designed by Courteau is modified so as to obtain with the 228 cm f/9 telescope monochromatic images of a 4 x 11 arcminutes field at 45 wavelengths simultaneously. Each wavelength band has 15 A full width at half maximum and the central wavelengths for adjacent bands differ by 15 Å. The 45 monochromatic images cover a 16 cm diameter photocathode of an ITT F-6094 image tube. The proposed imaging spectrograph changes the telescope focal ratio to faster than f/3 so that the sky background in a 15 Å band can be reached in 2 to 3 hours exposure.

Several simultaneously obtained monochromatic pictures of a galaxy at effective wavelengths falling along the profile of a selected absorption or emission line in the spectrum of the galaxy will be combined to indicate the distribution of radial velocities in the galaxy. A composite color photograph will be obtained by printing these pictures one over another through filters of widely differing colors; areas of different radial velocity will have different hues in the resulting color photograph of a galaxy.

29.02.10 Winds in Elliptical Galaxies. L.I. Cowie, H.U. Reanalysis of the gas flow in 20 galaxies with recent estimates of supernova and mass injection rates suggest that thermally unstable steady winds of the type found by Mathews and Baker (Ap.J. 170, 241, 1971) are not formed. Thermal instability within the galactic gas leading to optical emission and possible generation of radio sources may be induced by external pressure: the process is particularly effective within rich clusters. The evolution of the gas with inclusion of conduction and viscosity has been analysed.

29.03.10 Optical Emission-Line Spectra of 3C 327 and Other Narrow-Line Radio Galaxies. R. COSTERO & D. E. OSTERBROCK, Lick Observatory, Board of Studies in Astronomy and Astrophysics, University of California, Santa Cruz. - Relative emission-line intensities were measured in the spectrum of 3C 327 as well as in the spectra of other "narrow-line" radio galaxies, having forbidden-line as well as Balmer-line widths of order several hundreds of km/sec. These narrow-line objects appear to be the radio-galaxy analogues of Seyfert galaxies of class I. The relative intensities in these newly measured spectra are compared with those in the spectrum of Cyg A, itself a narrow-line radio galaxy. There is a strong general similarity of the emission-line spectra, though some lines, in particular [O III] 3372, vary considerably from object to object. In 3C 327 the Balmer decrement agrees with the theoretical recombinant decrement with a small amount of assumed reddening. The [O III] temperature is similar to those in planetary nebula. Photoionization seems the most plausible energy-input mechanism in 3C 327 and other narrow-line radio galaxies, as in Cyg A. Absorption lines of an integrated late-type stellar component can be seen in the spectra of several narrow-line radio galaxies, although they are not seen in Cyg A.

29.04.10 The Optical Emission-Line Spectrum of 3C 120. M. M. PHILLIPS & D. E. OSTERBROCK, Lick Observatory, Board of Studies in Astronomy and Astrophysics, University of California, Santa Cruz. - Spectrophotometric measurements of the nuclear region of 3C 120 were made using the image-dissector scanner of the Lick 120-inch telescope. 3C 120 has previously been studied by Wampler and Shields, Oke, and Sargent, and we therefore observed it partly to check our methods. This object is a radio galaxy which has long also been considered a Seyfert galaxy, and thus it represents an important link between these classes of objects. The relative intensities of the individual emission lines and the continuous spectrum were measured in the wavelength region 13346-7085 (in the rest system of 3C 120). The measured Balmer decrement is quite steep. The [S II] ratio F(6717)/F(6731) = 0.91 corresponds to a mean electron density of \( n_e (10^4/T)^{1/2} = 1.7 \times 10^3 \text{ cm}^{-3} \) in the region of [S II] emission. The [O III] ratio \( F(\lambda 4959) + F(\lambda 5007) / F(\lambda 4363) = 23 \) (uncorrected for reddening) implies an electron temperature of roughly 30,000K in the low-density limit \( n_e = 0 \), and approximately 20,000K for a density of \( 10^5 \text{ cm}^{-3} \). Broad emission features of Fe II are present in the spectrum. In particular, a weak emission line at 46369 may be identified with an Fe II transition of multiplet (40). The profiles of the H I, He I, He II lines are fairly symmetrical, with the full width at half maximum of the H I and He II lines approximately 2000 km s\(^{-1}\), while He II 4686 appears to have somewhat wider wings, as Shields, Oke and Sargent previously suggested.

29.05.10 Optical Spectra of 3C 227 and Other Broad-Line Radio Galaxies. D. E. OSTERBROCK, A. T. RUGG, & M. M. PHILLIPS, Lick Observatory, Board of Studies in Astronomy and Astrophysics, University of California, Santa Cruz. - Emission-line profiles and relative line intensities were measured for 3C 227, as were line intensities for 3C 382 and 3C 445, for which we have previously published the line profiles. These three radio galaxies and 3C 390.3, for which we previously published both line profiles and intensities, all have similar emission-line spectra, with broad Balmer lines and much narrower forbidden lines. The Balmer emission lines have weak narrow components with the same widths and redshifts as the forbidden lines, and the remaining broad components have irregular nonsymmetric profiles. In each of these four radio galaxies the broad Balmer lines have different, unusually steep decreases. The narrow emission lines have relative intensities