COMSATS PHYSICS TODAY

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Student's Question of the Day

What is Laser Holography?

The term "holography" is a compound of the Greek words "holos = complete" and "graphein = to write". Holography is a technique for recording and reproducing an image of an object through the use of interference effects. Unlike the two-dimensional images recorded by an ordinary photograph or television system, a holographic image is truly three-dimensional. Such an image can be viewed from different directions to reveal different sides and from various distances to reveal changing perspective.

The basic procedure for making a hologram is shown in figure 1. The object to be holographed is illuminated with monochromatic laser light and photographic film is placed so that it is struck by scattered light from the object and also by direct light from the source. In practice, the light source must be a laser as it is monochromatic (of single wavelength) and coherent (of constant phase difference). Interference between the direct and the

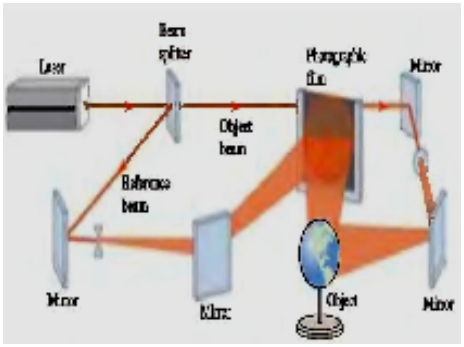

Fig.1. A hologram is the record on film of the interference pattern formed with light from the coherent source and light scattered from the object (University Physics 12th Edition).

scattered light leads to the formation and recording of complex interference pattern on the film.

To form the image, light is simply projected through the developed film, as shown in figure 2. Two images are formed, a virtual image on the side of the film nearer the source and a real image on the opposite side. Because of the principle of superposition for waves, what is true for the imaging of a single point is also true for the imaging of any number of points. The film records the superposed interference pattern from the various points, and when light is projected through the film, the various image points are reproduced simultaneously. Thus the images of an extended

object can be recorded and reproduced just as for a single point object.

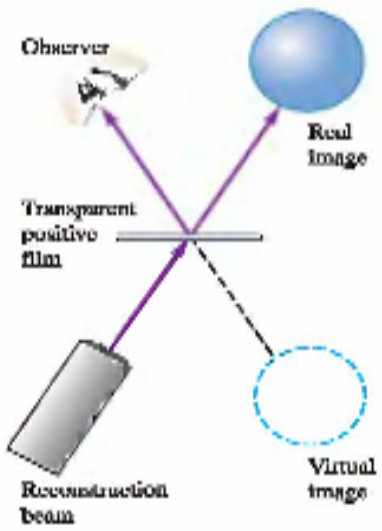

Fig.2. Images are formed when light is projected through the hologram. The observer sees the virtual image formed behind the hologram (University Physics 12th Edition).

Fig.3. Two views of the same hologram seen from different angles (University Physics 12th Edition)

Figure 3 shows photographs of a holographic image from two different angles, showing the changing perspective in this three-dimensional image. With its many applications holography is one of the most interesting developments in modern optics. Holography can be put to a variety of uses other than recording images. Holographic data storage is a technique that can store information at high density inside crystals or photopolymers.

Holography can also be used for the security and artistic purposes. Many works of science fiction use holograms as plot devices.

Shahzada Qamar Hussian

(Lecturer, Physics, CIIT Lahore)

New Research

Type-1.5 superconductor shows its stripes

Victor Moshchalkov and colleagues at the Catholic University of Leuven and the Swiss Federal Institute of Technology in Zürich are the first to show that the vortices in single-crystal samples of magnesium diboride (MgB2) behave in both ways (Type I and Type II. Superconductor)

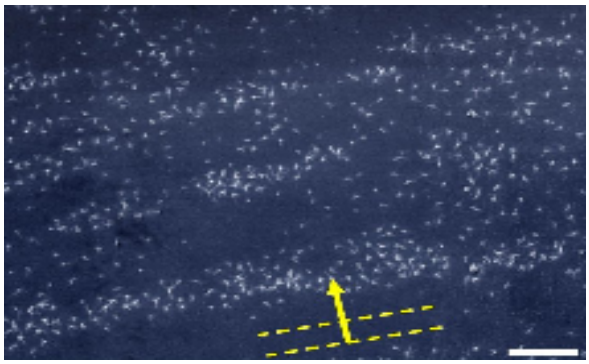

Fig.4. Vortex stripes seen in the "type-1.5" superconductor studied by Victor Moshchalkov and colleagues

They have given the material a name type-1.5 superconductor because its vortices appear to repel each other over short distances and attract each other over longer distances *arXiv*:0902.0997

Not wonder, this is Physics

What lies behind the dazzling dance of light in diamond?

When light enters a faceted diamond from all sides, it bounces back and forth several times before it comes out. As white light consists of seven colors, each color bends and reflects inside at different angle. This is therefore diamonds sparkle with colored light, each of its dozen facets produce its own dazzling display. The speed of light inside a diamond is 80,000 thousand miles per second .That is more than 100,000 miles per second slower than in air.

News Bulletin

1. The bibliography of Dr. Ashsaq Ahmad, HOD, Associate professor and Dr. Muhammad Asif, Assistant Professor has been accepted for publication in the forth coming issues of
   a) 2000 Outstanding Intellectuals of the 21st Century-2009/2010 (International Biographical Centre, Cambridge, England)
   b) Marquis Who's Who in the World, 2010 Edition (New Providence USA)
2. Dr. Muhammad Asif, Assistant Professor, has been appointed as Deputy Director General for Asia, International Biographical Centre, Cambridge,England. http://www.internationalbiographicalcentre.com/
3. The bibliography of Dr. Muhammad Asif, Assistant Professor, has been published in "Who's Who in America" - 63rd Edition, 2008. http://www.marquiswhoswho.com/products/WAprodinfo.asp
4. Miss Ishrat Sultana Lecturer Physics Department left for South Korea on March 7, 2009 for her Ph.D study at Sungkyyunkawn University in the field of nanotechnology. The Physics department arranged an informal get together to wish her success for her future study plans.
5. A student - faculty get together and welcome party was arranged on March 27th, 2009 at village restaurant M.M. Alam road Lahore in the honor of the new comers. The department of physics is grateful to Advisor Admin Sheikh Hanif, incharge COMSATS student's services Prof. Rashid Najeeb and Admin officer Miss Nazish Bakhat for gracing the occasion with their esteemed presence.
6. A research paper by Dr. Muhammad Asif titled**,** "Relationship between viscosity and conductivity for tokamak plasmas" has been published in "Brazilian journal of Physics"**,** Vol.39 No.1 P.59-69, 2009.

Photo Gallery

Glimpses of the welcome party held in March 2009 at village restaurant are posted below.

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- Organization of Co-Curricular activities e.g. Quiz competition, Research and general paper reading contest etc

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