CGPM 2007

CCAUV report

President: Dr. Joaquín Valdés (CIPM)

Executive Secretary: Dr. P. Allisy-Roberts (BIPM)

CCAUV meetings

1999, 2001, 2002, 2004 and 2006

16 members and 14 observers

CCAUV

Summary of Comparison Status

A

Sound pressure in air

2 CIPM key comparisons published

1 in progress.

A

Free field sound pressure in air

1 CIPM key comparison in progress

(due to finish in 2008)

A

Sound pressure in water

1 CIPM key comparison published

U

Ultrasonic power

2 CIPM key comparisons published

V

Vibration

1 CIPM key comparison of charge sensitivity published in 2002, an extension of which is in progress with three additional participants, who will be linked through the PTB.

RMO key comparisons

linked to CIPM key comparisons

APMP

1 comparison of sound pressure in air published in 2007, and one in progress, with ten participants, that is due to finish in 2007.

1 vibration comparison of charge sensitivity published in 2004.

COOMET

1 comparison of sound pressure in air published in 2007, another one in progress.

1 vibration comparison of charge sensitivity in progress (due to finish in 2007).

EUROMET

2 comparisons of sound pressure in air published in 2007.

1 comparison of ultrasonic pressure planned for 2008.

1 vibration comparison of charge sensitivity published in 2006 (an extension planned for a further four participants).

SIM

1 comparison of sound pressure in air published in 2007 for five participants.

1 vibration comparison of charge sensitivity approved for equivalence (an extension is to be published).

Status of the non SI units neper and bel

In 2004 the CCAUV addressed again the question of confusion generated by the use of dimensionless units like the neper and the bel instead of the SI units.

Two proposals were supported

1.- Remove the bel and the neper from Table 6 to Table 8 as “non SI units”

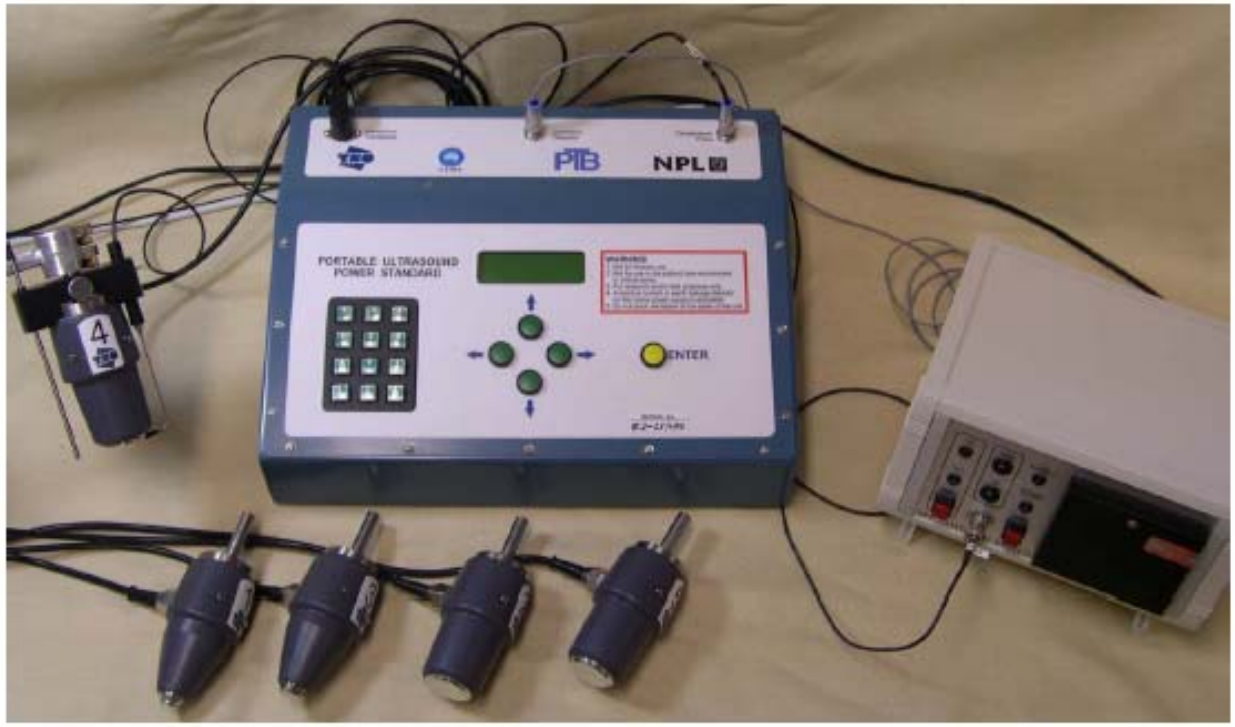
2.- The reference value of the quantity should always be stated in SI units whenever the decibel is used.

