Laboratory 1 – Discussion

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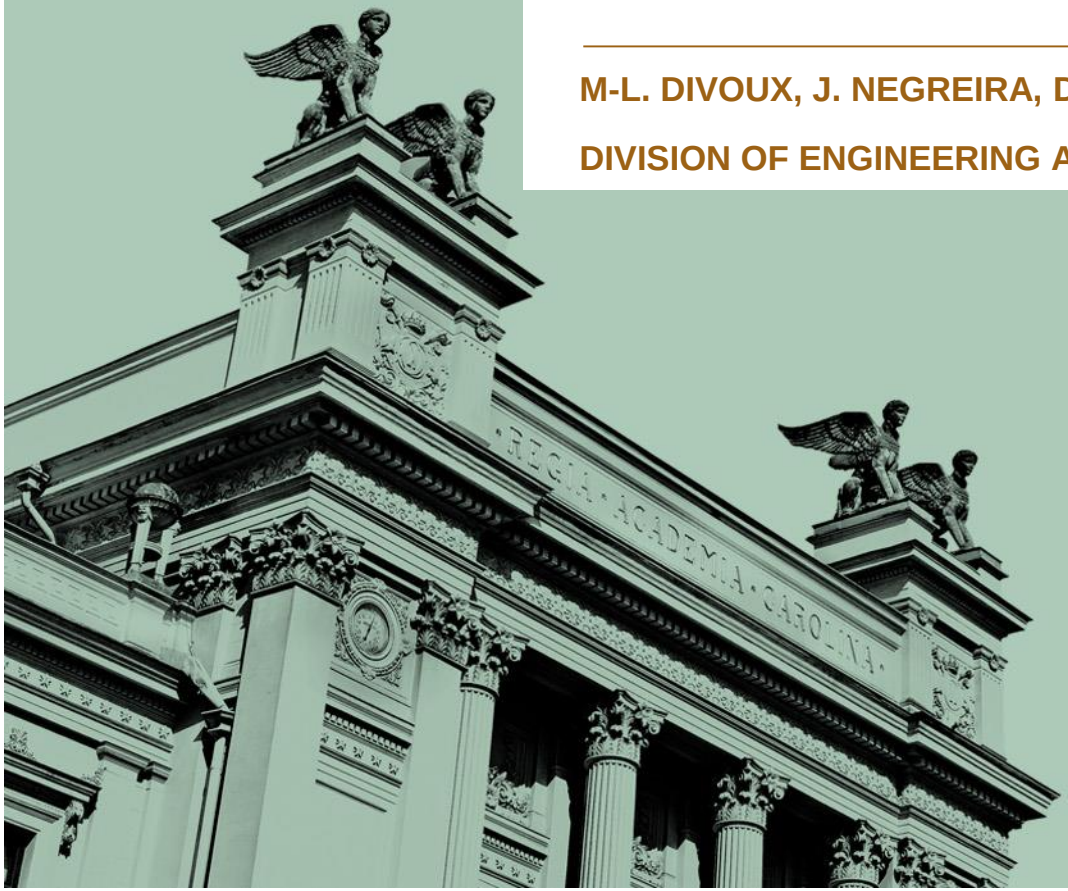
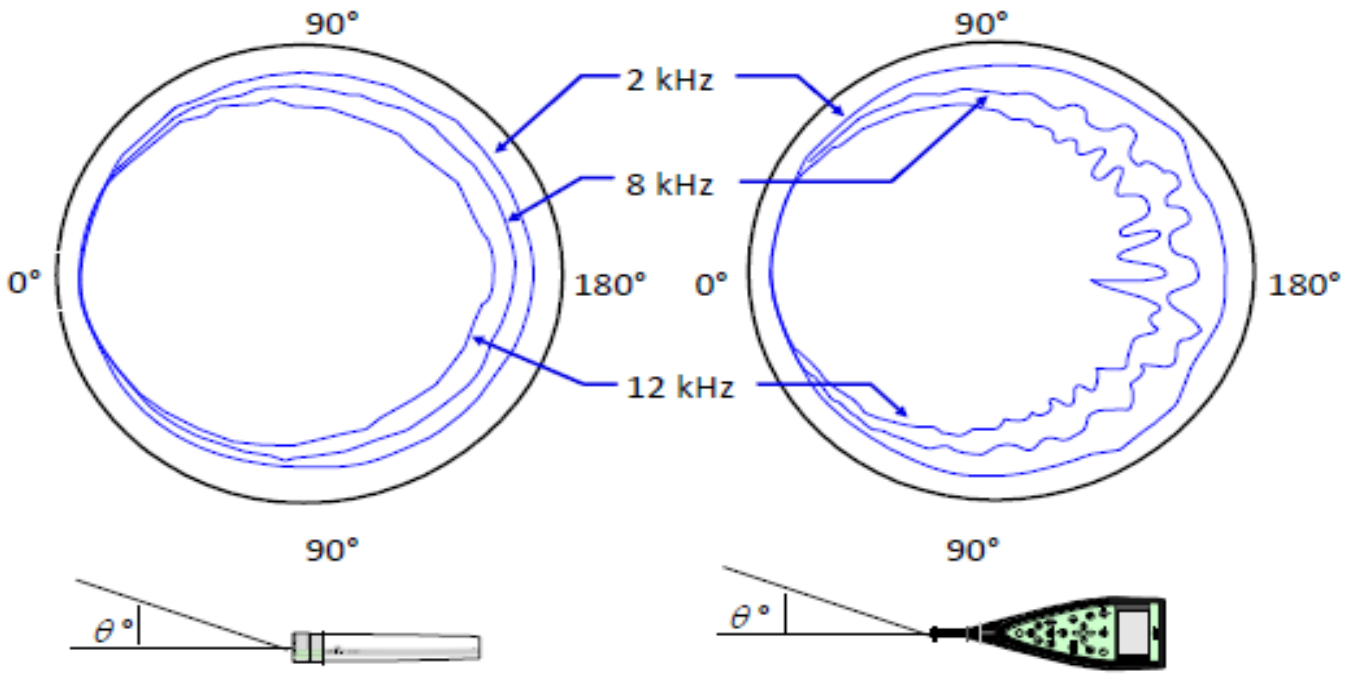


