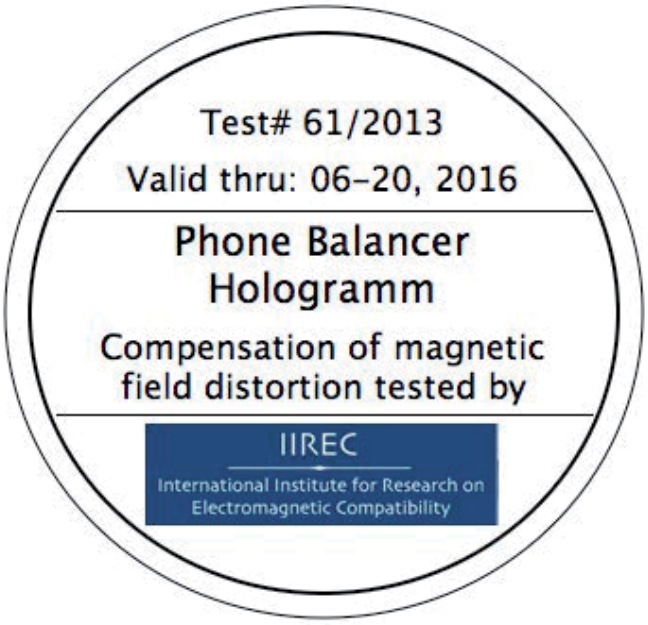
For **magnetic distortions** in the DC and ELF range, brought about by transmitting cellulars in their ambience, an average **compensation effect** from all measuring points was found at 114 % with a **Nokia** phone. With an **iPhone,** the average compensation rate turned out to be 138 %. **After stressing a test sample of the Balancer** in a strongly inhomogeneous magnetic field, **an identical value** (within the limits of measurement precision) of 143 % **was found. In the relevant range of distortions**, i.e. resulting from an assessment of distortions from **0 to 0,3 μT occuring in the ambience of a cell phone in transmission mode**, a **compensation rate** was found which, within the limits of measurement precision, **matches the ideal value of 100 %.**

Evidence was given for the **particular feature** that **the Balancer would protect the phoning person, even after dropping the cellular, from magnetic distortions that would otherwise remain in space** (which might be within the human body).

So, by **objective physical measurement** with **magnetic induction** meters, the test has proven the **application of the Phone Balancer Hologram to result in an improvement of bio-compatibility by mitigation of magnetic field distortions in the ambience of transmitting and receiving cellular phones**.

Effects measured are at an order of magnitude that is significant according to rules of metrology and relevant to biology. Special care was taken to evaluate the active net effect of the Phone Balancer Hologram independent of background variations.

Based on the evidence given for the effectiveness of the Phone Balancer and the persistence of its effect after exposure to most adverse magnetic field conditions, the manufacturer is entitled (if meeting the conditions specified below) to declare the product «Phone Balancer Hologram» as »tested by IIREC« and to apply the following test seal with the product:



Conditions:

(1) The validity of the test seal must be prolongued in due time before expiring.

(2) Any variation of production, specification or effect of the product must be communicated to IIREC.

(3) The test seal is no longer applicable, should a later testing by IIREC find the product no more complying with the features or conditions stated here.

Important notes:

(1) The test seal may be attached to the product, to product documents and to product package, in any location where the manufacturer decides to place a seal.

(2) In due time before expiration of validity of the test seal, IIREC will offer to the manufacturer periodical test repetitions and, in case of positive results, confirm the further validity of the test seal.

(3) If desired, IIREC may elaborate proposals for extended testing to prove biological effects of the product and for product certification.

(4) To keep up the product quality found in the tests falls within the liability of the manufacturer.

The expert signing this report confirms that measurements were conducted under his supervision and that results are correct within the boundaries of measurement and assessment precision.