Advances in AUV research work

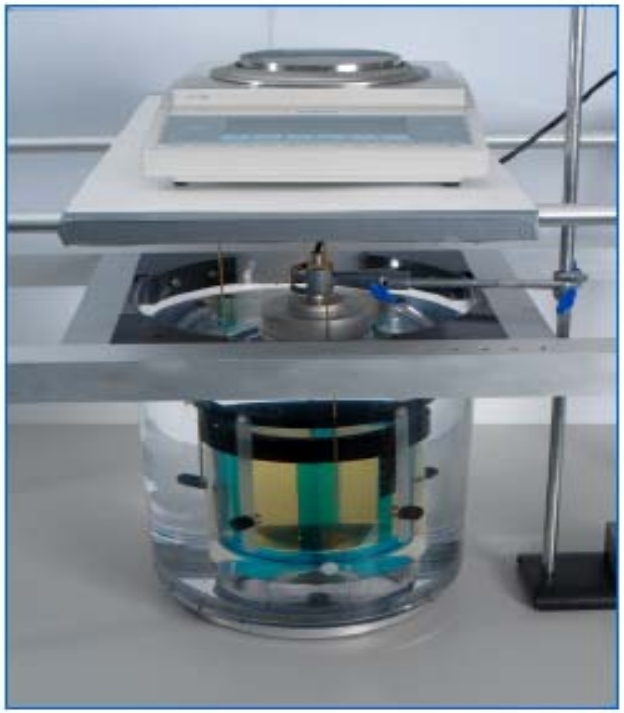
New developments

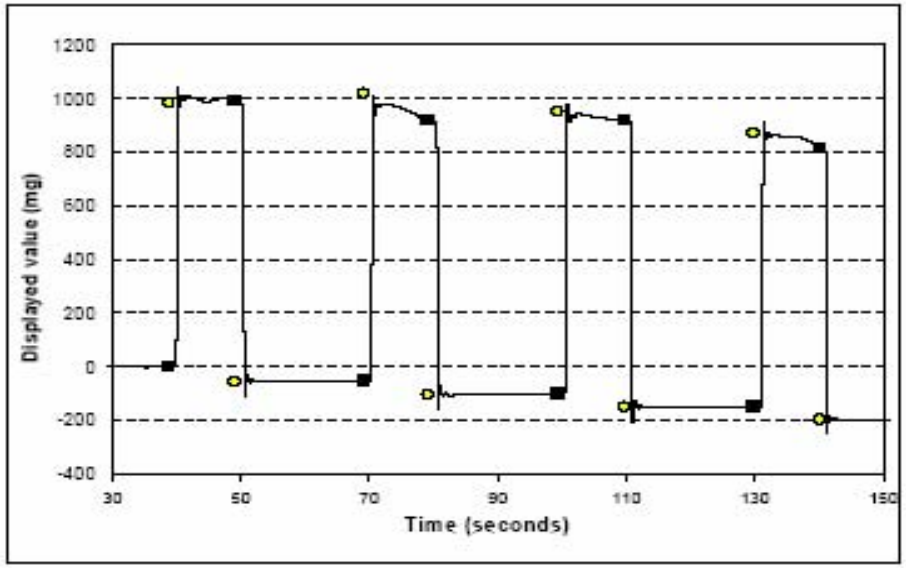
NPL – PTB – TNO - CSIRO

Portable ultrasound power standard

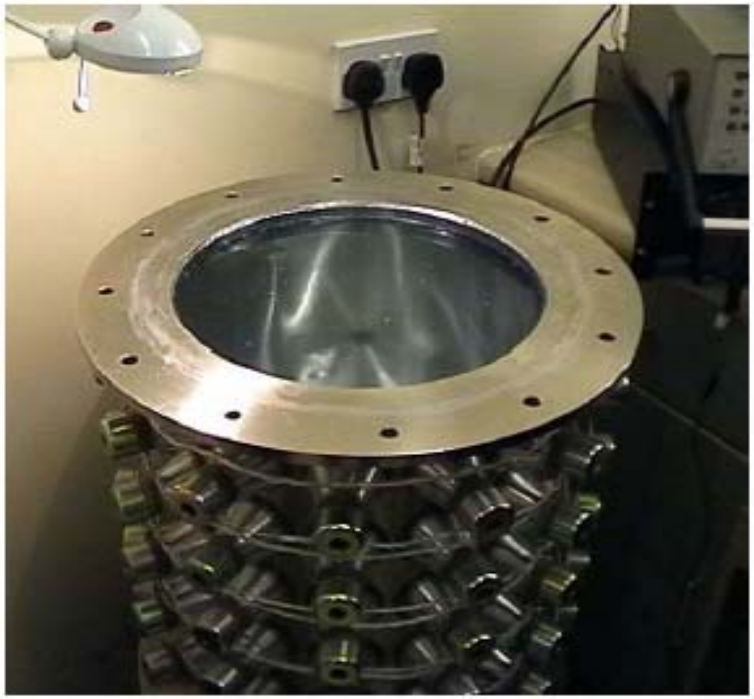


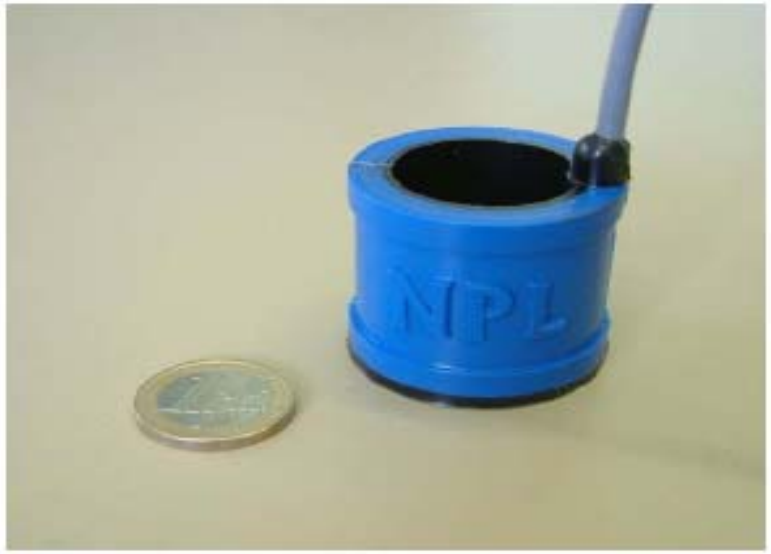
Measurements of ultrasound power at very high therapy levels (> 300 W).

