# INT Symposium on "Advanced Photonic Imaging in Neuroscience"

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Ruiyao Cai obtained her BSc and MSc in Biotechnology at the University of Milan-Bicocca, Italy. After a period as intern at the University of Oxford and as research fellow in the lab of Neurobiology of the University of Milan-Bicocca, she moved to Munich for her PhD studies. Currently, she is completing her doctoral program in Ertürk´s lab at the Institute for Stroke and Dementia Research, LMU, in Munich. Her research projects focus on the development of new tissue clearing technologies for biomedical research.

## S2-L3 '*Panoptic imaging of intact organs and adult rodent bodies using vDISCO.*'


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The effects of most diseases are not confined to a particular body region, therefore a systems biology approach is needed to study diseases at a whole-body level. In light of this, tissue clearing methods started to revolutionize standard histology, allowing us to image organs and organisms without sectioning. So far, the highest level of tissue transparency has been achieved by DISCO clearings, which are based on organic solvents. It has also been shown that they are compatible with deep tissue antibody labeling. Nevertheless, owing to the fact that organic solvents can eventually quench the endogenous fluorescent signal, the reliable detection and quantification of the biological fluorescent information in all body districts have still represented a challenge. To overcome this issue, we developed a new pipeline called vDISCO, which exploits a pressure-driven, nanobody-based whole-body immunolabeling system to enhance the signal of fluorescent proteins, to preserve it for good and to image through dense and hard tissues such as bones and skin. vDISCO allowed us to image and quantify subcellular details in intact transparent mice. Using vDISCO we visualized the first whole-body neuronal map in adult mice at subcellular resolution. Next, we screened whole mice for changes caused by CNS trauma and we found degeneration of peripheral nerve terminals in the torso. Moreover, using vDISCO we observed short vascular connections between skull marrow and brain meninges, which were filled with immune cells upon stroke. Taken together, our method represents a powerful tool to analyze effects of neuronal conditions in the whole organism.