

gampt **ULTRASOUND ● SCHOOL**

11. Workshop „Innovative Lehrmittel für das Erlernen physikalischer Konzepte“

Natalia Pozoga, Uwe Peterson

GAMPT – GESELLSCHAFT FÜR ANGEWANDTE MEDIZINISCHE PHYSIK UND TECHNIK

1998 Firmengründung

2003 Zappendorf

seit 2010 in Merseburg bei Halle



Ausbildung

- Equipment für die Ausbildung an Fach- und Hochschulen



Medizin

- Messung von Mikroblasen (BubbleCounter)
- THED - Time Harmonic Elastography (Kooperation mit Charité Berlin)



Industrie

- Messungen dünner Schichten
- Ultraschallsonden nach Kundenspezifikation
- F&E - Entwicklung von Sensoren und Messtechnik

GAMPT – Ultraschall in der Ausbildung



⇒ Didaktische Vorteile:

- **Leichtes Verständnis** durch einfache und anschauliche Objekte
- **Hohe Motivation** der Schüler und Studenten durch selbstständiges Arbeiten und Experimentieren
- **Strukturiertes Lernen** durch schrittweises Vorgehen im Experiment

A photograph of children in a classroom. In the foreground, a child is holding a small black object, possibly an ultrasound probe. In the background, another child is holding a white container with a blue lid. The scene is brightly lit, and the children appear to be engaged in a learning activity. The text 'ULTRASOUND 4 SCHOOL' is overlaid in large, bold, yellow letters.

