

# Brian Carmignani, Physics and Math

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## Phase Measurement Algorithms in Fluorescence Molecular Tomography

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Fluorescence Molecular Tomography (FMT) is a technique being developed for the imaging of tumors. FMT has the potential to provide high sensitivity at very low prices, compared to traditional mammogram, PET, and MRI techniques. To image cancer with FMT, a diode laser is pulsed at a modulated radio frequency and sent through the tissue in question. The phase lag is then measured by comparing the demodulated signal measured on the other side of the tissue to the output of the function generator that modulates the radio frequency signal. The difficulty that arises is the phenomenon known as RF coupling where the signals from different parts of the system mix and the actual information is drowned out. The precision of two phase measurement and correction algorithms was compared. One used a traditional Fourier analysis as a mathematical band-pass and method of phase measurement of the waveform in question after subtracting out a noise approximation. The other used a wavelet transform of the signal to measure phase after subtracting out the same noise approximation.