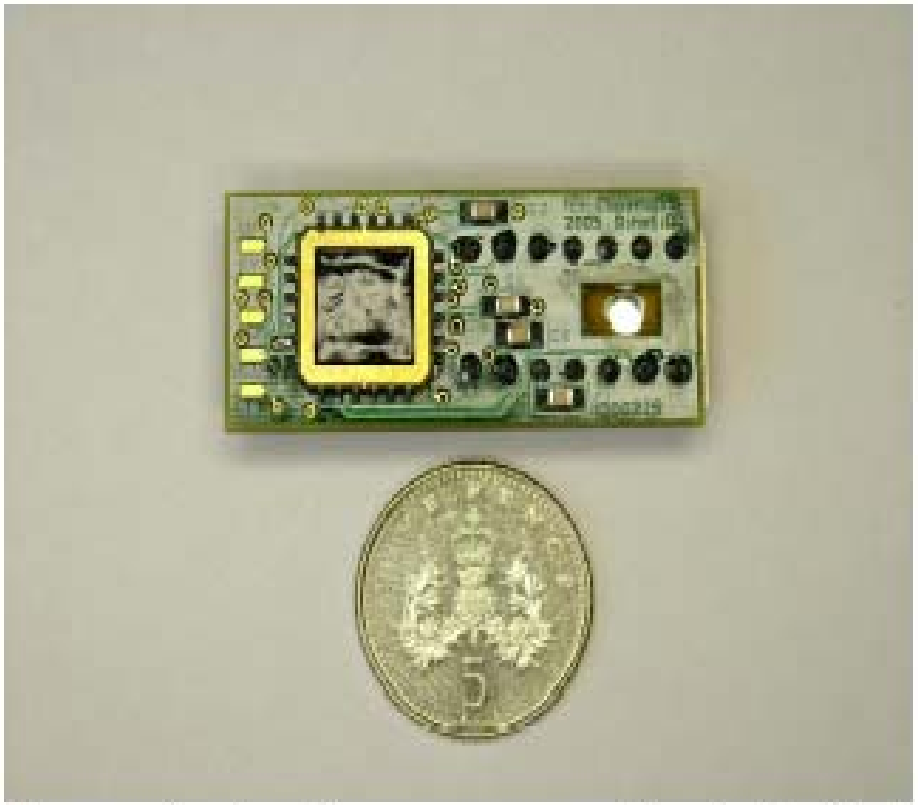




Standardisation of measurements for high power ultrasonic cavitating fields

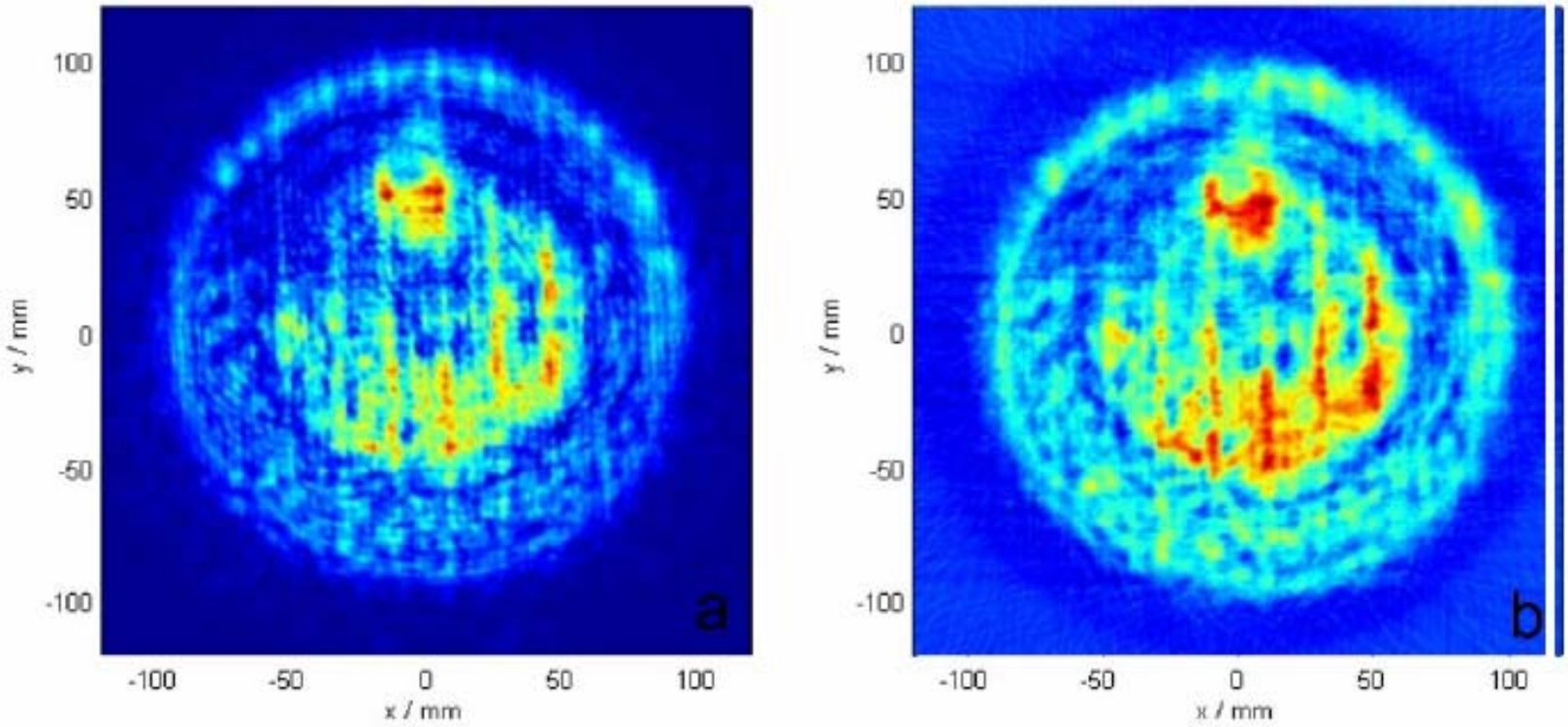






Shown in the figure are: on the left, first generation hardware with circular microphone diaphragm towards right hand side of board. Other components are for capacitance detection, signal conditioning and amplification. Device is coupled to additional wireless and signal processing hardware (not shown). On the right, microphone under test for effect of humidity. NPL have developed test suite for free field sensitivity, temperature, pressure and humidity dependencies, noise floor and distortion (leading to dynamic range)

Optical tomography for measuring acoustic fields in water



Planar hydrophone scan (left) and acousto-optic tomography scan (right) at 12 mm from the surface of a high frequency sonar array operated at 500 kHz. The colour mapping shows an arbitrary amplitude scale.

