

# COMBUSTION WEBINAR

**Toward five-dimensional imaging for  
combustion diagnostics**

**Speaker:** Weiwei Cai, Shanghai Jiao Tong Univ.

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**Abstract:** The past decades have seen substantial progress in combustion diagnostics. Especially, the optical diagnostics have evolved to be multi-dimensional ( $3D+t+\lambda$ ), multi-physical and multi-species. A plethora of techniques such as multispectral absorption tomography, volumetric laser-induced fluorescence, plenoptic imaging, and snapshot spectral imaging have been developed. New mathematical tools such as nonlinear tomography, compressed sensing and deep learning have also emerged. These new technologies and concepts have brought new vitality to the combustion community. This talk will mainly introduce the development of various tomographic modalities and their applications to combustion studies. Meanwhile, the application of deep learning algorithms for tomographic inversion and online in-situ prediction of flame evolution will also be discussed. Finally, the development of computational spectrometers/spectral cameras and their role in five-dimensional imaging will be introduced.

**Biography:** Dr. Weiwei Cai is a Research Professor in the School of Mechanical Engineering at Shanghai Jiao Tong University. He received his PhD from Clemson University in 2010. Before joining SJTU, he worked at the University of Cambridge from 2013 to 2015 as an EU Marie Curie Fellow. His research mainly focuses on the computational imaging techniques for combustion diagnostics including tomography, holography and snapshot spectral imaging.

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