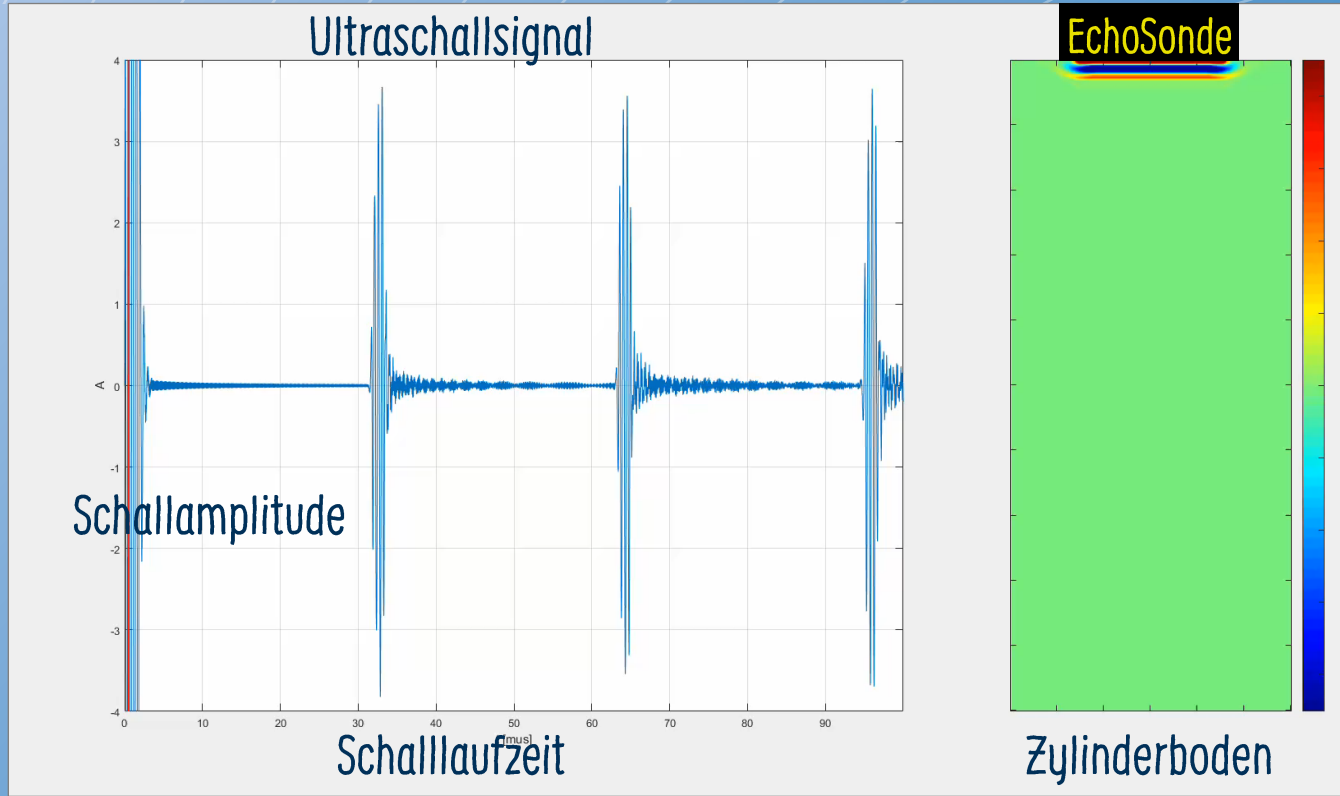
ULTRASOUND 4 SCHOOL

Ultraschall begreifen mit dem

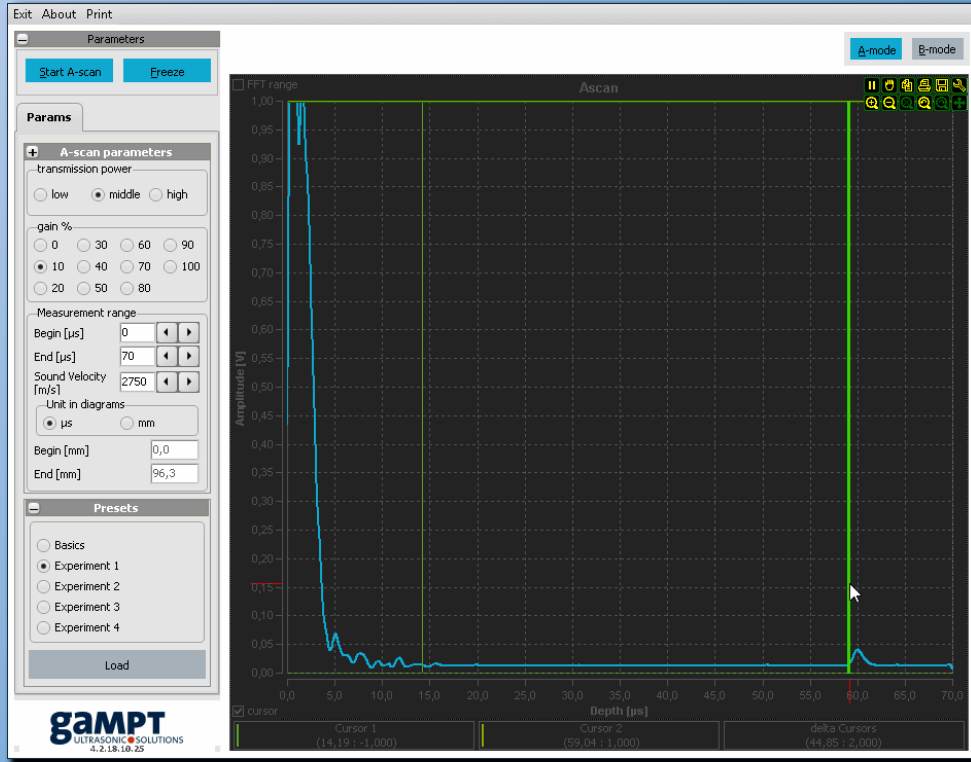
EchoSet



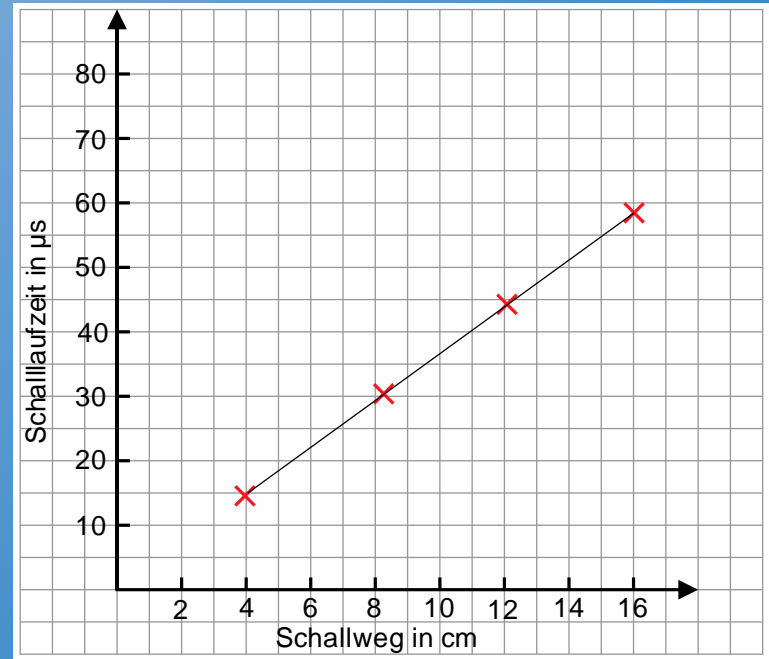
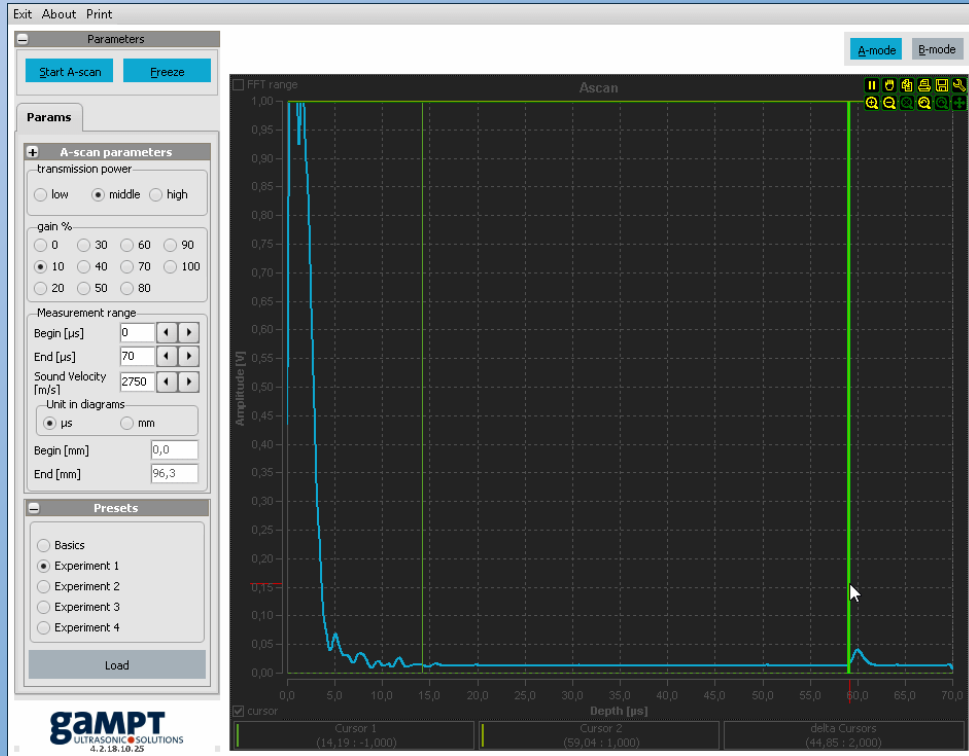
Simulation der Fortpflanzung eines Ultraschall-Impulses in einem Zylinder



EchoSet Experiment 1 – Schallausbreitung im Festkörper

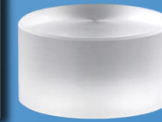
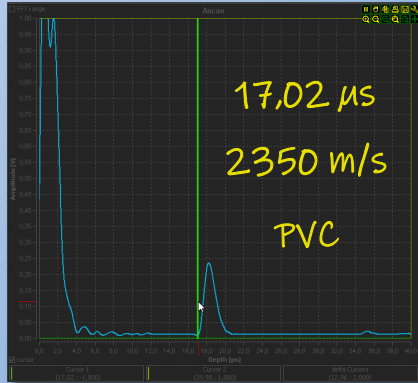