Outline

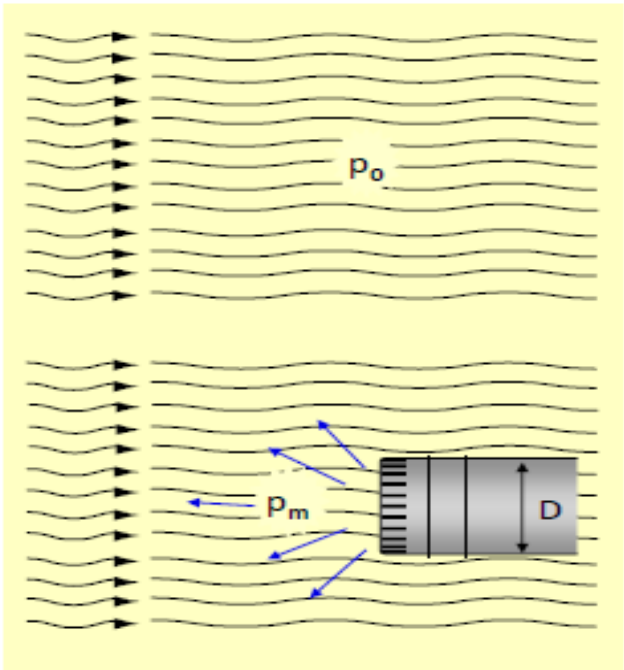
Microphone features

Directional Characteristics

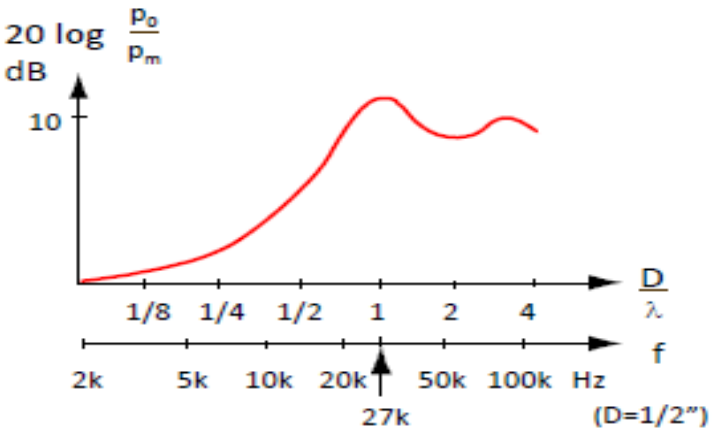


Microphone features

Free Field Correction



$$\sqrt{\frac{(5 - 4 \times \cos(\pi \times \text{freq} \times \text{diameter})}{c}}$$



