

The CUNY Center for Advanced Technology In Photonics Applications (CUNY CAT)
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Underwater Imaging

Optical imaging techniques and technologies for underwater target detection and identification for such applications as underwater mine detection is an area of avid interest. This opportunity includes experimental and theoretical investigations for enhancing the efficacy of underwater optical imaging. The objectives of the project are aimed at developing a method for estimating polarized scattered photon distribution in turbid water and extracting key features of the target and optical properties of intervening water from experimental data. coordinated an ongoing effort to develop using time-gated and polarization-sensitive techniques

The current laser range gating (LRG) approaches use light pulses of several nanosecond duration and gating time of the same duration as the pulsewidth. We are examining the effect of shorter light pulses (pulsewidths on the order of picoseconds to sub-picoseconds) and shorter gating time at appropriate gate position on the background noise due to scattered light and ambient light. Results of our initial laboratory scale experiments, displayed in Fig. 1, indicate substantial reduction in noise and enhancement in image clarity. Polarization is another of the enabling characteristics of light that has the potential not only to enhance image resolution but to provide surface and subsurface information useful for target identification. A major thrust of our experimental effort is to develop and explore the performance of ultrafast time-gated and polarization sensitive imaging approach for underwater imaging using laboratory scale experiments.

Imaging through Turbid Water: Pulsewidth and Gatewidth Dependence of Image Quality

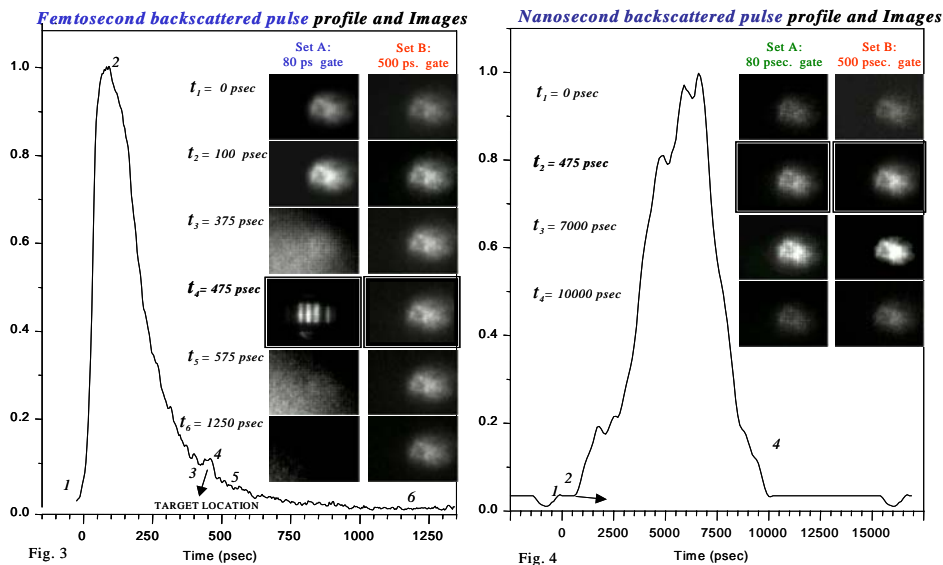


Fig. 1. Imaging of an US Air Force resolution target in highly scattering water. Shorter pulses and shorter gatewidth at proper location provided well-resolved image of the bar chart.

This technology opportunity sheet describes continuing efforts in this area. Several patents may have been issued or are pending and which may be available for licensing.

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