EchoSet Experiment 1 – Schallausbreitung im Festkörper



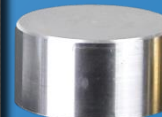
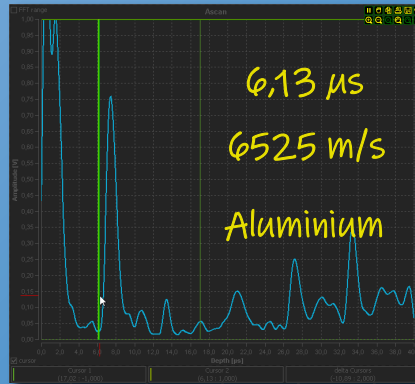
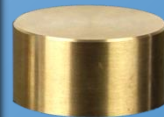
Schalllaufzeit ~ Schallweg

EchoSet Experiment 2 – Materialabhängige Schallausbreitung



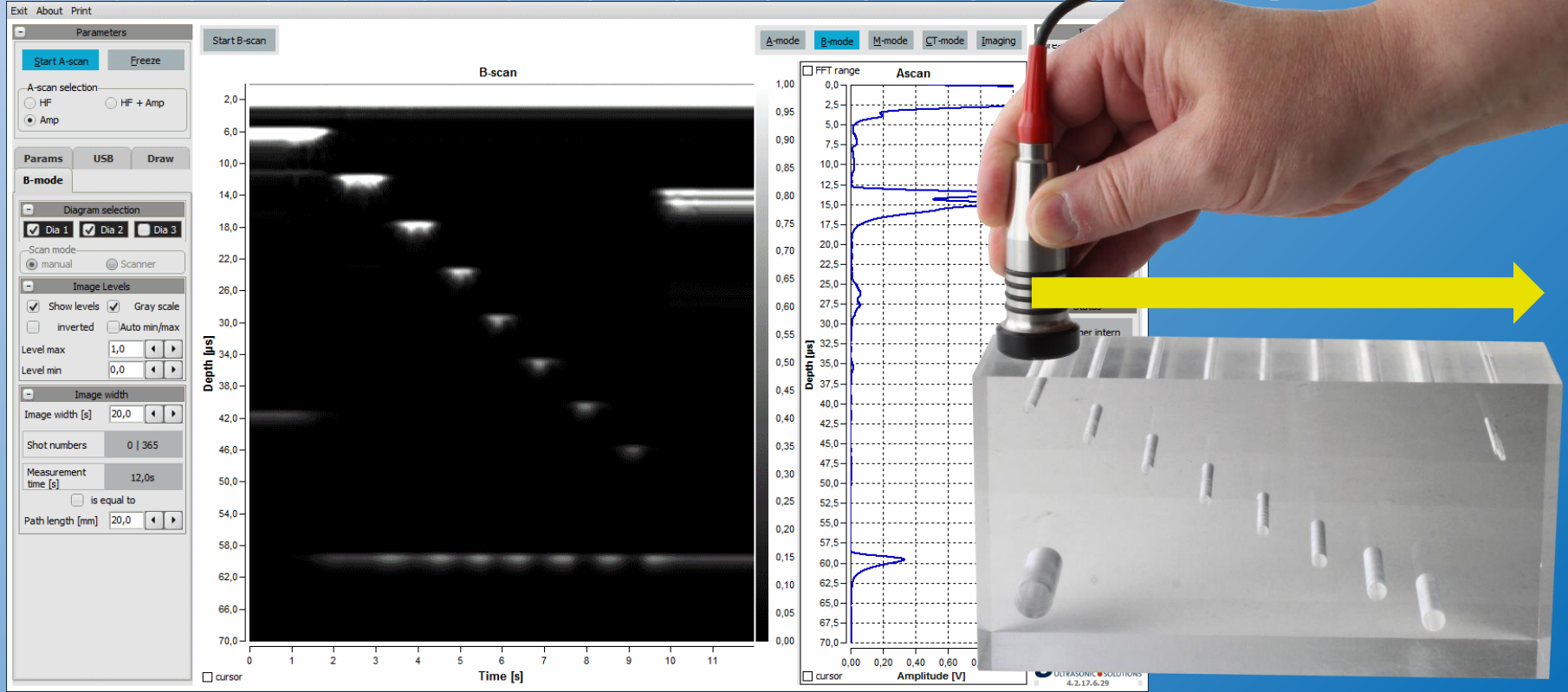
$$c = \frac{2 * h}{t}$$

c - Schallgeschwindigkeit
h - Probenhöhe = 2 cm
t - Schalllaufzeit

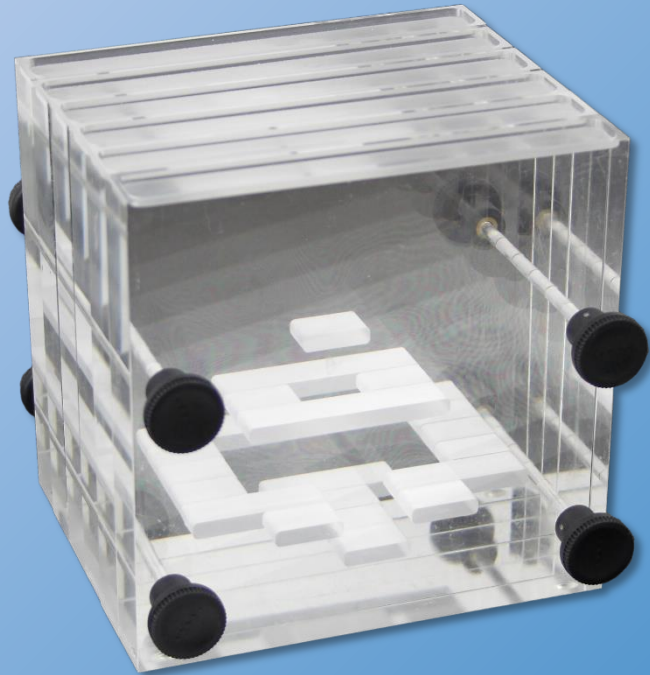


Material	Schallgeschwindigkeit in m/s	Material	Schallgeschwindigkeit in m/s
Aluminium	6350	Messing	4430
Kupfer	4660	Plexiglas	2760
Silber	3600	PVC	2330
Gold	3240	Polyurethan	1780
Blei	2160	Teflon	1400
Luft (20°C)	343	Wasser (20°C)	1484