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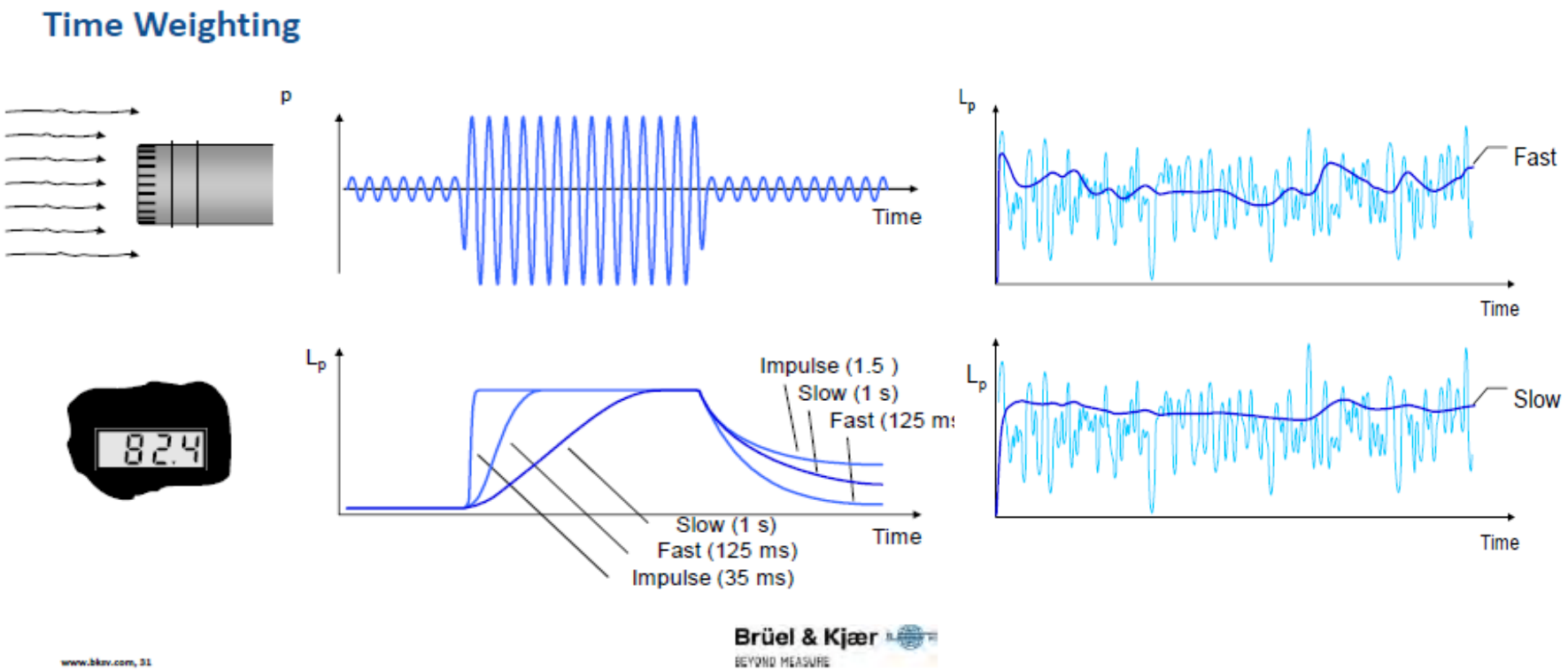
