

DIFFUSE-TARGET FOURIER-DOMAIN  
HOLOGRAPHY IN PHOTOREFRACTIVE  
QUANTUM WELL FILMS

*K. Jeong, D.D. Nolte, M.R. Melloch*<sup>1</sup>

Physics Department, Purdue University  
(*West Lafayette, Indiana 47907-2036*),

<sup>1</sup>School of Electrical and Computer Engineering,  
Purdue University  
(*West Lafayette, IN 47907*)

S u m m a r y

Fourier-domain holography (FDH) of diffuse targets using photorefractive quantum well (PRQW) devices has specific advantages over image-domain holography. In the recording process, the broad spatial frequencies of the diffuse target produce a broad illumination of the quantum well device that fills the device window and allows the good overlap with a broad reference profile and produces uniform modulation index across the device. This prevents the grating erasure of low spatial frequencies and hence prevents high-pass filtering. It also eliminates field screening that reduces diffraction efficiency. In the readout process, fabrication defects and dust on the quantum well film produce a delocalized low-intensity background at the readout camera as opposed to bright localized spots that occur in image-domain holography. These advantages of FDH over image-domain holography of diffuse targets make it a candidate for improved holographic optical coherence imaging applications.