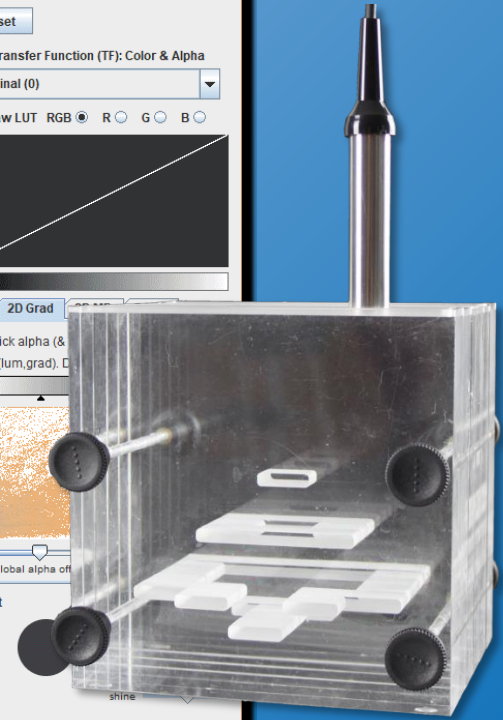
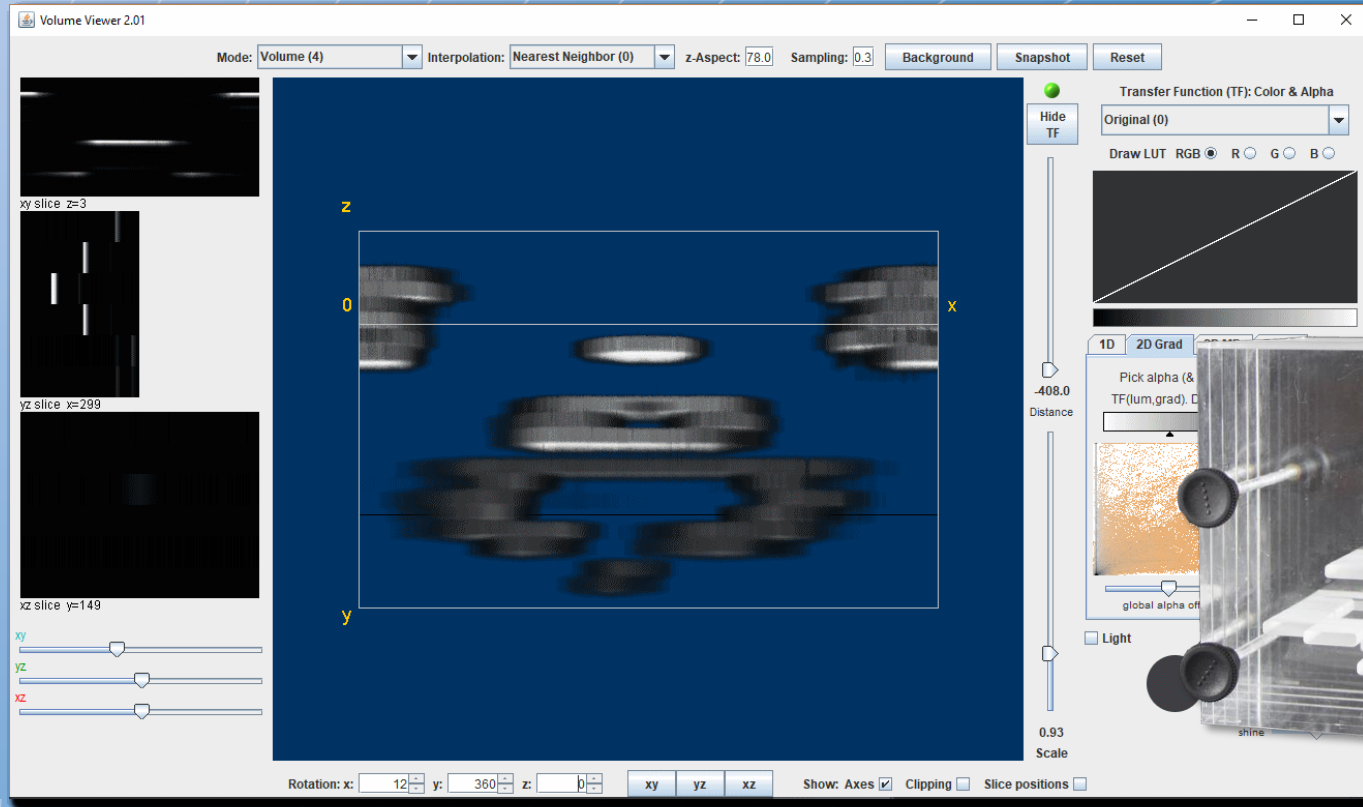
EchoSet Experiment 3 – Das handgeführte B-Bild



EchoSet Experiment 4 – 3D-Ultraschall