INTER-NOISE 2007

28-31 AUGUST 2007
ISTANBUL, TURKEY

An investigation of microphone calibration in a diffuse field

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Acoustic Technology, Ørsted•DTU
Technical University of Denmark
Ørsteds Plads B352
2800 Kgs. Lyngby
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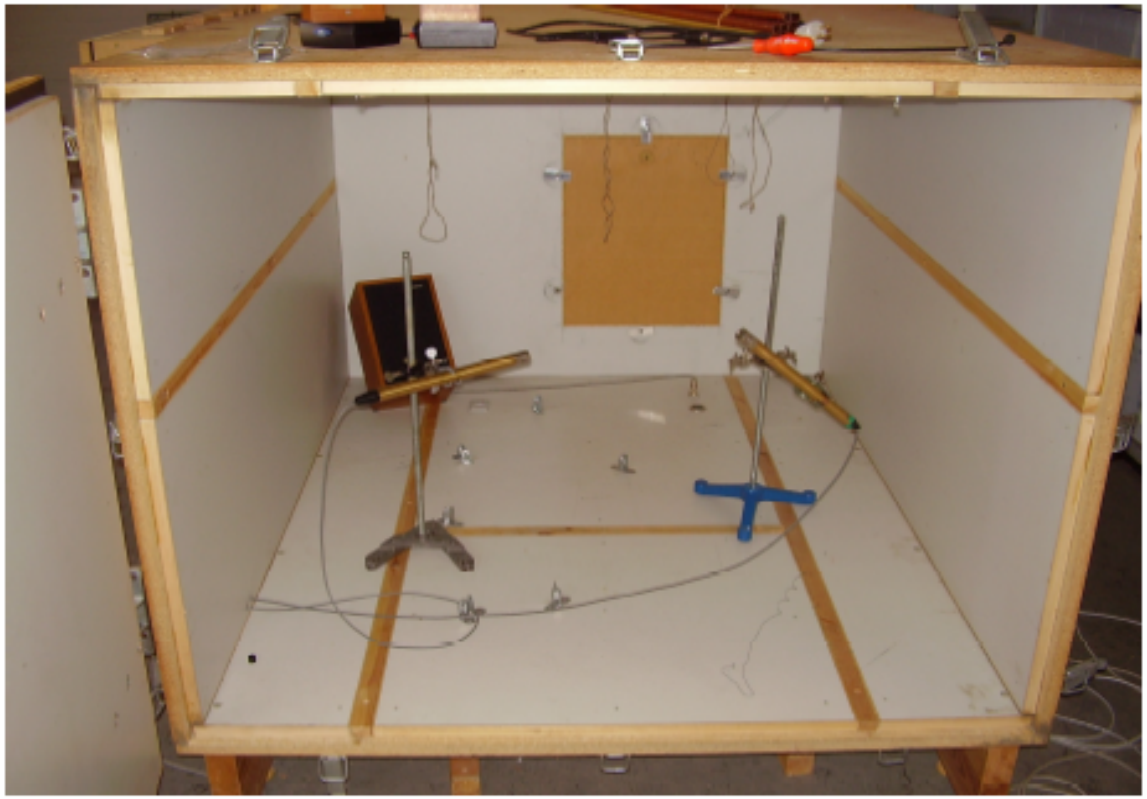
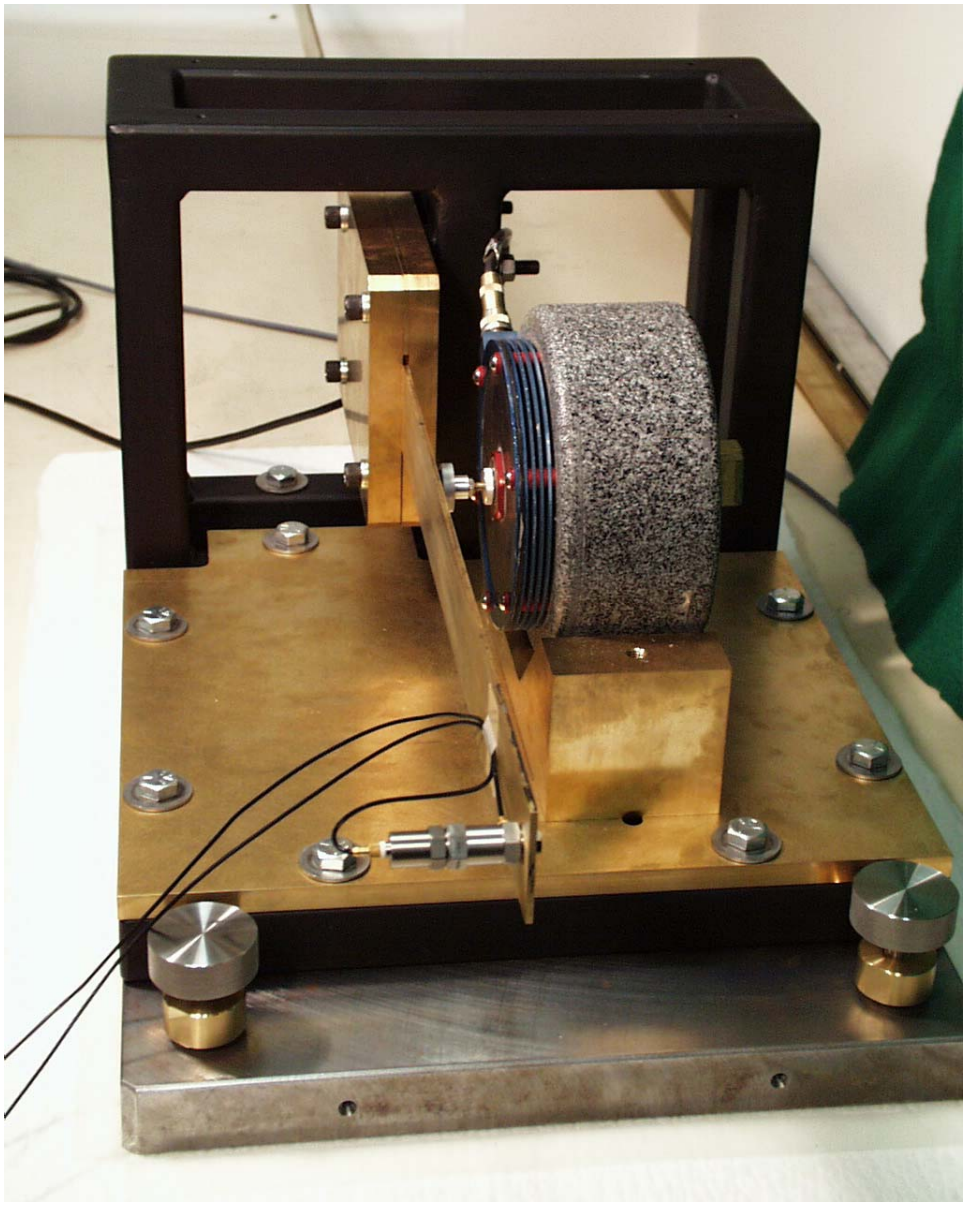


Figure 1. Picture of the scale model of the reverberation room.

