Institute Lecture

Lasers: Evolution, Applications and Future

Prof. Ernst Wintner
Visiting Professor, Department of Mechanical Engineering,
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On leave from Vienna University of Technology, Photonics Institute,
Vienna, Austria

Monday, 28th October 2013,
Time: 5.00 PM, Venue: L-2, Lecture Hall Complex

Abstract

The LASER was invented by Maiman in 1960 after fundamental theoretical work by Basov, Prokhorov and Townes, who extrapolated the idea of the MASER (Microwave....) into the visible. Since that time more than 4000 laser schemes have been developed, however there is a much smaller number of lasers having substantial and indispensable applications in various fields of modern life. This lecture will cover various aspects and applications of lasers including Metrology (Laser pointers, distance and speed meters, Doppler velocimeters); Materials processing (Laser cutting, welding, engraving, forming, surface hardening); Medical applications (Necessary treatments, and cosmetics, ophthalmology, laser surgery, dentistry, neurology, photodynamic therapy, soft laser therapy); Cosmetics (Hair removal, tattoo removal, bleaching of teeth); Laser initiation of chemical processes (laser ignition, laser 3D printing); Communications (DVD player, optical fiber and free space communication); Laser diagnostics (Laser-induced breakdown spectroscopy, non-linear spectroscopy, optical coherence tomography); and Fundamental research (cooling down to μK, measurement of optical frequencies (10-15 accuracy)).

Applications of continuous wave radiation and pulsed radiation are evolving from micro-seconds to atto-seconds; from femto-second material ablation to laser fusion and so on. The number of applications is steadily growing and becoming innumerable. This lecture will also attempt to cover the future directions in these areas.

About the speaker

Dr. Ernst Wintner is a professor at the Photonics Institute of TU Vienna. Prof. Wintner, after having completed a thesis in metallurgy, received his PhD (in physics and mathematics) in 1976 from University of Vienna. Thereafter, he joined Vienna University of Technology, changing to the field of photonics. His scientific work comprises nonlinear optics, fiber optic sensors, solid-state lasers, ultrashort pulse generation and their applications to for e.g., materials processing and medicine and finally color fading in art collections. Together with GE Jenbacher GmbH & Co KG of Tyrol, Austria, a leading gas-engine developer, he founded a research group for laser ignition in 1998, representing one major focus of his interests. He was a visiting scientist at MIT from 1982 to 1984 and at Friedrich Schiller University, Jena, in 1986, and a visiting professor at the Institute of Laser Engineering, Osaka University, in 2000-2001. He is (co)author of more than 200 scientific publications, including five book chapters. Up to end of October 2013, Prof. Wintner is a visiting Professor in Department of Mechanical Engineering, IIT Kanpur.

Tea at 4.45 PM **All interested are welcome.**

Ajit K. Chaturvedi
Dean of Research and Development
IIT Kanpur