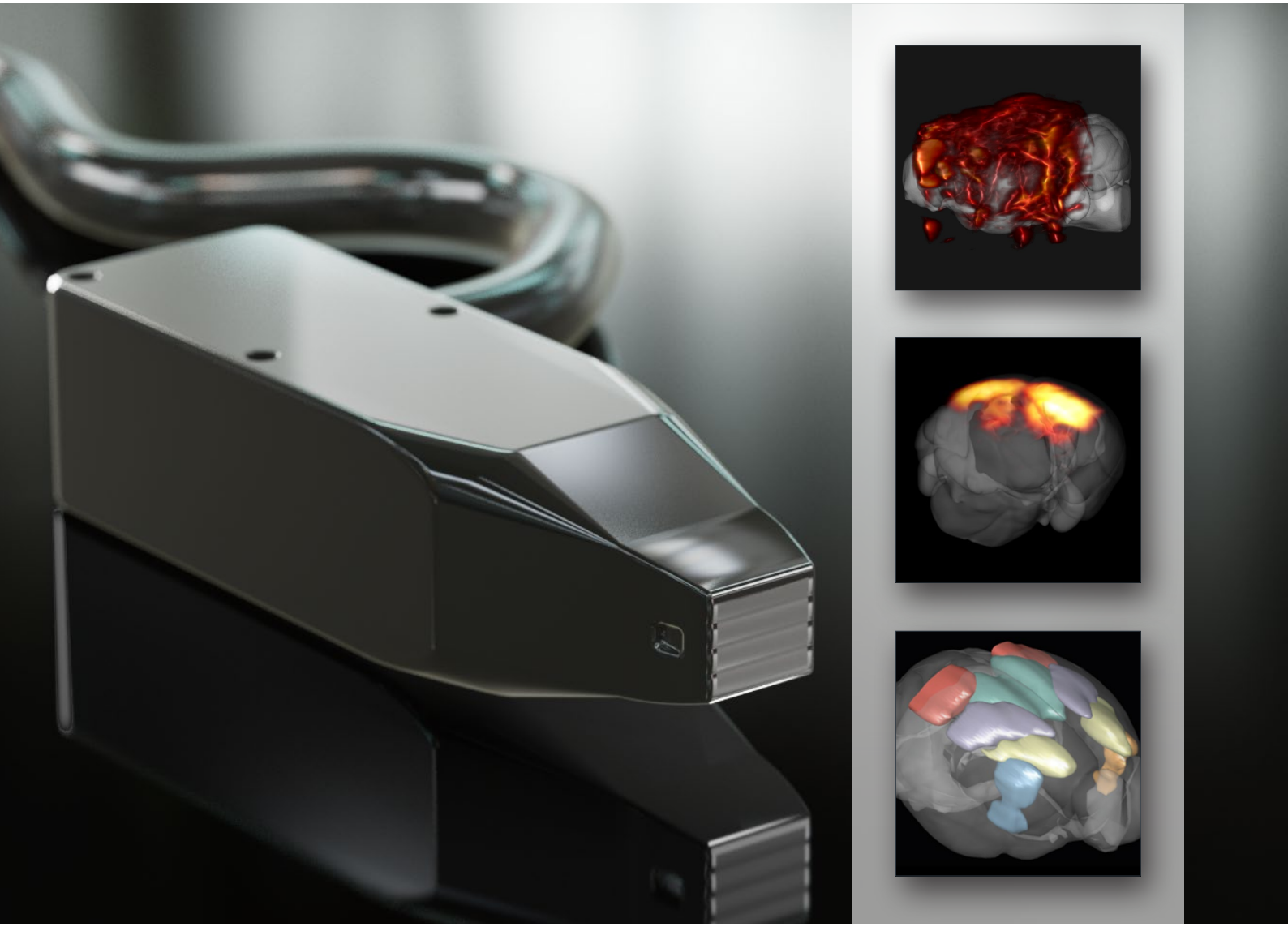
ICONEUS

REVEALING THE BRAIN

IcoPrime-4D MultiArray

High-sensitivity probe for 3D brain-wide imaging in the mouse using the Iconeus One functional ultrasound platform



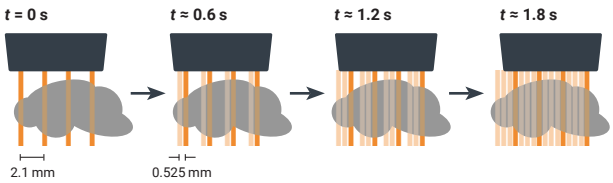
High-sensitivity mouse brain imaging

IcoPrime-4D MultiArray is a high-sensitivity, high-resolution probe for generating 3D images of the mouse brain using the Iconeus One functional ultrasound platform.