Krems, 06-18, 2013

Mag. Dr. Walter Hannes Medinger

Generally Sworn and Certified Expert at Court
Scientific Head of IIREC
International Institute for Research on ***E***lectro***M***agnetic ***C***ompatibility – *EMC* on biophysical foundation

Enclosures (pp. 18 to 21): 22 diagrams (mappings or measurement results)

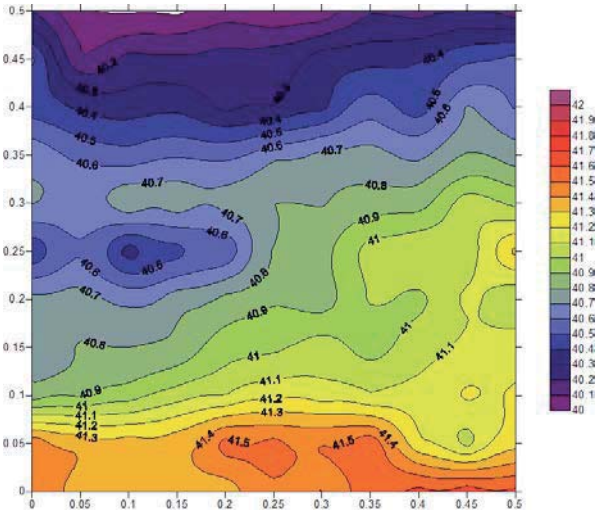
Literature

DEL GIUDICE E, DOGLIA S, MILANI M, and VITIELLO G (1988): Structures, correlations and electromagnetic interactions in living matter: Theory and applications. In: Fröhlich H (Hrsg.), *Biological Coherence and Response to External Stimuli*, Berlin: Springer-Verlag, pages 49-64.

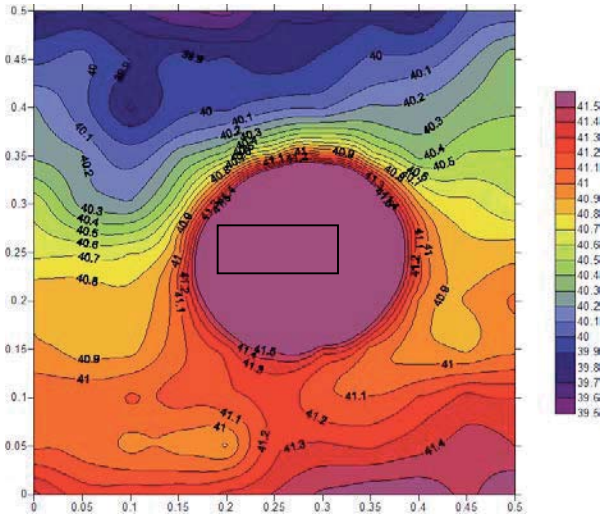
DEL GIUDICE E, DOGLIA S, MILANI M, SMITH C, and VITIELLO G (1989): Magnetic flux quantization and Josephson behaviour in living systems. Phys. Scripta **40**: 786-791.

MEDINGER W (2005): Significance of weak static and ELF magnetic fields and their gradients with respect to electromagnetic biocompatibility. – A new method for precise localization of techno- and geogenic stress zones. IIREC-Berichte Nr. 02/2005 (with abstract in German language).

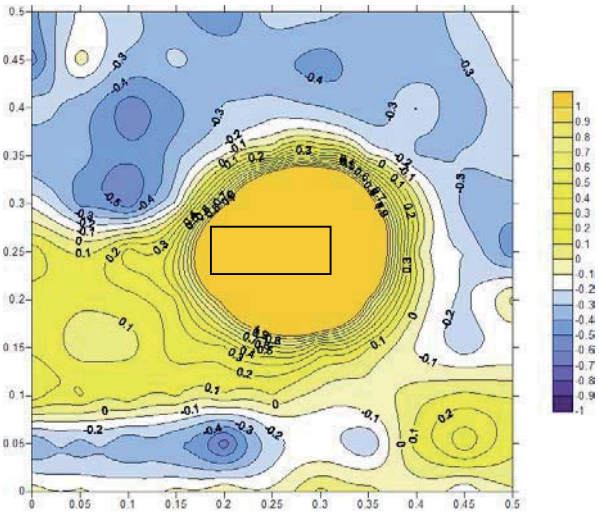
SMITH C W (2002): Effects of Electromagnetic Fields in the Living Environment. In: Clements-Croome D (Hrsg.), *Electromagnetic Environments and Health in Building*, Oxon: Spon Press, pages 53-118.