Very little has been published on diffuse-field calibration of microphones [8, 9]. The only fundamental study was published more than forty years ago [8], and no standard about the diffuse-field calibration of microphones has ever been developed, undoubtedly because diffuse-field reciprocity calibration of microphones is even more difficult than free-field reciprocity calibration.



NRC

Ohm, W.S., Wu, L., Hanes, P., Wong, G.S.K.

"Generation of low-frequency vibration using a cantilever beam for calibration of accelerometers“

Journal of sound and vibration 289 (1/2), 192-209, January 3, 2006.

Meas. Sci. Technol. 17 2197–2205

Investigations of primary high frequency vibration calibration using Sine-approximation method: problems and solutions

Qiao Sun, W. Wabinski and T. Bruns 2006

NIM China, PTB, Germany

AUV metrology for materials testing

Some examples

AUV metrology for materials testing

NPL

Techniques to determine the acoustic properties of panel materials used at sonar frequencies,

Measurements applied in the area of ultrasound for characterization of the acoustic properties of tissue-like and acoustic absorbing materials.

AUV metrology for materials testing

PTB

Measurement of the dynamic influences on force transducers and the traceable dynamic calibration of force transducers.

AUV metrology for materials testing

CENAM

Applications for the automotive industry related to the visco-elastic properties of materials.

Measurement differences demonstrated between laboratories had a real economic impact.

The expertise residing within the CCAUV would be of benefit in addressing these issues.

AUV metrology for materials testing

ISO

Measurements are required to take decisions. The whole traceability chain should be considered, from primary standards through field calibrations to customer measurements, welcoming a widening of the scope of the CCAUV to encompass testing of materials and structures.

AUV metrology for materials testing

IEC

Need to develop suitable standards for the emerging high intensity focused ultrasound (HIFU) equipment for therapeutic applications (significant topic discussed in the IEC Technical Committee 87 on Ultrasonics).

AUV metrology for materials testing

IMEKO

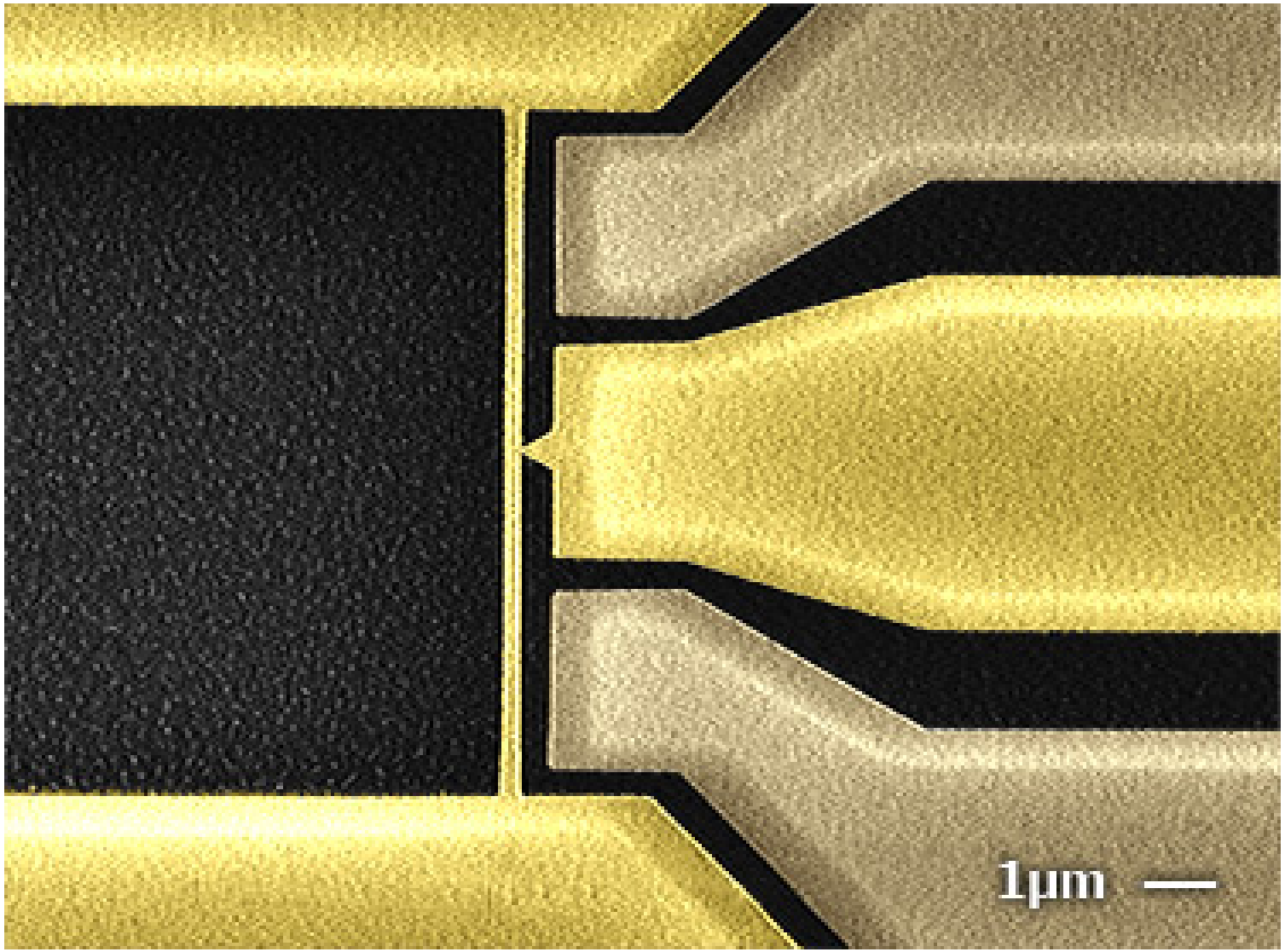
IMEKO Technical Committee TC 22 as a new forum for vibration and shock metrologists, also focus applications of metrology for testing.