With its simultaneous multi-slicing technology, the IcoPrime-4D MultiArray probe offers:

- **High sensitivity** – A unique design and powerful software allow the mouse brain to be visualized directly through the skin and skull.
- **High resolution** – A voxel size of 100 × 100 × 525 µm provides unprecedented detail, with zero cross-talk between arrays leading to artefact-free images.
- **Fast acquisition** – A complete 3D image can be acquired effortlessly in just 2.4 seconds.
- **Streamlined operation** – The probe is compatible with most head-fixed configurations, making it an easy-to-use and versatile addition to your experimental setup.



The IcoPrime-4D MultiArray probe contains an 11 × 9.5 mm tip containing an array of four fUS transducers, which simultaneously acquire four 2D images before being moved stepwise across the scanning surface. The dwell time is typically set at 0.4 s, with the translation between each slice taking 0.2 s, meaning the whole four-scan sequence is complete in just 2.4 s. The field of view is ~7 mm wide × 8 mm long.

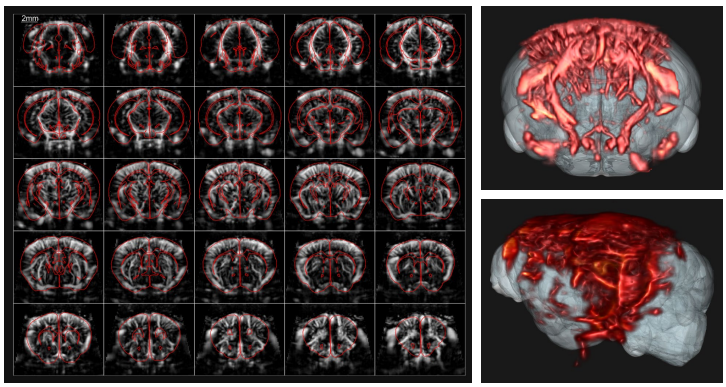
Exploring new frontiers in neuroscience

Thanks to its unprecedented sensitivity and ease of use, IcoPrime-4D MultiArray is already accelerating advances in neuroscience research.

Whole-brain vascular imaging

Using IcoPrime-4D MultiArray, you can non-invasively obtain high-resolution images of the entire mouse brain vasculature, revolutionizing your vascular research capabilities.

Explore the intricate vascular networks within the mouse brain like never before, and gain valuable insights into blood flow dynamics.

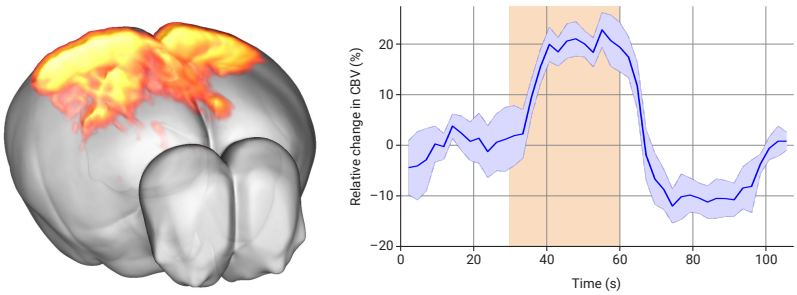


Left: A typical set of Power Doppler images obtained following an antero-posterior scan of an anesthetized mouse, obtained transcranially using IcoPrime-4D MultiArray. Right: Projection of this multi-slice scan onto the Allen Atlas anatomical template.

Brain-wide activation mapping

Unravel the brain correlates of any sensory stimulation or behavioral task with unprecedented detail using IcoPrime-4D MultiArray.

With its sub-mm resolution, you'll have at your disposal a new way of exploring neural responses, providing you with a powerful tool for delving deeper into brain function and behavior.



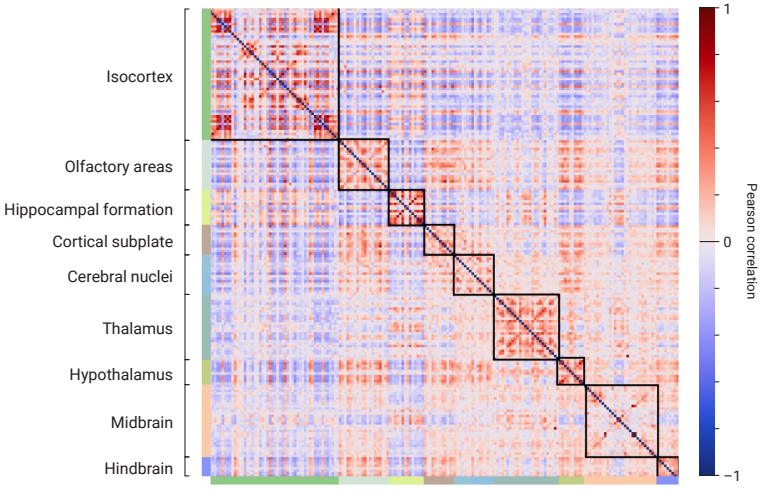
Left: A 3D projection of a brain-wide activation map of the mouse obtained following exposure to strobe lighting for 30 s, showing significant activation in four brain areas involved in visual processing – primary visual cortex, retrosplenial cortex, superior colliculi and subcortical lateral geniculate nucleus. Right: Mean relative change of cerebral blood volume (CBV) in activated voxels during the visual stimulation (n = 8).

