

Holography could see storage boost

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San Jose, Calif. - In addition to the encouraging report on new materials development for holographic storage, there is good news on how to store digital data more efficiently for those working with more conventional holographic materials. Researchers at IBM Corp. have developed a method for allowing more digital data to be stored in almost any holographic medium, given a target bit-error rate. The relatively simple technique came out of an overdue analysis of the needs of holographic data storage as compared with other holographic applications. The results should be brighter prospects for the entire field.

Most holographic storage systems require that many holograms be stored within the same volume of holographic material. Because the holograms are recorded in sequence, each one slightly erases all those preceding it. For that reason, researchers have used a recording schedule-giving more exposure time to early holograms and less to later ones-to even out the resulting diffraction efficiency. At the IBM Almaden Research Center (San Jose), researchers have shown that the conventional wisdom about recording schedules does not take into account the particular needs of digital data storage.

The new scheme, which assigns exposure times based on a non-linear curve, came about from analyzing the bit-error-rate associated with early- and late-recorded holograms. Because the earlier holograms are more degraded than their later counterparts, they are also noisier. As a result, they need to have a higher diffraction efficiency for the individual pixels to be correctly identified as "on" or "off" at the detection plane.

Shift to bit-error-rate

Conversely, late-recorded holograms are much cleaner and, as a result,

can be dimmer without introducing extra errors. This shift to recording schedules based on bit-error-rate rather than diffraction efficiency should give most holographic materials an immediate boost in capacity.

The technique, however, has no relevance to the new PQ-doped PMMA material being worked on by other researchers. According to MIT's Selim Shahriar, "No complicated scheduling is necessary when writing multiple holograms in a single spot. In polymers with diffusion amplification, all the holograms can be written with the same exposure time."