EchoSet Experiment 4 – 3D-Ultraschall



Ultraschall zum Anfassen
mit dem

ImageSet

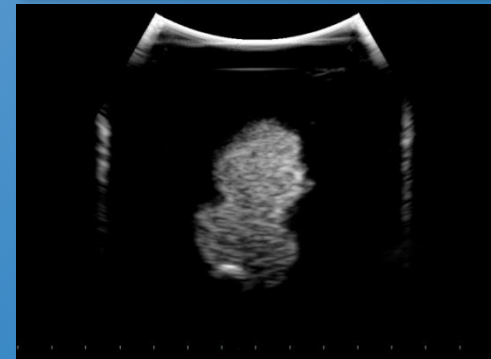
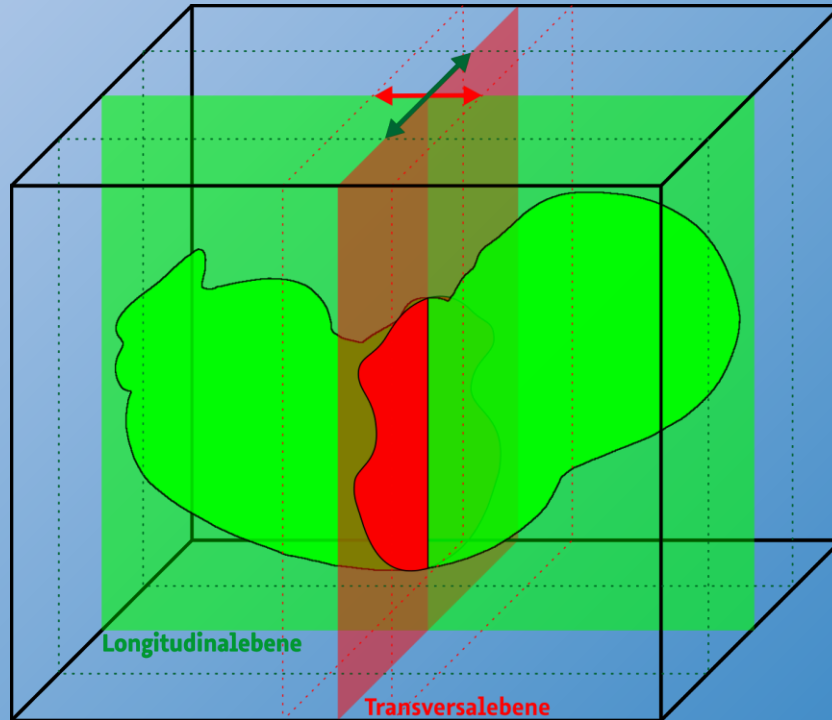


