



DEPARTMENT OF ELECTRICAL & COMPUTER ENGINEERING

LINE-OF-SIGHT OPTICAL COMMUNICATION LINKS

MERIT

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BACKGROUND INFORMATION:

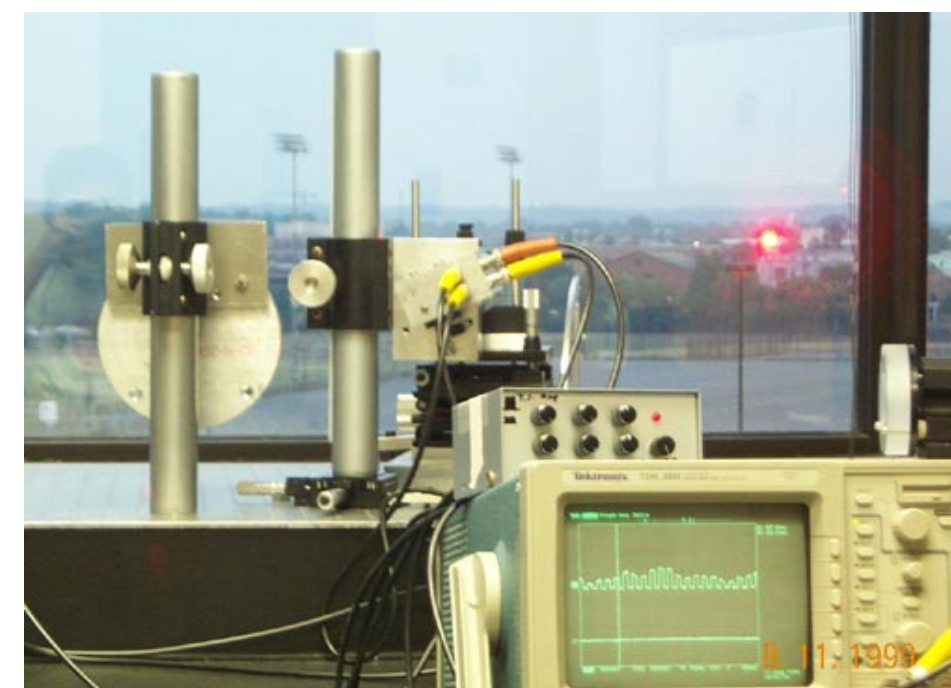
- also called optical wireless
- intrinsic security
- freedom from spectrum allocation from FCC
- functionality over modest ranges (up to a few kilometers)
- atmospheric turbulence causes fluctuation in signal intensities

LONG TERM OBJECTIVE:

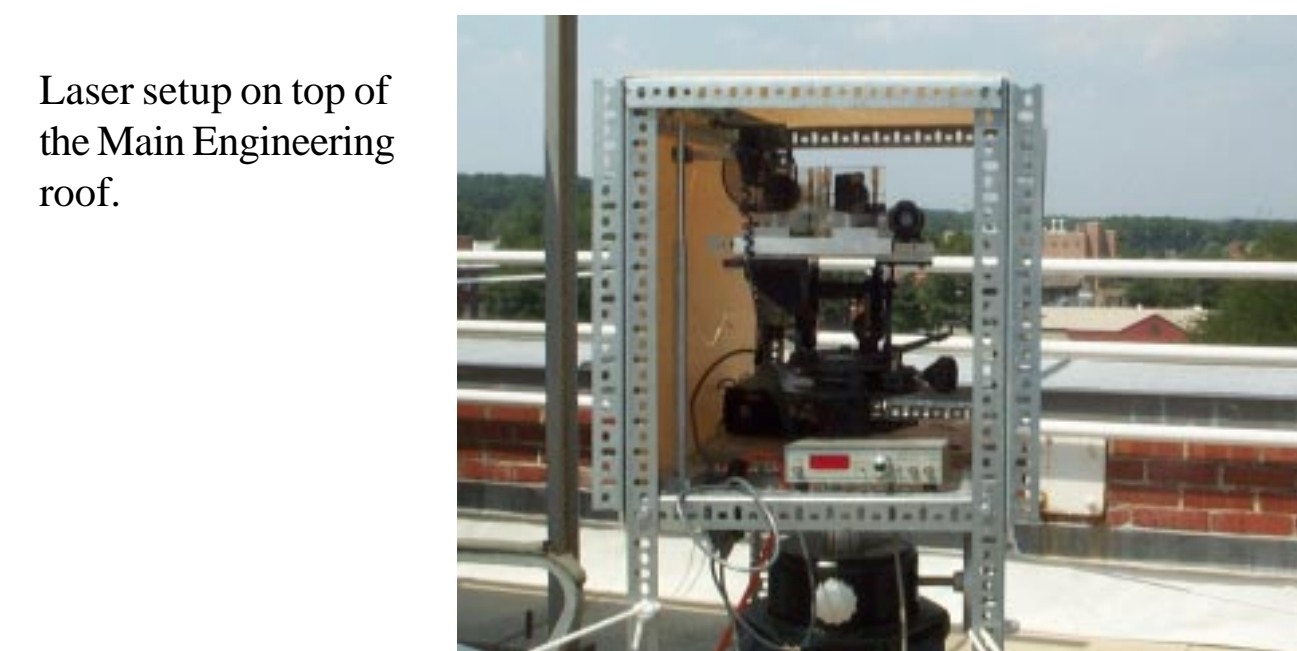
- development of system for commercial uses
 - high data rates (>1 Gb/s)
 - bit error rate less than 10^{-9}