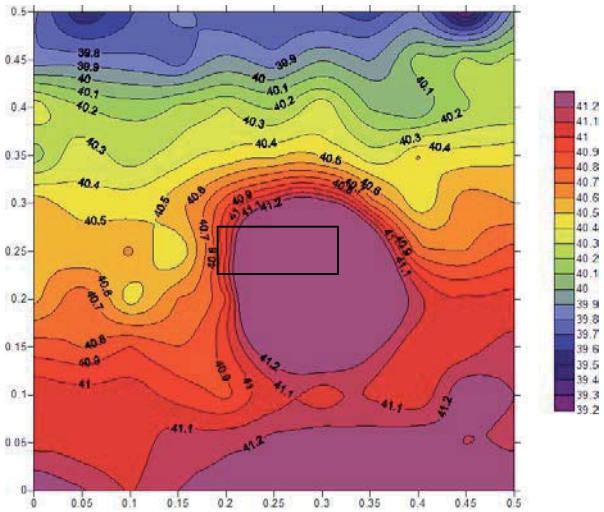
Diagr. 1: Background »B« without a cellular
Vertical magnetic induction (ELF+DC) in Microtesla (μT) cf. color scale and contour lines; on axes: distances in Meter (m)



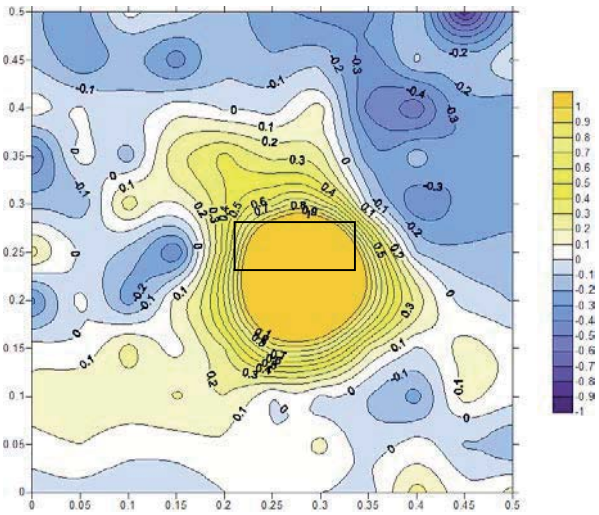
Diagr. 2: Field with Nokia cell phone
Values > 41.5 μT in the center above the cellular (black rectangle) were omitted, in order to elaborate details in the ambience of the phone.



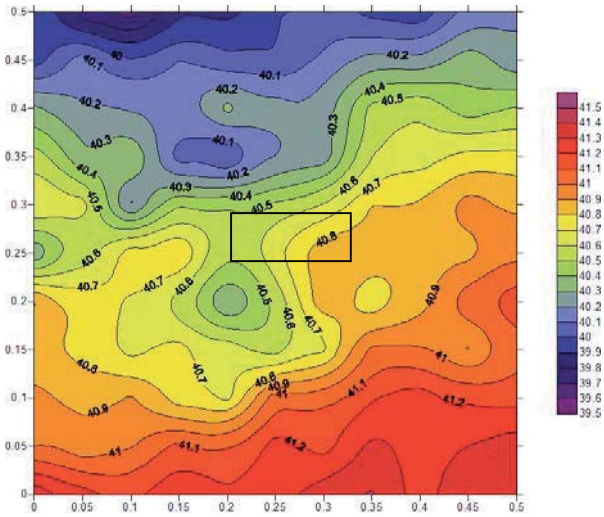
Diagr. 3: Effect by Nokia phone
The strongest alterations of the background field (blue = rise, yellow = decline of values) are brought about by the transmitting cellular on the LHS of the field.