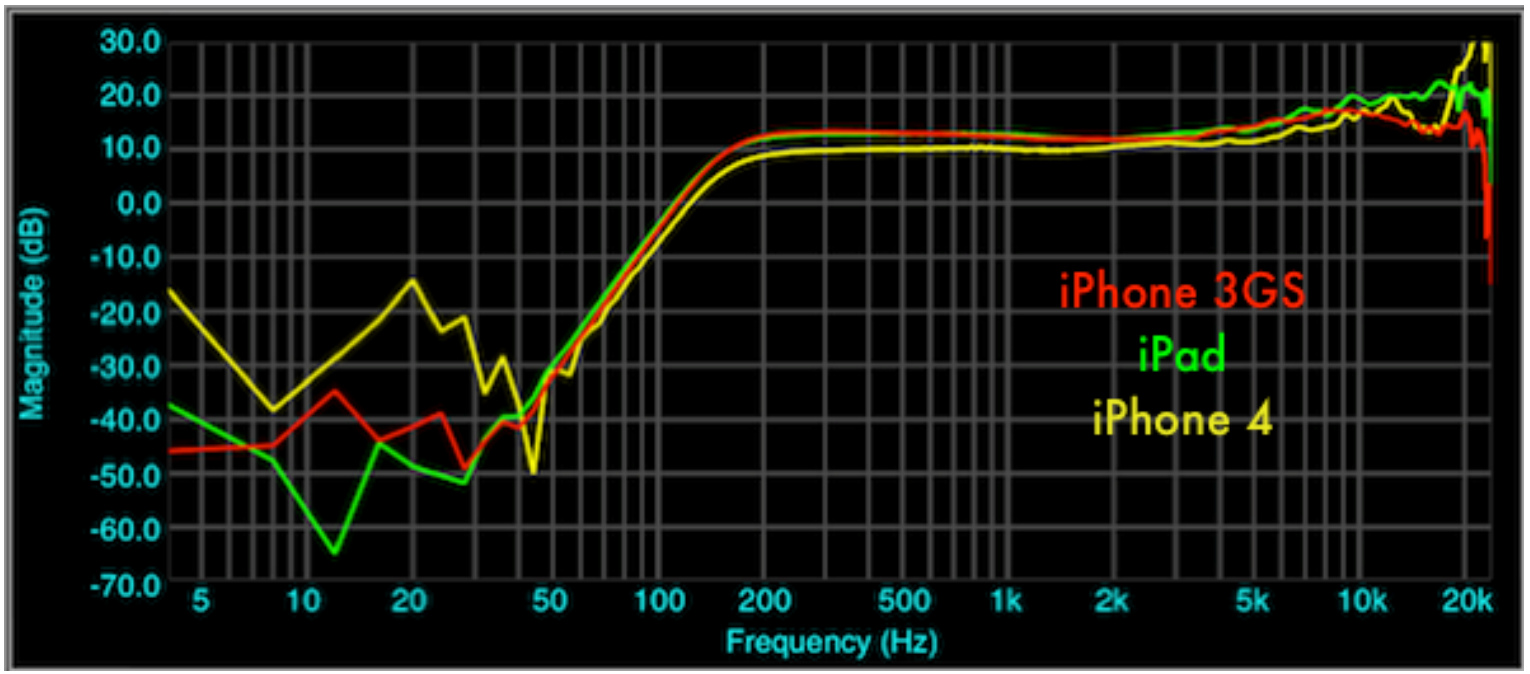
Microphone features



