FORTHCOMING PAPERS

Resonance Light Absorption by the Ordered Structures of Ions Stored in a Trap

E. V. Baklanov, V. P. Chebotayev (USSR)

The ordered structures of ions stored in a trap are considered. It is shown that light absorbation of ions has a resonance with a homogeneous width.

CO_2-Laser-Induced Multiphoton Absorption of CF_2Cl_2. Collisional Effects

E. M. Alonso, A. L. Peuriot, V. B. Slezak (Argentina)

Energy absorption by CF_2Cl_2 from an intense TEA CO_2 laser pulse is measured as a function of the pressure of CF_2Cl_2 and the pressure of Ar bath gas for different laser energy fluences. A simple experimental method is proposed for the determination of the fraction of the molecules excited by the laser field and the average energy of the molecular ensemble.

FM Dye Laser

D. M. Kane, S. R. Bramwell, A. I. Ferguson (U.K.)

We have investigated the detailed operation of a frequency modulated dye laser (FML). The FML consists of a standing wave Rh6G dye laser with an intracavity transverse ADP phase modulator which is driven at a frequency close to the cavity mode spacing. An ideal FML output consitsts of a laser beam which is constant in amplitude but sinusoidally varying in frequency. This provides a source of many laser modes which are equally spaced by the modulation frequency. Several dye lasers configurations have been investigated. Measurements of the mode intensities, total power, amplitude modulation and rf beat amplitudes have been made as a function of the rf driving frequency of the phase modulator. The FM laser obtained has been frequency stabilised by locking it to a reference interferometer and also by frequency offset locking it to a single-frequency dye laser.

Dye-Laser Pulse Shortening by Transient Absorption Following Excited-State Intramolecular Proton Transfer

N. P. Ernsting, B. Nikolaus (F. R. Germany)

Molecules undergoing excited-state intramolecular proton transfer often show transient absorption after pulsed optical excitation, due to the tautomeric form in the singlet ground state. This absorpt ion may be used to suppress, after a short time, the laser action of dyes emitting in the transient absorption band. The method is designed for high photochemical stability. Lasing from PBBO, pumped 10 times above threshold by an excimer pumped PTP dye laser, was suppressed after 3.3 ns by the addition of 2-(2 '-hydroxypheny l)-benzoxazole, which absorbed 30% of the pump energy. At higher concentrations, intense and stable 80 ps PBBO laser pulses were obtained. The pulse evolution is simulated by model calculations. A hypothetical super-dye, consisting of chemically linked laser- and absorber-moieties, is also discussed. Here Förster energy transfer should result in particularly efficient laser pulse shortening.

Coherent and Incoherent Reflection and Transmission of Multilayer Structures

B. Harbecke (F. R. Germany)

The complex-amplitude reflection and transmission cofficients r and t of a pile of films are represented as a product of matrices. The matrices describe the transformation of two plane waves travelling in opposite directions between the films, and their development within the films.
If one of the films is significantly thicker than the other layers (e. g., several films on a substrate), the calculated reflectance $R = rr^*$ and transmittance $T \sim tt^*$ show narrow Fabry-Perot oscillations which, in a lot of cases, are not observed in the experiment. Since the matrix method is equivalent to the representation of the amplitudes r and t as a coherent superposition of multiple reflected waves within the thick slab, we are able to suppress, in the calculation, the interference within this thick film by adding the absolute squares of the partial waves corresponding to an incoherent treatment. This procedure is shorter and more simple than averaging over an appropriate interval of frequency of thickness, which, in most cases, leads to the same results.

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Invited Paper

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