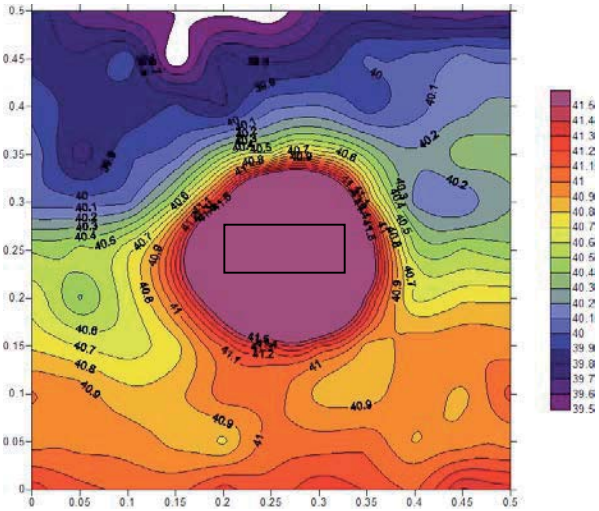
Diagr. 4: Field with iPhone
Again, values > 41.5 μT were omitted in favor of details in the ambience of the cellular.



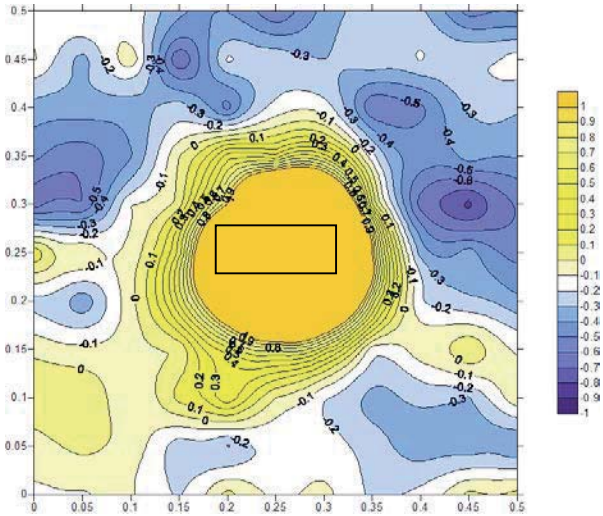
Diagr. 5: Effect by iPhone
The iPhone differs from the Nokia phone in magnetic constitution. This is why distortions in the ambient magnetic field exhibit a different distribution.



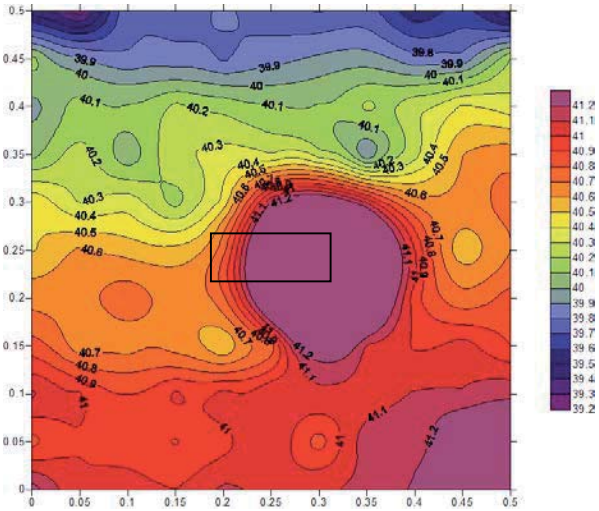
Diagr. 6: »B« after cellular operation
After removal of the cell phones (!), there is a sustained field distortion. The black rectangle denotes the previous position of the cellulars in the measuring field (Nokia first, then iPhone).