CCAUV Working Groups

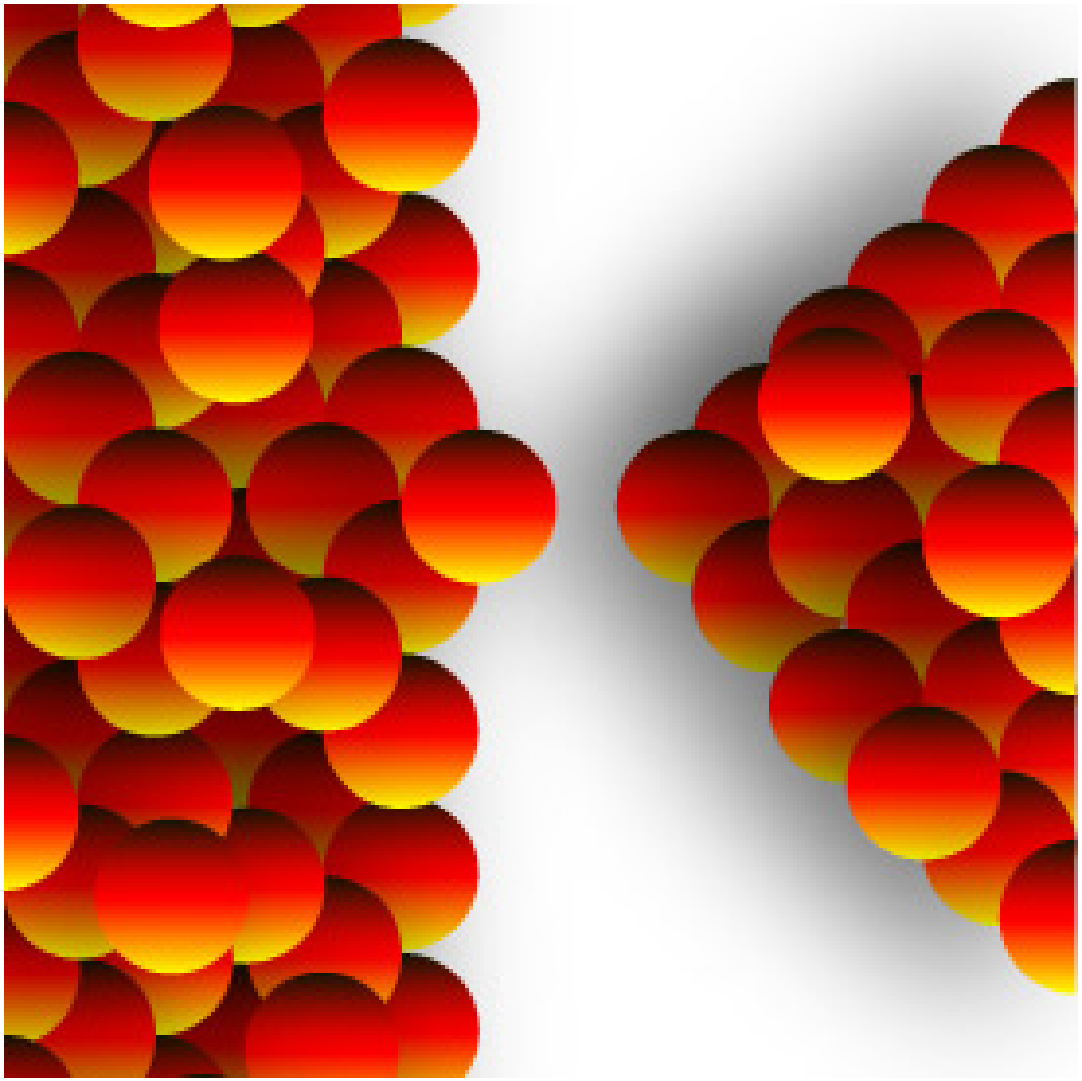
CCAUV Working Group for RMO Coordination

