



To whom it may concern

It is truly my pleasure to write this Letter of Support for the fairSIM project of Dr Marcel Müller. My laboratory at UCSC works in optical systems design and tool development for live 3D super-resolution microscopy. We are collaborating with Dr Müller on an exciting project related to our publication on 3D Multifocus Structured Illumination Microscopy (MF-SIM, Abrahamsson *et al.* BOE 2017). I have been deeply involved in the development and application of SIM since I started my PhD in the laboratory of Dr Mats Gustafsson at UCSF in 2005. SIM stands apart among the super-resolution imaging methods in providing outstanding live cell imaging performance due to its gentle light dose, high speed of acquisition, and excellent 3D contrast and resolution imaging capability.

Several commercial SIM microscopes exist today (OMX Deltavision, Zeiss Elyra, and Nikon SIM) and these are widely available in imaging facilities at both academic and private research institutes. They excel in live cell imaging studies. However, SIM data reconstruction remains a major challenge. Super-resolved images are not directly formed in the microscope, but computed from the raw image data, making this reconstruction crucial. Commercial software is expensive, closed source and linked to specific instruments, so that the user does not always know what the software is doing. This introduces a real risk of artefacts being interpreted as biological information.

From my perspective, the greatest advancement in the field of SIM during the last ten years is Dr Müller's free, open source, and user friendly SIM data reconstruction software fairSIM. This software gives everyone access to data reconstruction capability and finally makes it useful and practical to share also raw imaging data. It works as a plugin to the universally loved, free and open source software ImageJ/FIJI and is already quite powerful. It runs on all computer platforms and works for all commercially available SIM instruments as well as for home-built systems. Dr Müller has released fairSIM for 2D SIM and is now preparing to tackle the even more complex project on implementing true 3D SIM image reconstruction capability. He is also working on extensive image validation and user manuals to make the software even more enabling to our field. It is most obvious at academic meetings I attend that the super-resolution imaging community is very eagerly awaiting 3D reconstruction capability to be added to fairSIM. This software development project and the extensive support it will provide in terms of user training and data validation will have a high impact on the field of live super-resolution microscopy.

Sincerely,

A handwritten signature in black ink, appearing to read "Sara", followed by a long horizontal flourish.

Sara Abrahamsson, Ph.D.

Assistant Professor, Electrical and Computer Engineering, Baskin School of Engineering
University of California Santa Cruz, Santa Cruz, CA, USA
email: sara@ucsc.edu