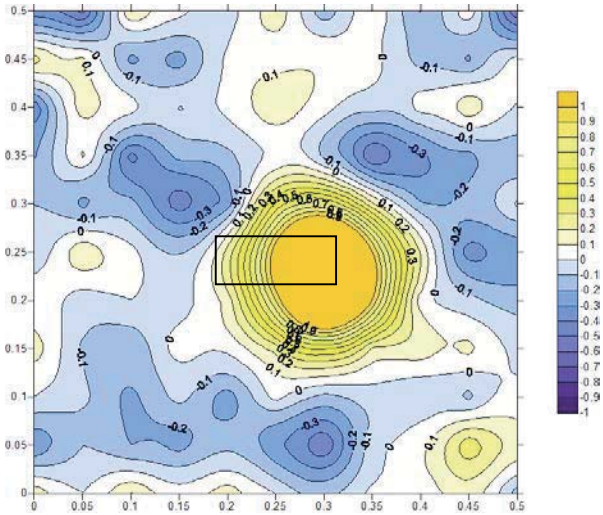
Diagr. 7: Field with Nokia phone + sticker
There is a distinct variation against the field of the operating cellular without a Lakosa sticker (cf. diagr. 2).



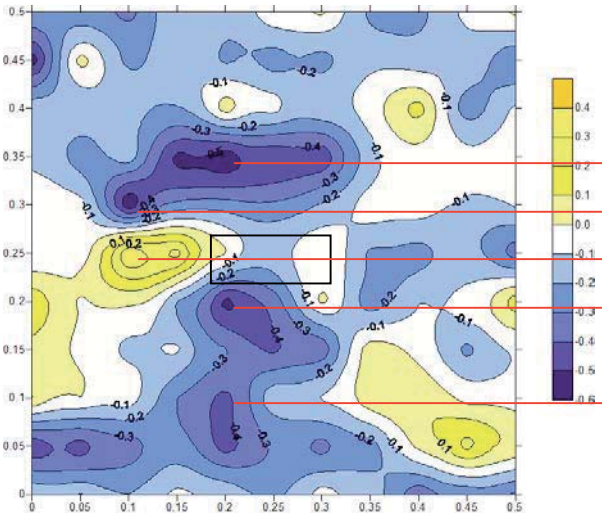
Diagr. 8: Effect by Nokia phone + sticker
Effects in the ambience of the cellular with the sticker indicate that background distortions are levelled out.



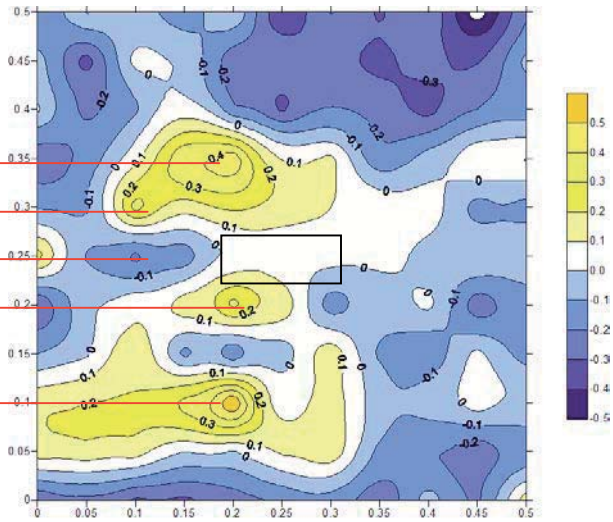
Diagr. 9: Field with iPhone + sticker
The field is obviously calmer than in the case of the iPhone without a sticker.



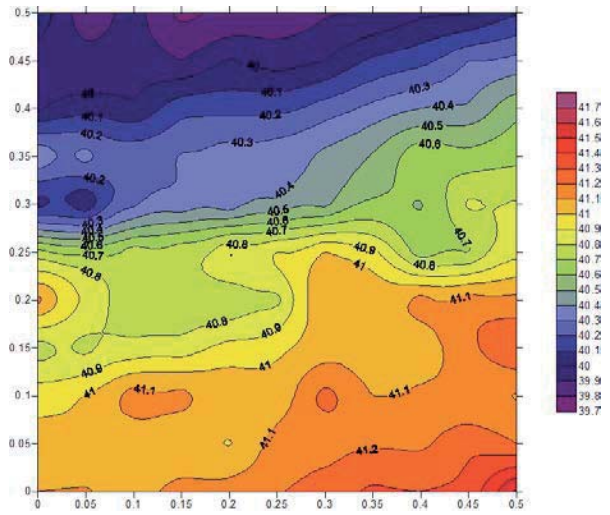
Diagr. 10: Effect by iPhone + sticker
Effects around the smart phone with sticker are complementary to those in diagr. 5.



