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Plasma Physics

Dr. Sangeet Kumar, HOD Physics,
NDSU, VKSU, A.S.

[##] Laser: Plasma Production

A new method for the preparation of plasma has been achieved after the development of Laser. When radiation from a powerful source is switched laser was brought to a focus in a gas, the gas which is normally insulating and transparent to radiation at ordinary intensities was rapidly converted to a highly conducting self-luminous hot plasma. A typical shock wave accompanies the generation of the plasma and this wave propagates through the surrounding gas.

From analogy with the electrical breakdown of gases it is natural to assume that the breakdown of gases with the laser beam and the consequent production of plasma is intimately connected with the electric field. Typical laser plasmas have been produced by beams from ruby ($\lambda = 6943 \mu\text{m}$) and neodymium laser $\lambda = 1.06 \mu\text{m}$ for a flash duration $\tau = 100 \text{ ns}$. The whole process of plasma formation can be divided into three distinct phases, firstly initiation, secondly formative growth and the onset of breakdown and thirdly the plasma formation with the generation of shock waves and their propagation. It is generally taken that the breakdown of the gas takes place when the electron concentration reaches a value of 10^{13} electrons per cc.