

## FORTHCOMING PAPERS

### Selective Laser Heating and Nonlinear Light Scattering in a Homogeneous Medium

*M. V. Belyayev, V. P. Chebotayev, A. P. Maiorov, V. A. Smirnov (USSR)*

Observation of light scattering on the laser-produced temperature inhomogeneities, the centres of which are connected with some absorbing molecules, is reported. The experimentally observed scattering intensity agrees well theory.

### Further Investigations on the Pumping of $\text{CH}_3\text{OD}$ and $\text{CD}_3\text{OD}$ by a cw $\text{CO}_2$ Laser

*M. Fourier, A. Kreisler (France)*

Respectively, 41 and 36 new cw fair-infrared lasing lines have been observed using a waveguide resonator in  $\text{CH}_3\text{OD}$  and  $\text{CD}_3\text{OD}$  pumped by a low-pressure  $\text{CO}_2$  laser emitting in the 9.4, 10.4  $\mu\text{m}$  regular bands and in the 10.8  $\mu\text{m}$  hot band. The wavelength range was 46.6  $\mu\text{m}$  — 1.67 mm in  $\text{CH}_3\text{OD}$  and 53.6  $\mu\text{m}$  — 1 mm in  $\text{CD}_3\text{OD}$ .

### Superheating in the Heat-Pipe Oven

*S. Milosevic, R. Beuc, G. Pichler (Yugoslavia)*

We present a device which modifies the heat-pipe oven in such a way that the molecular number density can be drastically reduced. The device is essentially a small chamber with an independent internal heater inserted into the center of the ordinary linear heat-pipe oven which in turn, serves, as a reservoir of the liquid metal. The advantage of the present design of superheating within the heat-pipe oven, where temperature differences of several hundreds degrees centigrade were obtained is shown in the case of far blue wings of the first self-broadened potassium resonance lines.

### Passive Mode Locking of the Continuous Wave DCM Dye Laser

*P. M. W. French, J. R. Taylor (England)*

The first passive mode locking of the continuous wave cw DCM dye laser is reported. Subpicosecond pulses as short as 0.68 ps were obtained over spectral region from 655 to 673 nm from a simple linear cavity with no dispersion optimisation. The dye 1,3'-Diethyl 4,2'-quinolythiacarbocyanine iodide (DQTCI) was used as the saturable absorber.

### Preionization and Discharge Stability Study of Long Optical Pulse Duration UV-Preionized XeCl Laser

*R. S. Taylor (Canada)*

This paper presents a complete study of the temporal and spatial characteristics of the preionization of a XeCl rare-gas halide laser. The detailed study was made possible using the technique of laser-induced preionization which utilizes the uv radiation from a KrF laser to preionize a second rare-gas halide laser. In addition to the preionization study, high spatial and temporal resolution framing camera photographs have been used to investigate the growth of discharge instabilities which can lead to the premature termination of the XeCl optical pulse. The roles played by HCl, Xe, the buffer gas as well as the discharge energy loading in the development of discharge instabilities have been determined experimentally.

### Calculations of TM-Polarized Nonlinear Waves Guided by Thin Dielectric Films

*D. Mihalache, D. Mazilu (Romania)*

We found the dispersion relations for TM-polarized nonlinear waves guided by a dielectric film of thickness  $d$  bounded on one side by a nonlinear uniaxial medium characterized by a dielectric tensor  $\epsilon_{xx} = \epsilon_{yy} = \epsilon_c$ ,  $\epsilon_{zz} = \epsilon_c + \alpha_c |E_z|^2$ ,  $\alpha_c > 0$  (self-focusing medium),  $E_z$  being the electric-field component perpendicular to the surfaces. Numerical calculations are given for the power dependence of the propagation wave vector. For sufficiently large  $d/\lambda$  ( $\lambda$ : wavelength) we have found regions with multiple solutions corresponding to the same power flow. This suggests possible applications to optical devices.

H. Haken

# Laser Theory

Corrected printing. 1984. 72 figures. XVI, 320 pages  
Soft cover DM 95,-. ISBN 3-540-12188-9  
(Originally published as "Handbuch der Physik/  
Encyclopedia of Physics, Volume 25, 2c", 1970)

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This book, written by one of the pioneers of the laser theory, is now considered by many laser physicists as a classic. It provides a thorough introduction to quantum mechanical treatment of the laser, the semiclassical approach and the rate equation treatment. Many features of laser light starting from gross features, like intensity, to fundamental aspects, such as photon statistics and optical coherence, are treated in detail.

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