Microphone features

iPhone Built-in Microphone Frequency Response

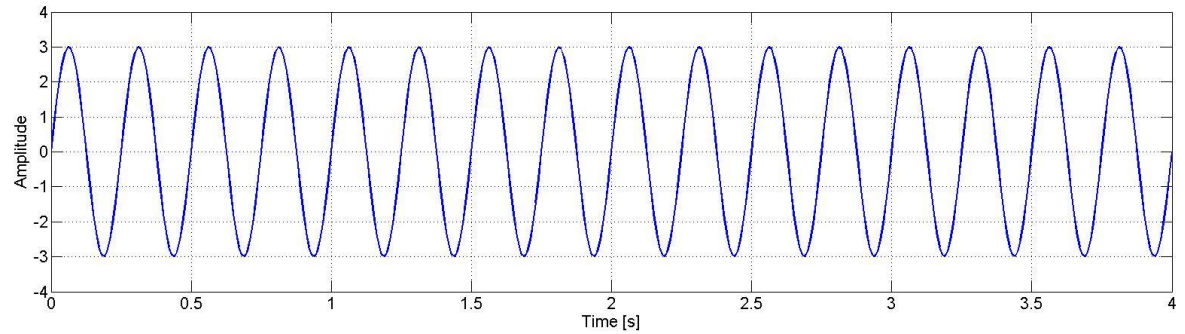


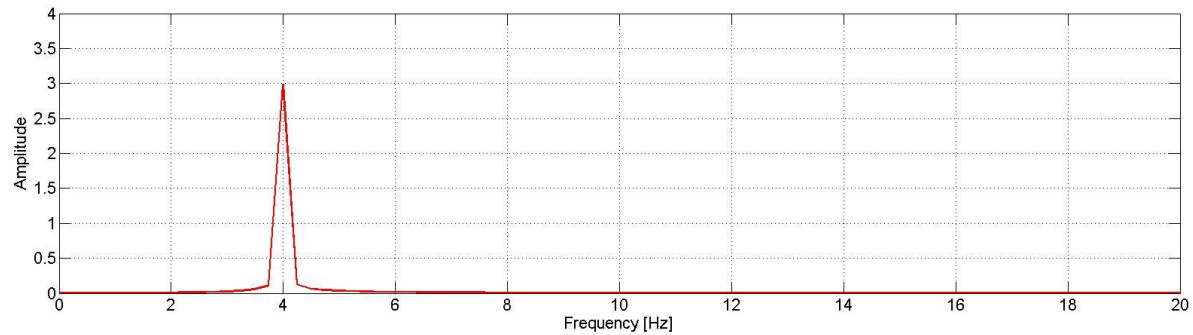
REF: http://blog.faberacoustical.com/2010/ios/iphone/iphone-4-audio-and-frequency-response-limitations/

Note on provided *"readsound.mat"*

$$y(t) = 3\sin(2\pi 4 \cdot t)$$

FFT



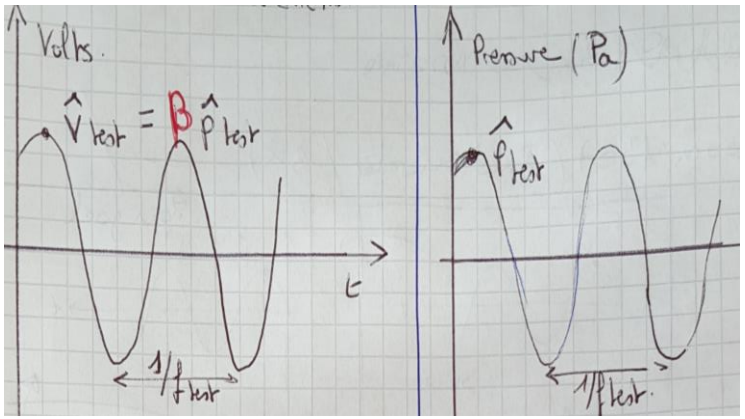


Smartphone calibration (I)