SHORT TERM OBJECTIVES:

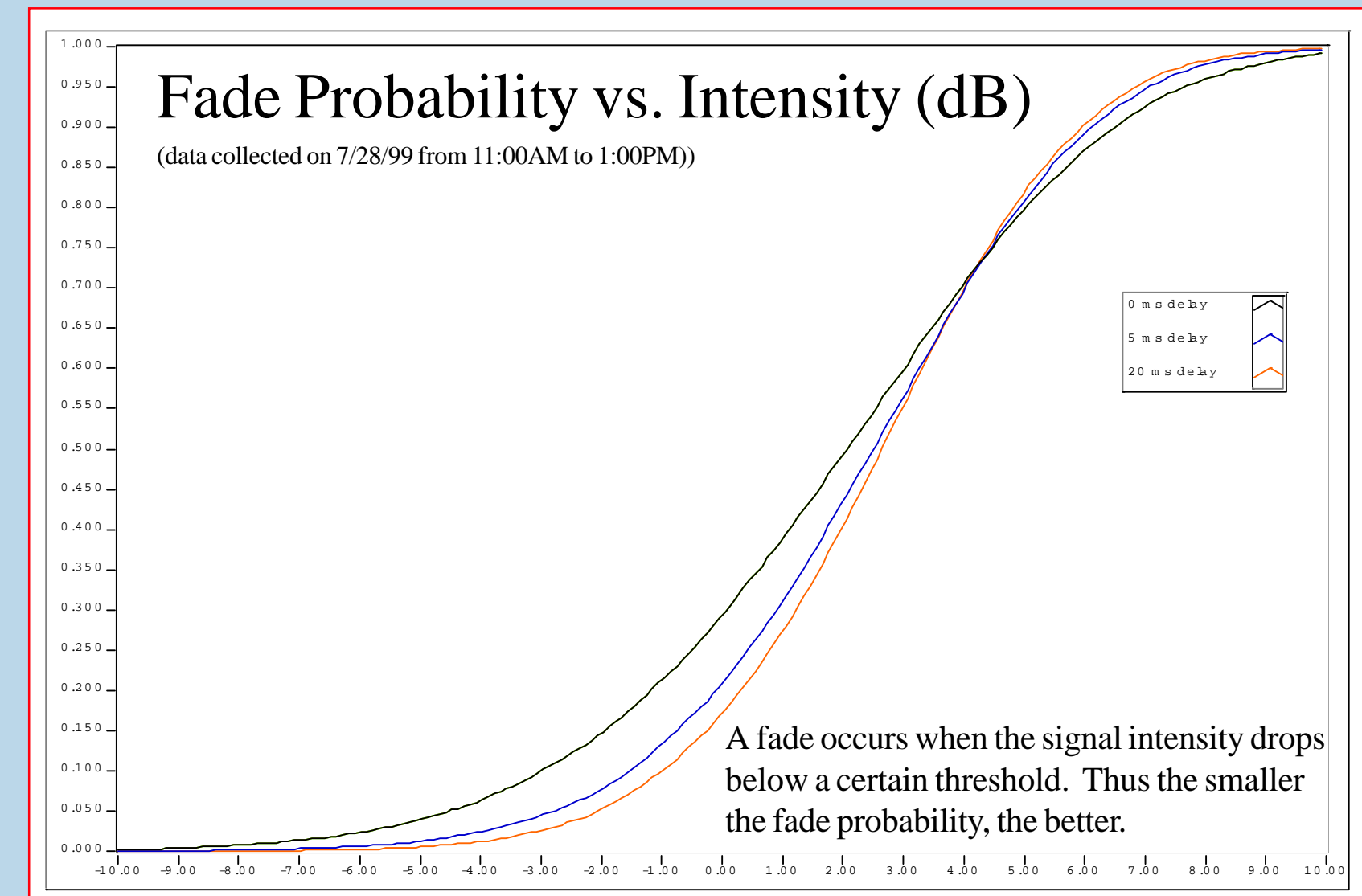
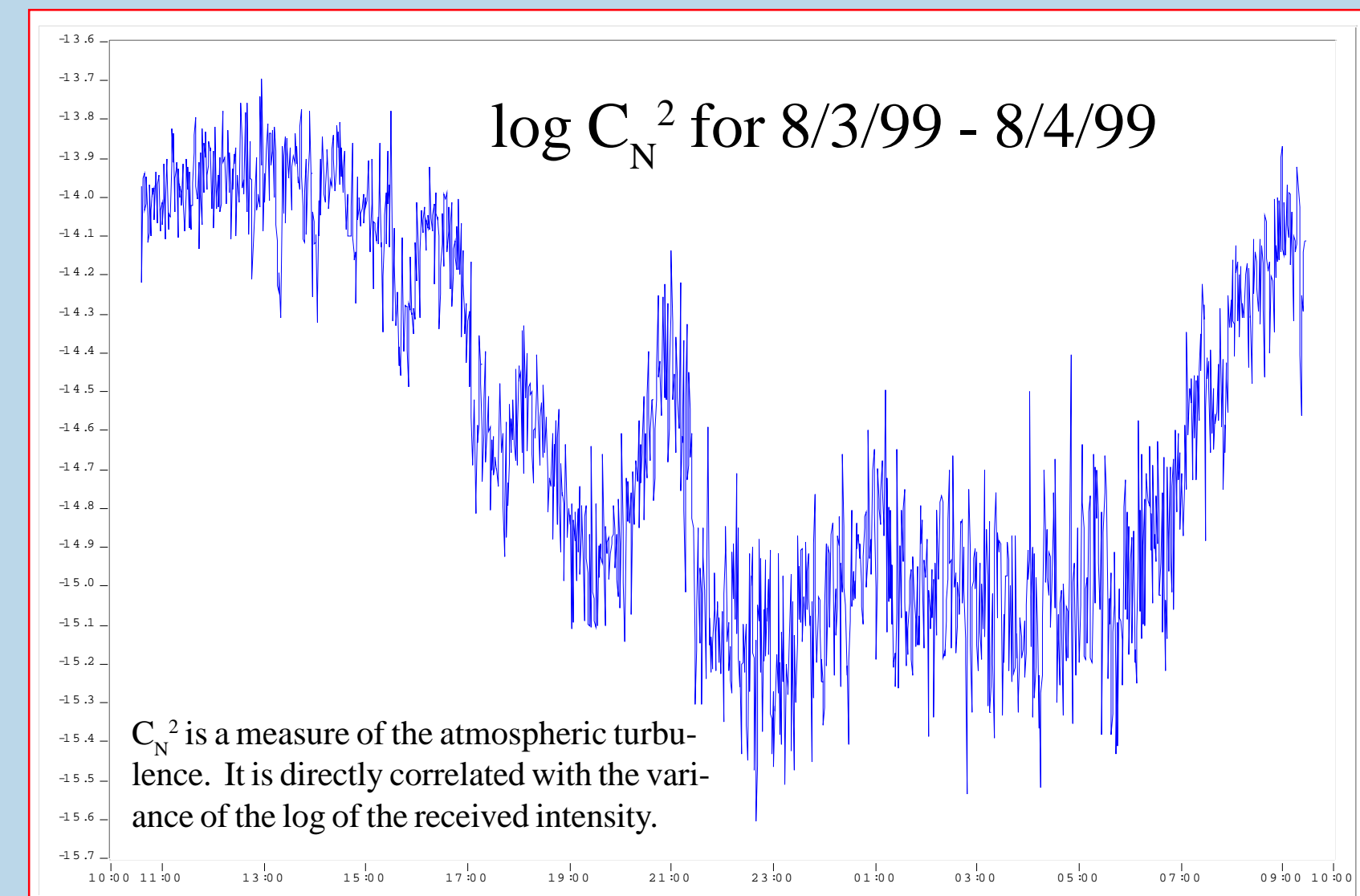
- characterization of the atmospheric turbulence
- testing of the channel delay scheme



