resonance radiation of O I should be possible and would allow the main present uncertainties to be removed.

Detailed Star Charts from a Computer. E. EISNER AND D. M. ROMAIN, *Bell Telephone Laboratories*. A set of computer programs has been written for the determination of angular positions of celestial objects from photographs of the objects against star backgrounds. We here describe in outline and illustrate the use of those of the programs that enable the correct identification of reference stars on the photograph, and give the apparent positions accurately. The programs select those of the stars contained in a large ($\sim 260\,000$ stars) catalogue on magnetic tape, that would appear in the field of view of a given camera. They then accurately up-date the positions of these stars and produce a diagram on microfilm and a printed table of the positions of the stars in the field of view. The sizes of the plotted stars in the diagram correspond to their magnitudes, and an additional diagram is produced in which the stars are numbered to correspond to their positions in the printed table. With these diagrams the identification of stars on a photograph is very rapid and certain. Examples of the diagrams and comparisons with 2 photographs of the sky and with *Apparent Places of the Fundamental Stars* are given. Other diagrams are used to show clearly the effects of precession, of proper motion and of aberration and nutation.

Photoelectric Three-color Observations of Polarization in the Light from the Reflection Nebulae NGC 2068, 7023 and IC 349, the Crab Nebula and the Galaxies NGC 1068, 3034 and 7814. A. ELVIUS, *Uppsala Observatory* AND J. S. HALL, *Lowell Observatory*.—The observations were obtained with the 69-in. Perkins reflector of Ohio Wesleyan and the Ohio State University at the Lowell Observatory during the fall of 1964. A Glan-Foucault prism was used as analyzer in the polarimeter, and all measures were made with color filters centered in the uv, blue, and yellow spectral regions.

(a) *Reflection Nebulae*: Measurements have been made in several points in NGC 2068, NGC 7023 and the Merope Nebula (IC349). The degree of polarization was found to be higher in yellow light than in the shorter wavelengths, as previously mentioned by Gehrels. The degree of polarization, however, was usually not found to be a linear function of $1/\lambda$, and the slope seems to increase with increasing angular distance from the illuminating star.

Though the direction of polarization is in many cases related to the direction to the illuminating star,

it was sometimes found to be clearly related to the direction of nebular filaments.

(b) *Crab Nebula*: Observations indicate that the polarization is nearly the same in all three colors, as expected from the theory of synchrotron radiation.

(c) *Galaxies*: Some faint regions of M82, containing filaments, have been observed. Although photographs published by Sandage (*Science* 144, 407, 1964) indicate a very high polarization in these regions, the photoelectric data so far reduced show no more than 25% polarization in any of the three colors.

Polarization has been observed in NGC 1068 where Walker has already reported high uv polarization in its nucleus (*Astron. J.* 69, 682, 1964). The degree of polarization decreases with wavelength, probably because of the mixture of synchrotron radiation with unpolarized starlight.

Polarization was also found in the dark lane crossing over the central part of NGC 7814. The electric vector is generally parallel to the dark lane and the polarization is probably due to absorption.

The Extension of Radio Source Spectra to a Wavelength of 11.4 M. W. C. ERICKSON AND W. M. CRONYN, *University of Maryland*.—Approximately 500 observations of 120 different radio sources have been made with the Clark Lake antenna. These consist of about one-quarter of the sources available to the antenna, and some preliminary results are presented. In particular, we have observed most of the high-temperature sources discussed by Williams (*Nature* 200, 56, 1963) as well as most of the known quasi-stellar sources.

Some source spectra show a downward curvature at 7.9 m as discussed by Williams. They are the high brightness temperature sources 3C48, 3C119, 3C147, 3C295, 3C298, and 3C299. This curvature is confirmed and is much more striking at 11.4 m. These data lend support to Williams' hypothesis of self-absorption at decimeter wavelengths. In addition, 3C196 appears to have a somewhat lower flux at 11.4 m than at shorter wavelengths.

This drop in the flux of high brightness temperature sources does not appear to be a general property of all quasi-stellar sources, however. 3C9, 3C47, and 3C245 do not display such a drop. In fact, these sources appear to be 30 to 50% more luminous at 11.4 m than extrapolations of their shorter wavelength spectra (Conway, Kellerman, and Long, *Monthly Notices Roy. Astron. Soc.* 125, 261, 1963) would indicate. These three sources all have appreciable angular diameters, and their brightness temperatures are not particularly high. On the other hand, all of the sources displaying the drop are of