$$\tilde{p} = p_{ref} * \sqrt{10^{\,Leq/10}}$$

$$\hat{p} = \tilde{p} * \sqrt{2}$$

$$\beta = \frac{\hat{V}}{\hat{p}}$$



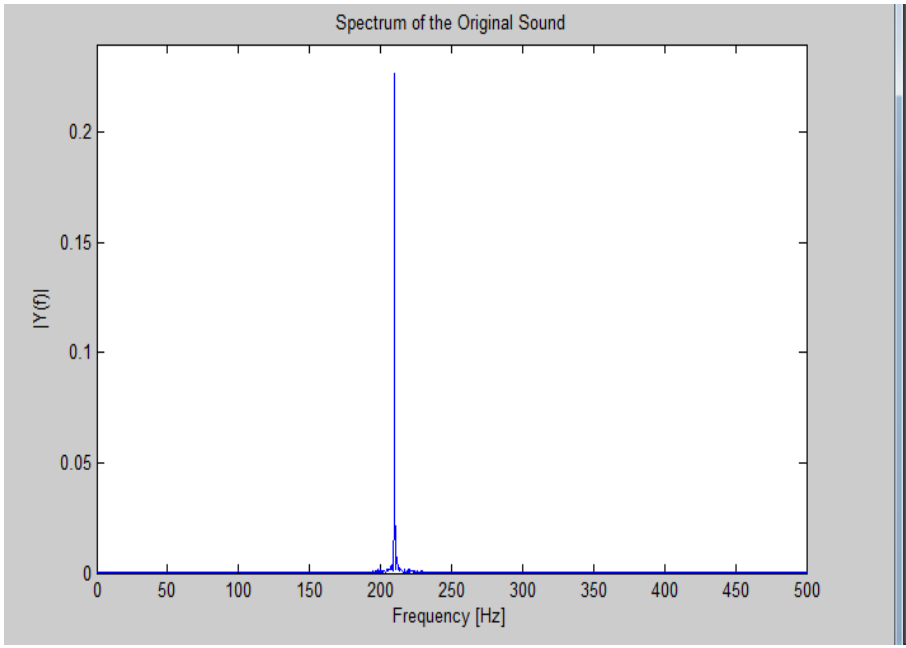
- **<u>210 Hz:</u>** $\hat{V}$=0,23 and $L_{eq,Norsonic}$ =80,7 dB

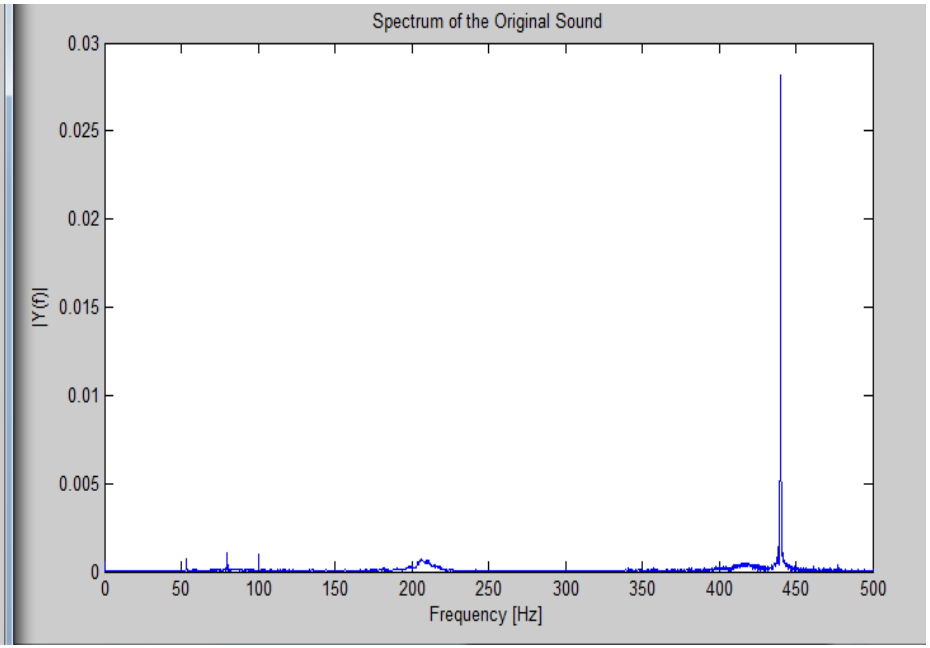
  → $\hat{p}$ = 15329·$p_{ref(20\ \mu Pa)}$ = 0,30658 Pa → $\beta = \hat{V}/\hat{p}$ = 0,75

