ignition in proposed laser-driven controlled thermonuclear reactions is achieved by efficient coupling of intense laser irradiation into DT-filled microspheres to produce fusion plasma by ablation-driven compression waves. During the last decade, intensive studies were devoted to maximizing the radiation–target-coupling efficiency by improving illumination uniformity and symmetry[1] and choosing the best displacement of target from light focus.[2] Asymmetry will be severe in controlled-fusion reactions with targets crossing the laser beams at speeds up to 10^6 cm sec^{-1}. We investigate the asymmetrical illumination of a spherical target by a multibeam-laser system. Closed-form expressions are obtained for a spherical target displaced from its proper place with regard to (1) normally incident energy on the surface of the target, (2) energy scattered from the target and from the walls of the reactor, and (3) energy absorbed by the target (plasma). Starting with expressions for the electromagnetic fields in the image space of the optical system, we obtained two transformation matrices to calculate the on-target incident energy. One matrix accounts for the reactor's design parameters and the geometrical arrangement of the beams, and the other matrix accounts for the degree of asymmetry in the illumination process. Subjected to appropriate boundary conditions, and by use of Debye's potentials concept, the wave equation is solved in both plasma and vacuum to get expressions for absorbed and scattered energies. The effect of asymmetry and reflection from the reactor walls on energy deposited within the spherical target is also investigated.

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WK10. Filter Function of a Holographic Grating with Nonnegligible Absorption. M. L. CALVO AND E. GUIBELALDE, *Departamento de Optica, Facultad de Ciencias Físicas, Universidad Complutense, Madrid, Spain.*—We present a theoretical model for the filter function of a holographic grating when the absorption coefficient of the photomaterial is nonnegligable. In this case there is also modulation in the conductivity, which leads to a cosinusoidal function for the dielectric permittivity. The filter function of a holographic grating registered in this photographic material appears to be a complex function in which additional terms that are due to nonzero conductivity are present. The intensity response contains coupling terms that do not appear in the purely dielectric case. We introduce a new relative-diffraction-efficiency coefficient, which depends on the degree of modulation of the conductivity. Numerical calculations have been carried out for different values of the coupling constant of the conductivity $\beta = \Delta\sigma/\sigma_0$ when $\beta \simeq \alpha$ $(\alpha = \Delta\epsilon/\epsilon_0)$, $\beta < \alpha$, or $\beta > \alpha$. A generalization of this model is also calculated in which the wave fronts used in the register are Gaussian.

WK11. Viewing Diffraction Patterns by Photoelectron Microscopy.* GAIL A. MASSEY AND MASAHARU AMANO, *Department of Electrical Engineering, San Diego State University, San Diego, California 92182-0190.*—We describe an application of laser photoelectron microscopy to the visualization of near-field optical-diffraction patterns. In this technique a surface that can emit photoelectrons when illuminated at the laser wavelength is positioned a short distance behind an object whose diffraction pattern is to be recorded. The laser illumination is adjusted to project the pattern onto the surface. This arrangement is placed in vacuum in the object plane of a nonscanning electron microscope. Since the electron microscope can resolve emission-current-density variations on a spatial scale less than the wavelength of visible light, one can image evanescent as well as freely propagating fields. A convenient setup is to place the object on one side of a thin transparent plate with a suitable photoemissive coating applied to the opposite side facing the electron optics. We have used a lithium niobate plate with a tungsten–cesium coating, but other materials will work. The electrostatically focused instrument for obtaining these images is described, and some diffraction patterns are shown.

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WK12. Glass Near-Infrared Polarizers. T. P. SEWARD III AND D. A. NOLAN, *Research and Development Division, Corning Glass Works, PRC, Sullivan Park, Corning, New York 14831.*—Glass polarizers operating in the 700–1200-nm wavelength range, with dichroic ratios $[\mathrm{DR} \equiv (\log 1/T_\parallel)/(\log 1/T_\perp)]$ in excess of 20, are reported. For some of these polarizers, dichroic ratios greater than 40 have been measured. Example glasses with 95% polarization efficiency $[\mathrm{PE} \equiv (T_\perp - T_\parallel)/(T_\perp + T_\parallel)]$ at >40% average transmittance $[T_{\mathrm{av}} \equiv (T_\parallel + T_\perp)/2]$ and 98% efficiency at >45% average transmittance are discussed. These near-infrared polarizers are made by hydrogen reducing, to silver metal, aligned elongated silver halide particles in the glass. The wavelength of maximum polarization depends on the shape, or aspect ratio, of the resulting reduced silver-metal particles. The absorption, and hence the polarization efficiency, depends on the total amount of silver-metal present, which is controlled by the time and temperature of the hydrogen-reduction process. The polarizing layer thickness is generally about 20–100 μm, although much thicker layers can be produced. The glasses are chemically durable, and the polarizing properties are stable at temperatures below 350°C.

WK13. Characteristics of a Telescope. ROBERT H. NOBLE, FRANCISCO COBOS, FRANCISCO DIEGO, AND JOSE M. SASIAN, *Instituto de Astronomia, Universidad Nacional Autonoma de México, A.P. 70-264, 04510 México City, Distrito Federal, México.*—Ritchey–Chrêtien telescopes are designed to produce an aplanatic image, that is, an image with no third-order spherical or comatic aberration. Often a second system is designed with no spherical aberration at another focal ratio. The components are fabricated to match the design parameters as closely as possible within certain time and cost limits. We describe a set of measurements that demonstrate the degree of success of the final system in achieving the goals of the design. The characteristics of the systems were obtained to sufficient precision that they can be used to design other systems to be used with the same primary mirror.

WK14. Optical Sensor for Measurement of Road-Surface Wetness Based on the Polarized Reflection Flux. Y. ITAKURA, S. TSUTSUMI,* AND T. TAKEHANA,† *Department of Electrical Engineering, Faculty of Education, Shiga University, 2-5-1 Hiratsu, Ohtsu 520, Japan.*—This research is concerned with the development of a vehicle-borne optical sensor, which is useful for a real-time recognition of various statuses of the road surface, such as dry, wet, frozen, and snow-covered, as one of the parameters for vehicular antiskid control. The principle of this sensor is based on an increase in degree of polarization of the light flux reflected from the surface with an increase of its wetness. The light flux reflected from a wet surface is well polarized horizontally when the incident angle is the Brewster's angle, whereas the light flux reflected from a dry surface is almost unpolarized. By making a measurement of the degree of polarization of the reflected flux, we can completely discriminate between the dry surfaces and the wet ones with a classification probability of 100%. The degree of polarization of both the frozen and snow-covered surfaces would be slightly smaller than that of the dry surface because the two first-named surfaces are diffuse. Therefore it is difficult to distinguish the frozen and snow-covered surfaces from the dry one with the classification probability of more than 90%.

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WK15. Coherent-Optical Linewidth Measurements at Micrometer and Submicrometer Dimensions. MARILYN J. DODGE, *Semiconductor Materials and Processes Division, Room A331, Technology Building, National Bureau of Standards, Washington, D.C. 20234.*—In 1979, Nyyssonen[1] discussed the problem of spatial coherence in accurate optical micrometrology. Based on the theory of partial coherence, a model of the proposed measurement technique indicated that linewidths as small as 0.5 μm on an antireflection chromium photomask could be measured with an estimated uncertainty of 0.05 μm. A standard reference material consisting of a series of opaque lines, clear lines, and line spacings from 0.5 to 12.0 μm in