CCAUV Working Group on Strategic Planning

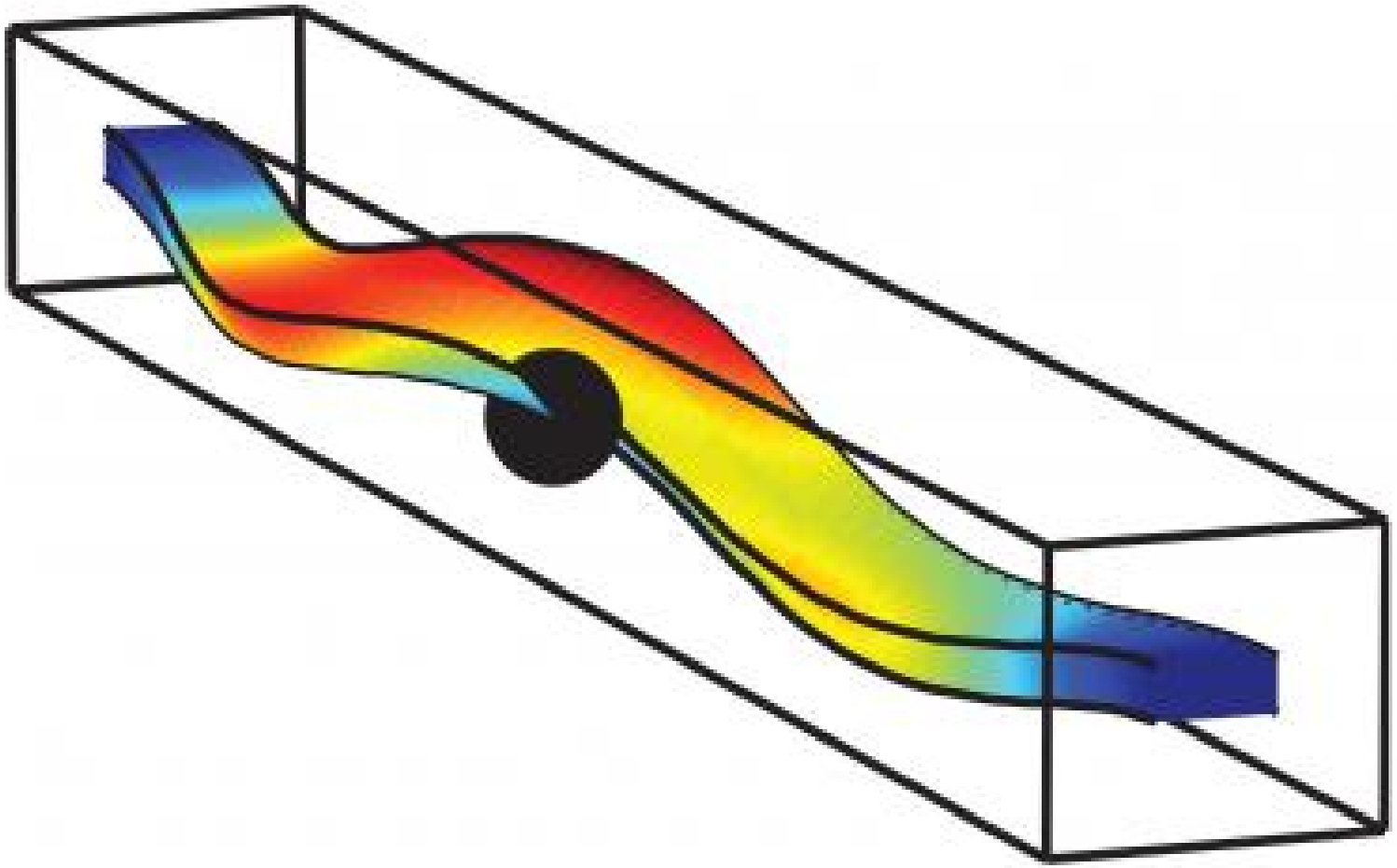
Chairman Bajram Zeqiri NPL, Christian Koch (PTB), TakashiUsuda (NMIJ), Salvador Echeverría-Gomez (CENAM), Alexander Enyakov (VNIIFTRI), Ian Veldman (CSIR-NML) and Enver Sadikoglu (UME – Coord. iMERA roadmaps)



Displacement detector JILA - NIST



Atomic point contact



High frequency nanoscale vibrations near the Heisenberg uncertainty limit

Thank you for your attention !!