- **<u>440 Hz:</u>** $\hat{V}$=0,029; → L_{eq}=62,71 dB with β =0,75

Smartphone calibration (II)

- Single tones, Part 1 (6th Oct 2015)
- *Readsound.mat* (Samsung edge):





Smartphone calibration (III)

440 Hz

Smartphone	Group	Output smartphone $\hat{p}$	Time weighting (F or S)	Average Δ(SPL-Leq)	β ~ 440 Hz	β average	β std deviation	L_{eq} 440 Hz (dB)	Comment
Samsung edge 6S	Divoux	0,029			0,75	0,75	0	62,71	

Smartphone calibration (IV)

210 Hz

Smartphone	Group	Output smartphone $\hat{p}$	Time weighting (F or S)	Average Δ(SPL-Leq)	β ~ 210 Hz	β average	β std deviation	L_{eq} 210 Hz (dB)	Comment
Samsung edge 6S	Divoux	0,23			0,75	0,75	0	80,7	

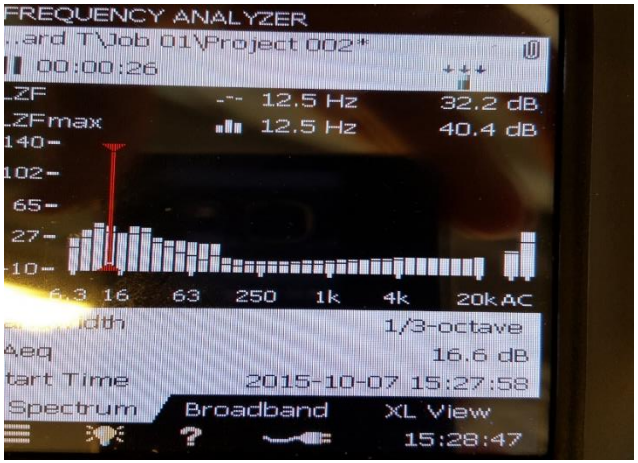
Smartphone calibration (V)

