Physics Colloquium
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3D Photoacoustic Tomography in an Endoscopic Form Factor

In previous work, our group has demonstrated the use of an endoscopic 64-element, 45 MHz phased ultrasound array and a 64x64 -element crossed electrode array for 3D ultrasound. In the present study, we adapt these two endoscopes for use in photoacoustic tomography (PAT) imaging. PAT is an emerging modality in which the absorption of pulsed light generates an acoustic shock wave that is imaged by an ultrasound transducer. PAT is particular useful in imaging vasculature since haemoglobin is a strong absorber of light. Integrating PAT into intrasurgical ultrasound endoscopes provide surgeons with the ability to image blood vessels so as to reduce bleeding and more clearly identify tumor margins. This work focuses on demonstrating that photoacoustic tomography can be successfully integrated into high-frequency ultrasound micro-endoscopy devices for intrasurgical imaging.