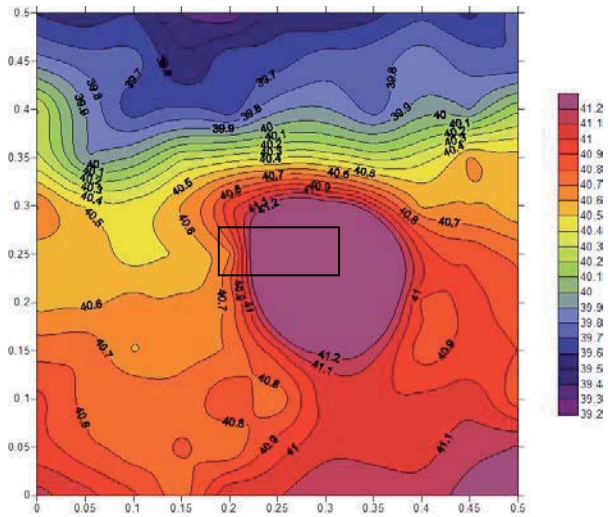
Diagr. 11: »B« effect after phone operation
The most pronounced distortions (blue = rise, yellow = decline of values) *following operation of cell phones without a sticker* occur in the ambience of the former position of cellulars.



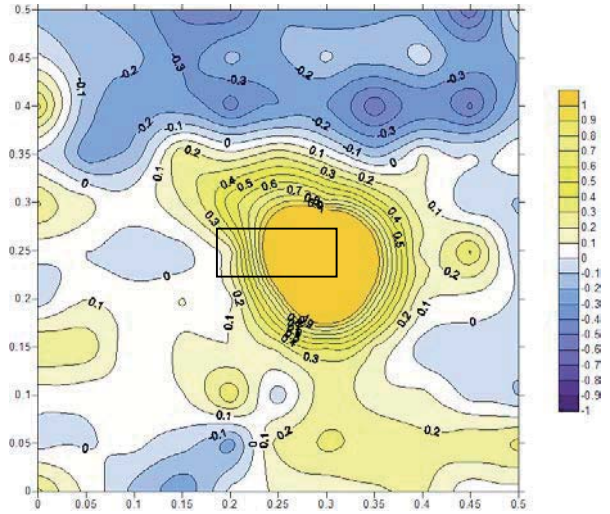
Diagr. 12: »B« effect by sticker on phones
»B« variations remaining *after operation of cell phones with sticker* rule out the effects by unprotected cellulars, (cf. diagr. 11, red lines between corresponding measuring points on left-hand and right-hand sides).



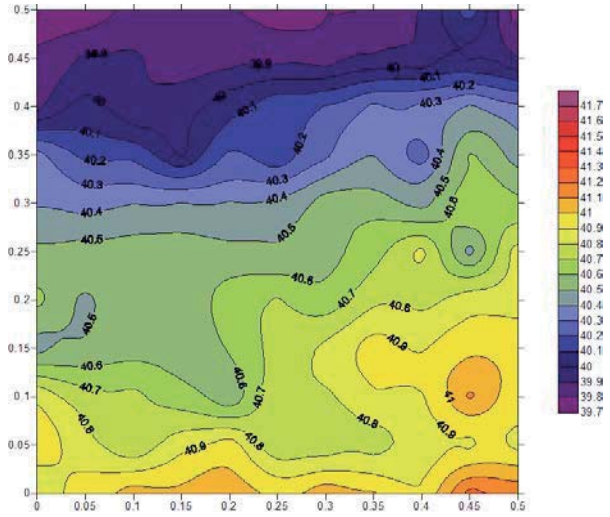
Diagr. 13: »B« before stress testing
Again, the background without a cellular was measured before test measurements proper (cf. diagr. 1).