Silence / background noise

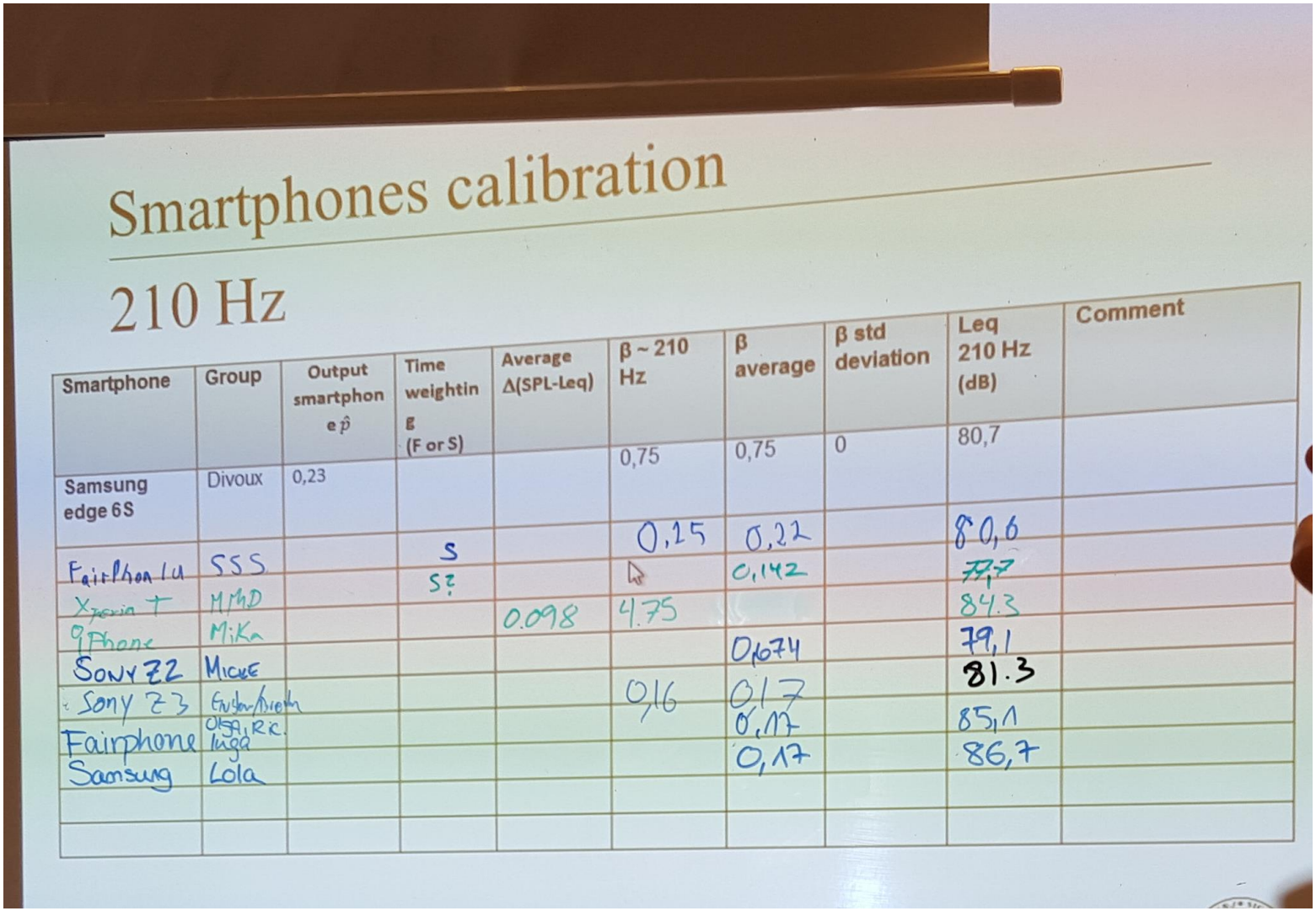
Smartphone	Group	Average Δ(SPL-Leq)	L_{eq} (dB)	Comment
Samsung edge 6S	Divoux		80,7	

Smartphone calibration (VI)

Silence / background noise in anechoic chamber

Mesure anechoic chamber	L_{Aeq}	L_{Ceq}	L_{eq}	
7th Oct / fan B&K	16,7	35,5		
8th Oct/ fan B&K	17,6	35,9		
4th Nov Norsonic	15,6		43,2	
6th Nov Norsonic	15,6		44,6	

Results



Smartphones calibration

210 Hz

Smartphone	Group	Output smartphone $\hat{p}$	Time weighting (F or S)	Average Δ(SPL-Leq)	β ~ 210 Hz	β average	β std deviation	Leq 210 Hz (dB)	Comment
Samsung edge 6S	Divoux	0,23			0,75	0,75	0	80,7	
Fairphone	SSS		S		0,25	0,22		80,6	
Xperia T	MMD		S?			0,142		~~77,7~~	
iPhone	Mika			0.098	4.75			84.3	
Sony Z2	Micke					0,674		79,1	
Sony Z3	Gustav/Björn				0,16	0,17		81.3	
Fairphone	Olga, Ric.					0,17		85,1	
Samsung	Lola					0,17		86,7	

Thank you for your attention!

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