

FORTHCOMING PAPERS

The Analysis of Excite and Probe Measurements of Relaxation Times with Fluctuating Pulse Durations

R. Illingworth and I. S. Ruddock (UK)

The effect of fluctuations in the pulse duration of synchronously pumped mode-locked pulse trains on excite and probe measurements is discussed. Relaxation times comparable with the pulse durations can be measured even when large pulse-to-pulse fluctuations in duration exist. The pump and probe pulse durations are assumed to be correlated. When the probe pulses are the second harmonic of the pump, or viceversa, the third harmonic must also be generated to permit deconvolution of experimental excite and probe data. When the pump and probe pulses have the same time dependence, the excite and probe curves consist of the desired response function convolved with the time-averaged second harmonic autocorrelation function which is easily measured. Deconvolution yields the relaxation time but fluctuations at the output of the detector system and limit the accuracy with which the relaxation time can be calculated.

Production of Photoionic Gallium Beams Through Stepwise Ionization of Atoms by Laser Radiation

A. N. Zherikhin, V. S. Letokhov, V. I. Mishin, M. E. Muchnik, V. N. Fedoseyev (USSR)

Production of intensive (up to 1 mA) ionic beams through stepwise photoionization of atoms induced by laser radiation is investigated. Optimum photoionization schemes are presented. A photoionic gallium beam is obtained with an average current value of 2.5 μ A.

A Tunable Frequency Stabilized Ar⁺ Laser

F. Spieweck (F. R. Germany)

The frequency of a single-mode Ar⁺ laser at $\nu = 582$ THz ($\lambda = 515$ nm) is stabilized by means of an external iodine cell to a Doppler broadened absorption profile. The - unmodulated - stabilized laser frequency is reproducibly to ± 1 MHz or $\pm 1.5 \times 10^{-9}$ ν and can be shifted within a 180 MHz wide range.

On the Validity of Modeling Rayleigh Scatterers by Spheroids

T. B. A. Senior, H. Weil (USA)

For single homogeneous lossy dielectric Rayleigh particles, the manner in which the particle shape affects the absorption and scattering is examined by computing the polarizability tensor elements using a general purpose program valid for any rotationally symmetric body. The results for a number of generic shapes are compared with those for the corresponding spheroids. When the dielectric constant is real and negative, the resonances attributable to bulk and to shape-dependent or surface polariton modes are tracked as functions of the length-to-width ratio of the particle and the bulk dielectric constant. The adequacy of using spheroid approximations for individual particles in a dispersion is also discussed.

Electron Dynamics in Free Electron Laser Resonator Modes

W. B. Colson (USA), P. Elleaume (France)

We study the electron phase-space evolution and gain in free electron laser whose short-wavelength radiation has Gaussian spherical wavefronts. Several free electron laser designs are considered: the undulator, tapered wavelength undulator, and the optical klystron. We find that the gain spectrum is no longer proportional to the slope of the forward spontaneous emission spectrum, and we determine the design of the gaussian mode which maximizes the energy extraction from the electron beam.

Effect of Rotational Relaxation on the Yield of the Multiphoton Dissociation of CF₃Cl and CF₃Br Under TEA-CO₂ Laser Pulses

M. Nève de Mévergnies (Belgium)

The yield of the multiphoton dissociation of CF₃Cl and CF₃Br induced by TEA-CO₂ laser pulses has been studied in the pressure range between 0.25 and 8 Torr, the laser wavelength being chosen so as to excite preferentially the minor isotopic components ¹³CF₃Cl and ¹³CF₃Br. For both compounds the dissociation probability is found either to increase almost linearly or to decrease monotonously with gas pressure, according as the laser beam is focused or unfocused, respectively. This behaviour is explained by rotational relaxation effects, and a value of 22 ns. Torr for the rotational self-relaxation time of CF₃Cl is obtained.

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With contributions by numerous experts

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