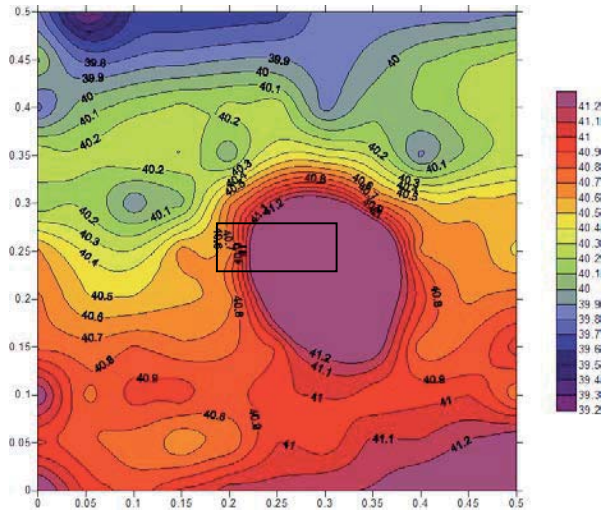
Diagr. 14: Field with iPhone
The measurement with iPhone (results mapped in diagr. 4) was repeated here.



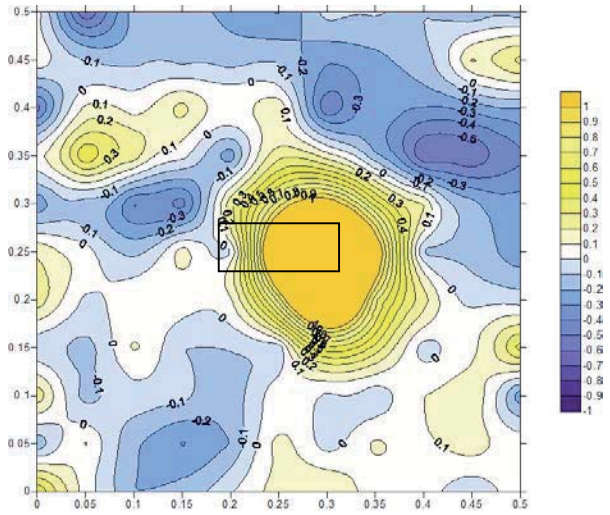
Diagr. 15: Effect by iPhone
This mapping answering to diagr. 5 exhibits – mostly in the upper and LHS portion – a similar structure of effects, with differences due to background variation.



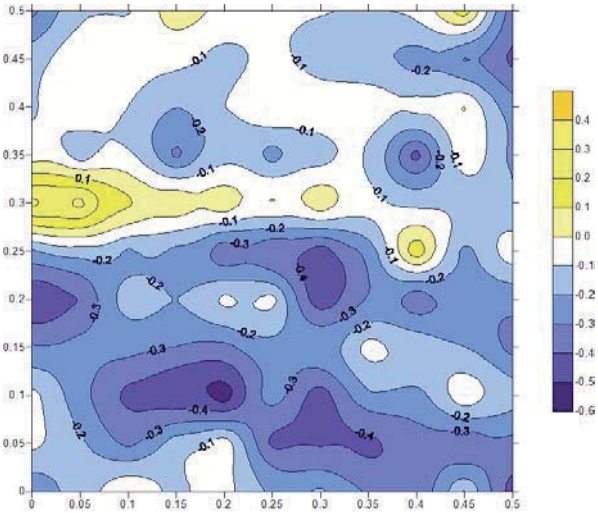
Diagr. 16: »B« after iPhone operation
The original magnetic background as mapped in diagr. 13 responds to the condition with iPhone operation (cf. diagr. 14), still after removal of the smart phone!



