FORTHCOMING PAPERS

Thermalization of ^{199}Hg Ion Macromotion by a Light Background Gas in an RF Quadrupole Trap

L. S. Cutler, R. P. Giffard, M. D. McGuire (USA)

The largest systematic uncertainty in the performance of atomic frequency standards using a cloud of ions stored in an rf quadrupole trap is second-order Doppler shift which depends on ion temperature and trapping parameters. This paper presents evidence that cooling the ions by collisions with atoms of a background gas light compared to the ions results in the condensation of the ions into a cloud of almost uniform density determined by space charge versus potential well forces. In this condition the second-order Doppler shift is simple to calculate and is found to depend only on readily measured characteristics of the ion cloud. This along with already observed good signal-to-noise ratio shows that the frequency standard we have constructed using the hyperfine splitting of singly ionized ^{199}Hg with helium cooling can have an order of magnitude better performance in accuracy, stability, and reproducibility than presently available commercial cesium beam standards.

Analysis of Q-Switch in a CO_2 Laser with Saturable Absorber

E. Arimondo, E. Menchi (Italy)

Intracavity experiments with an SF_6 saturable absorber have been performed with a CO_2 infrared laser. Accurate measurements of the passive Q-switch pulses versus the laser parameters have been made. A comparison with theoretical models is presented, discussing the involved approximations.

Properties of an Optical Phase-Shifter Made of Two Gold Mirrors

S. Carusotto, E. Iacopini, E. Polacco, (Italy), F. Scuri, G. Stefanini, E. Zavattini (Switzerland)

Reflectivity and phase-shift properties of a device composed of two flat mirrors with a gold coating 1 μm thick have been measured, at some relevant light incidence angles, for $\lambda_1 = 488$ nm and $\lambda_2 = 514.5$ nm. An experimental investigation of the low-frequency noise (around 50 mHz) contributed by the phase-shifter in an ellipsometer is described.

Measurements of the Velocity Gradient Using Laser Doppler Phenomenon

Y. Aizu, T. Ushizaka, T. Asakura (Japan)

This paper reports on a method for measuring the velocity gradient using a laser Doppler phenomenon. The velocity gradient is determined from the velocity difference between two different points of the probing object and is actually obtained from the optical heterodyning of two differently Doppler-shifted scattered light fields from two points of the object having different velocities. The properties of output beat signals are theoretically from their spectral broadening including the effect of the detecting aperture. The preliminary experiment was performed by using a rotating glass disk whose velocity is different from its center to the outside. The experimental results show the usefulness of the present method for measurements of the velocity gradient.

On the Opto-Voltaic Measurements in CO and CO_2 Lasers

K. M. Abramski, J. van Spijker, W. J. Witteman (The Netherlands)

We observed and compared the opto-voltaic signals in CO and CO_2 lasers. The signals are obtained capacitively from the water cooling jacket as a low voltage source not influencing the current circuit. We observed from measurement that the output power and the so-called optovoltaic input power have a distinct relationship depending on laser current and cavity parameters. It will be shown that opto-voltaic detection is a very sensitive method especially for CO lasers.

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Contributed Papers