ImageSet Demoversuch – B-Bild mit ImageSonde

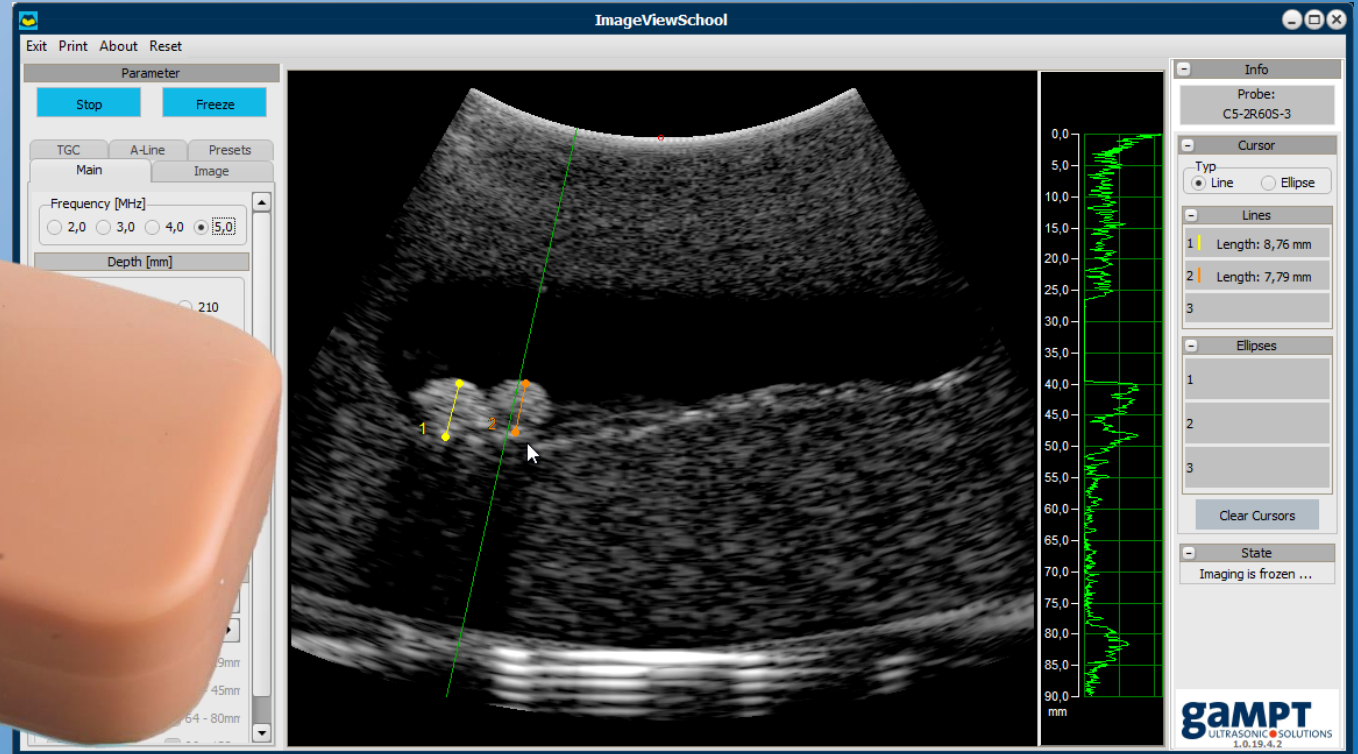


Sonogramm des konvexen Wandler-Arrays aus 64 Elementen

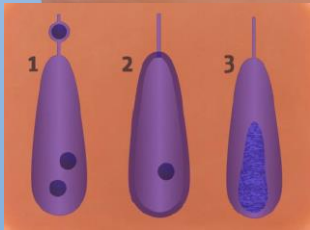
Scannen in Längsrichtung und in Querrichtung



ImageSet Demoversuch – Erweiterungen

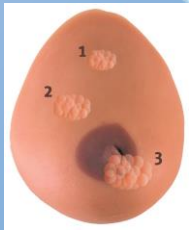


The screenshot displays the ImageViewSchool software interface. The main window shows a B-mode ultrasound image of a heart. Two measurement lines are drawn on the image: a yellow line labeled '1' and an orange line labeled '2'. A green vertical line is also visible. On the right side, there is a depth scale from 0.0 to 90.0 mm. The software interface includes a menu bar (Exit, Print, About, Reset), a parameter panel with 'Stop' and 'Freeze' buttons, and a control panel with 'TGC', 'A-Line', and 'Presets' tabs. The 'Main' tab is active, showing 'Frequency [MHz]' (2.0, 3.0, 4.0, 5.0) and 'Depth [mm]' (210). The 'Info' panel on the right shows 'Probe: C5-2R60S-3' and 'Cursor' options (Line, Ellipse). The 'Lines' panel shows two lines with lengths: 1 (8.76 mm) and 2 (7.79 mm). The 'State' panel shows 'Imaging is frozen ...'. The logo 'gamPT ULTRASONIC SOLUTIONS 1.0.19.4.2' is visible in the bottom right corner of the software window.



ImageSet Demoversuch – Erweiterungen

The screenshot displays the ImageViewSchool software interface. On the left, a hand holds a white ultrasound probe against a pig's ear. The software window shows a B-mode ultrasound image of the ear. A vertical green line is drawn through the image, with two orange lines forming a crosshair. A depth scale on the right side of the