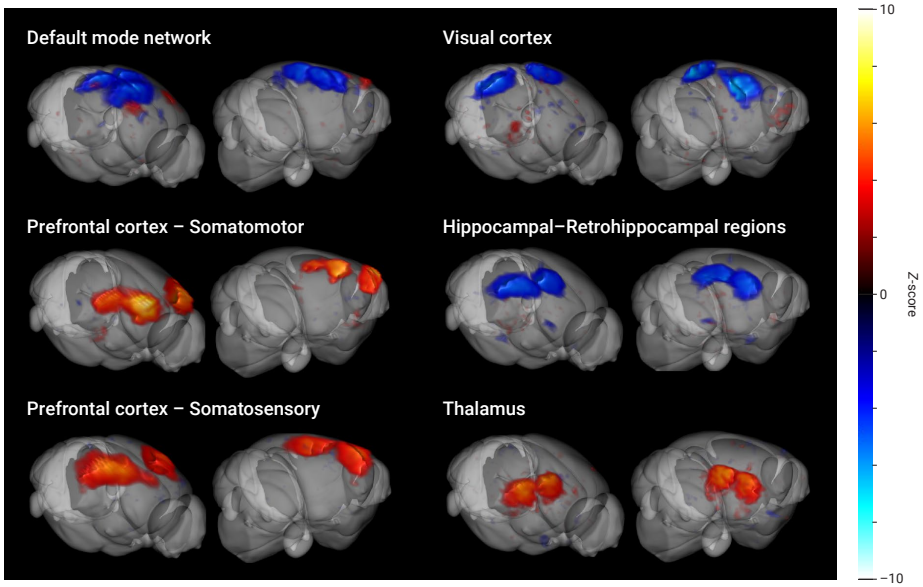
Resting-state functional connectivity mapping

Using IcoPrime-4D MultiArray, resting-state networks can be reliably mapped within minutes, giving access to a quantitative measure of the connection strength between brain regions.

In this way, the entire functional connectome can be revealed, revolutionizing the study of neural circuits in the mouse.







Top left: A head-fixed mouse in a mobile homecage during a scanning session with IcoPrime-4D MultiArray.
Top right: Mean functional connectivity matrix (n = 5) derived for more than 200 cortical and subcortical structures in the Allen Atlas, with boxed areas indicating regions with synchronized activity.
Bottom: Corresponding resting-state networks identified using independent component analysis, showing brain regions or networks with unique patterns of activity.

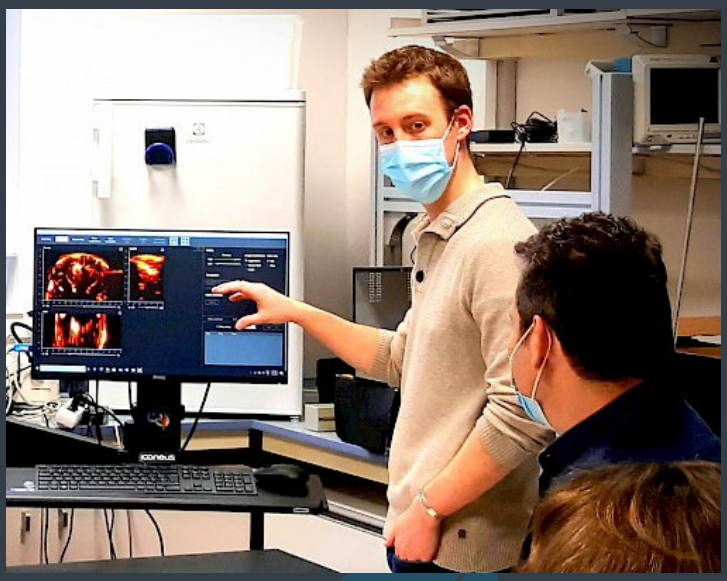
About Iconeus

Welcome to the future of brain imaging

We're Iconeus – a Paris-based company helping researchers to gain new insights into neuroscience using our groundbreaking functional ultrasound technology.

Our team of over 30 neuroscientists, software engineers and ultrasound physicists is dedicated to ensuring functional ultrasound achieves its full potential, by helping you integrate it into your research.

We look forward to hearing from you!



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Visit our website:

www.iconeus.com

contact@iconeus.com

25 boulevard Romain Rolland, 75014 Paris

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