

# ULTRA-HIGH DENSITY OPTICAL DATA STORAGE

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## 1. INTRODUCTION

Optical data storage has played a significant role in the extremely fast development of consumer electronics during the last three decades. The direction of development has been the same ever since the first CD disk was devised: for subsequent generations shorter wavelengths and higher focusing lens numerical apertures have been used. Unfortunately the natural limits of this development have been reached and further improvement does not seem to be possible using the same principles.

Recently holographic optical data storage has emerged as an extremely promising technique to pack around  $1\text{TB}/\text{cm}^3$  information into an appropriate medium. Unfortunately this method has its significant drawbacks: holographic disks are at the moment cannot be mass replicated and they are not naturally compatible with current standards.

## 2. DISCUSSION

We have developed an alternative approach of storing data. The principle is that every pit ends up storing more than a single bit of information. This is achieved by introducing pits with various angles with respect to the spin direction. The angle of the pit stores the information. With this method, referred to as multiplexed optical data storage (MODS), it is in principle possible to store up to 1TB per disk.

The talk will briefly overview current techniques of optical data storage and describe the principles of operation of the new solution. Experimental data will also be presented to demonstrate the full power of the method. This and system noise analysis shows that it is possible to obtain  $>43\text{dB}$  signal-to-noise ratios corresponding to a 14 fold increase in data storage capacity over any, currently existing solutions in laboratory conditions which translates to a 5 fold increase under user conditions. We will also describe results of both experiment and theory for writing MODS pits. Figure 1 shows how the system is able to recover angular information from the pits.

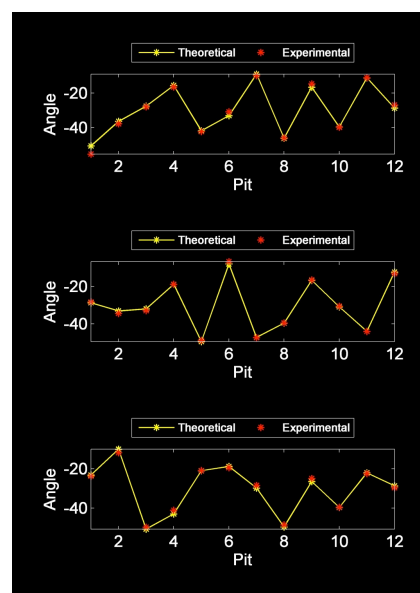


Figure1 Angle information obtained from a MODS disk