image ranges from 0.0 to 90.0 mm. The software interface includes a menu bar (Exit, Print, About, Reset), a Parameter panel with 'Stop' and 'Freeze' buttons, and a main panel with 'TGC', 'A-Line', and 'Presets' tabs. The 'Main' tab is active, showing 'Frequency [MHz]' with options 2.0, 3.0, 4.0, and 5.0 (selected). The 'Info' panel on the right shows 'Probe: C5-2R60S-3' and 'Cursor' options (Line selected, Ellipse unselected). The 'Lines' panel shows two lines with lengths: Line 1 (17,13 mm) and Line 2 (16,96 mm). The 'State' panel shows 'Imaging is frozen ...'. The GAMPT logo is visible in the bottom right corner of the software window.



ImageSet Demoversuch – Erweiterungen

The screenshot displays the ImageViewSchool software interface. On the left, a hand holds an ultrasound probe over an orange. The software window shows a B-mode scan of the orange with two yellow lines and orange markers. The parameter panel on the left includes a 'Freeze' button, 'A-Line' and 'Presets' tabs, and a frequency selection of 5.0 MHz. The main scan area shows two yellow lines with orange markers, labeled 1 and 2. The right panel shows a depth scale from 0.0 to 90.0 mm and a green waveform. The info panel on the far right shows 'Probe: C5-2R60S-3', 'Cursor' type (Line selected), and 'Lines' with lengths: 1 (20,86 mm) and 2 (10,25 mm). The state is 'Imaging is frozen ...'. The gamPT logo is visible in the bottom right corner of the software window.

Vielen Dank für Ihre Aufmerksamkeit

Besuchen Sie uns an unserem Stand oder unter www.gampt.de

GAMPT mbH
Hallesche Straße 99F
06217 Merseburg
Germany
+49-3461-2786910
info@gampt.de