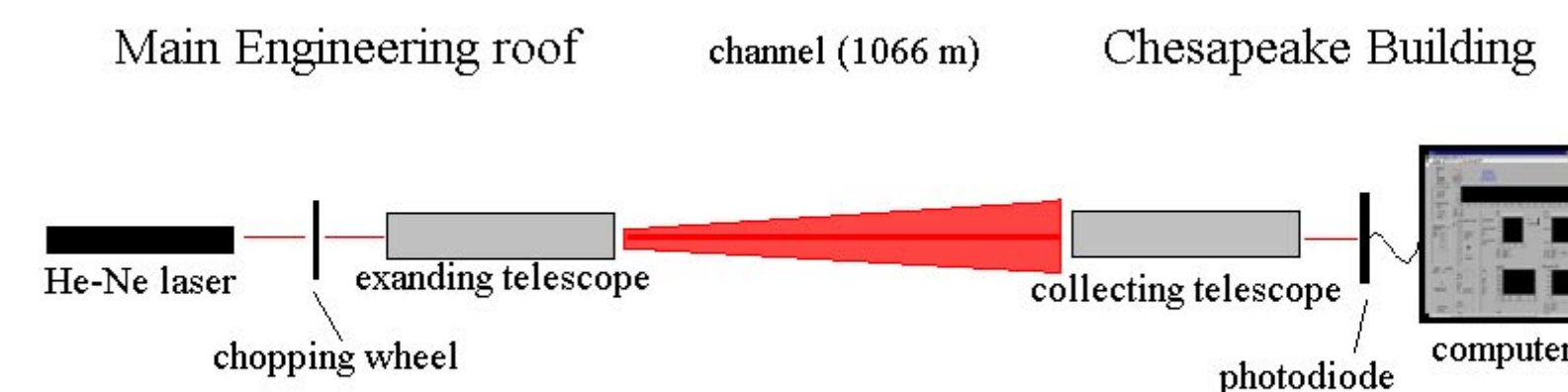
View of laser and setup from the Chesapeake building.



Laser setup on top of the Main Engineering roof.



Experimental Setup

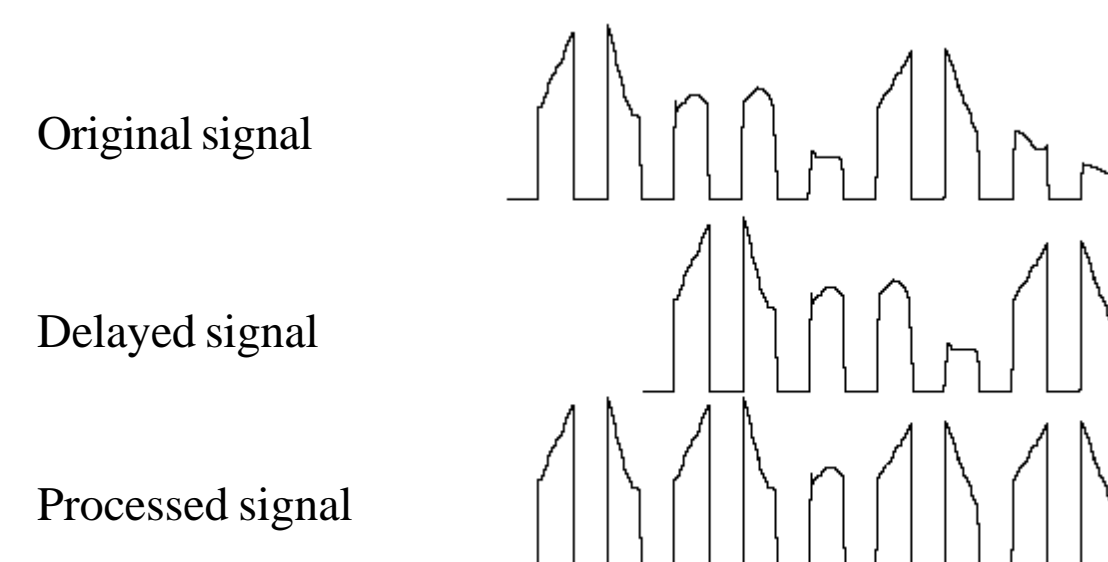


Notes:

- a chopping wheel is used to create a square wave of adjustable frequency
- a wider beam lessens the risk of misalignment
- the computer interface was done in LabVIEW™ in conjunction with a A/D card

CHANNEL DELAY SCHEME

- atmospheric turbulence is constantly fluctuating
- same signal over two channels, with one polarized horizontally and one polarized vertically
- delay one channel from the other
- recombine and process at receiver



RESULTS

The channel delay scheme is effective in significantly improving performance.

FUTURE WORK

More data needs to be taken to determine the the stability of the polarizations through the atmosphere and the delay necessary to ensure that the channels are uncorrelated.