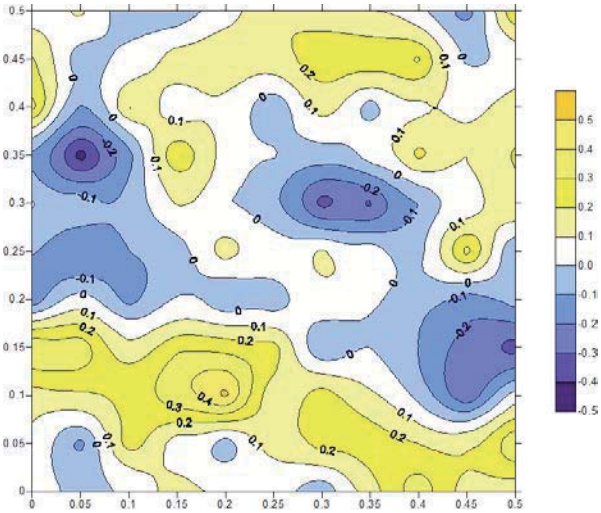
Diagr. 17: Field with iPhone + sticker (after magnetic stress treatment)
Situation answering to diagr. 9, but with a sticker having undergone 72 hours of exposure to a strongly inhomogeneous magnetic field.



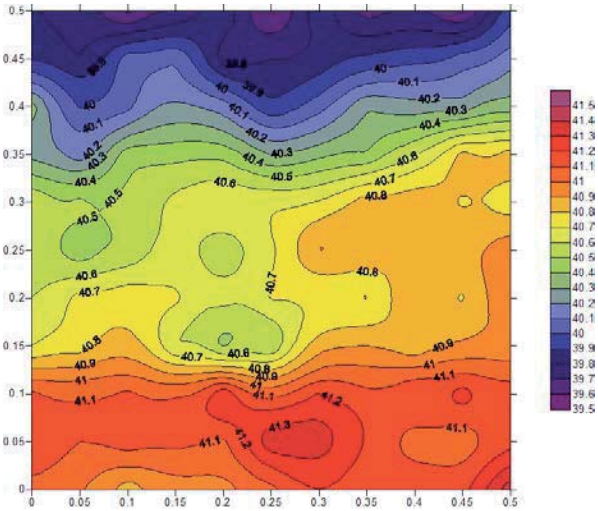
Diagr. 18: Effect by iPhone + sticker (after magnetic stress treatment)
Compared to diagr. 15 there is an obvious, distinct "levelling" or compensation effect.



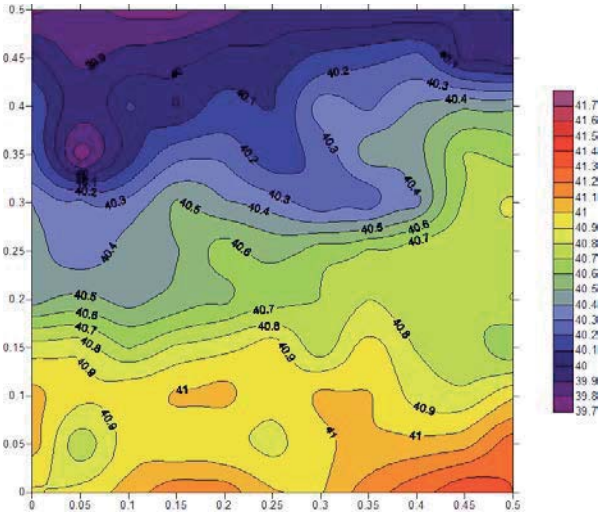
Diagr. 19: »B« effect after iPhone operation
Again, in the second measurement run, distortions (blue = rise, yellow = decline of values) *following operation of iPhone without a sticker* occur in the ambience of the former position of cellulars.



Diagr. 20: »B« effect after iPhone operation
Once more, *after operation of iPhone with sticker (having undergone magnetic stress treatment)*, the same compensation effect is found as in the first measurement run (cf. diagr. 20 : diagr. 19, same as diagr. 12 : diagr. 11).



Diagr. 21: »B« after 1st measurement run
Following operation of cell phones with stickers, the *background field is found about the same as before* in diagr. 1 (taking into consideration a natural variation of 0.2 μT).



Diagr. 22: »B« after 2nd measurement run
Following operation of an iPhone with a sticker previously put to magnetic stress treatment, the *background field is found about the same as before* in diagr. 13 (taking into consideration a natural variation of 0.1 μT).