than the expansion rate. There is a rapid rise to maximum in 10^2 sec or less and a slow subsequent decline taking about 10^3 – 10^4 sec coinciding qualitatively with the observed H α light curves. During this time (about 1 h) a large flare can derive the necessary 10^{32} ergs from normal photospheric energy output.

On the Nature of the Infrared Excesses in T Tauri-like Stars. ARCADIO POVEDA, *Observatorio Astronómico Nacional, Universidad de México*.—It has been argued (Poveda, *Bol. Ton. & Tac.* 4, 15, 1965) that very young stars may be accompanied by a thick circumstellar cloud, extremely bright in the infrared, that can evolve into planetary systems. Mendoza's (*Astrophys. J.* 143, 1010, 1966) discovery of the large infrared excesses in T Tauri stars supports the initial hypothesis that R Monocerotis is an early stage of the protoplanetary cloud where only about 1/100 of the star's luminosity leaks out in the visible, while FU Orionis' hundred-fold increase in luminosity in 1937 occurred because the particles coalesced into large planetesimals, or because they were blown away by the stellar wind.

Mendoza's observations show two types of infrared excesses: (a) stars whose infrared luminosity is at least 100 times larger than the visual one, like R Monocerotis, and (b) stars where the infrared luminosity is one to three times the visual, like T Tauri. In (a) the infrared luminosity results from the transfer of the star's electromagnetic radiation through the circumstellar cloud, while in (b), at a more evolved stage, the planetesimals capture only a fraction of the radiation, too small to explain the infrared excesses. These could be produced by the stellar cosmic rays (50–100 MeV), since they heat the matter of the dense stellar winds at intermediate distances.

The cosmic rays generated in the chromospheres move outward isotropically, guided by Parker's magnetic spirals, whereas Kuhi's (*Astrophys. J.* 140, 1409, 1964) results show the existence of enough mass in the stellar winds to absorb the stellar cosmic rays. Thus, infrared excesses of class (b) require that the stars should dissipate more energy in cosmic rays than in thermal radiation. This unexpected result is not too surprising, considering that the energy lost by some T Tauri stars in stellar winds is also somewhat larger than their visible luminosities. Thus, infrared excesses of class (b) may exist even in the absence of protoplanetary systems.

Recombination Line Survey of Galactic H II Regions. E. C. REIFENSTEIN, III, T. L. WILSON, B. F. BURKE, *Massachusetts Institute of Technology*,

AND P. G. MEZGER, *National Radio Astronomy Observatory*.—A survey of 109 α (5009 MHz) hydrogen recombination line radiation has been undertaken with the NRAO 140-ft telescope. The first phase of the survey has been completed, and consists of observations of the 80 most intense sources near the galactic plane. The recent 11-cm continuum survey of Altenhof and Mezger has been used as a finding list. Line radiation has been detected in 52 of the observed sources, and radial velocity measurements have been made. The large-scale distribution of these sources will eventually lead to a galactic model, when later phases of the survey have been completed. Special attention has been given to Cygnus X and the galactic center. In Cygnus X, 19 sources were observed, and the 109 α line was detected in 12 of these. An unexpectedly large fraction of sources both in Cygnus X and in the galaxy as a whole show no recombination line. This indicates that there may be a larger fraction of old supernova remnants, having relatively flat spectra, than was previously suspected. The galactic center observations have shown line radiation in the sources (0.5, -0.0), (0.7, -0.0), and (1.1, -0.1). No line of normal width could be seen in (0.0, 0.0), (0.9, $+0.1$), or (0.2, -0.0), although the presence of line radiation of very wide velocity spread could not be ruled out. Note that this is a correction to the earlier observation of P. G. Mezger and B. Hoglund (*Astrophys. J.* 147, 490, 1967), who attributed the lines of (0.5, -0.0) and (0.7, -0.0) to the sources (0.2, -0.0) and (0.5, -0.0).

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Galactic Radio Source W49 at 3.4 mm. KURT W. RIEGEL, *University of California*, AND EUGENE E. EPSTEIN, *Aerospace Corporation*.—The galactic radio source W49 has a flux of $54 \pm 11 \times 10^{-26}$ W M $^{-2}$ Hz $^{-1}$ at 3.4 mm. On the basis of our extension of the continuum spectrum of this source to high frequencies, we confirm the existence of a very dense component within the thermal component of W49.

A Model for the Common Nova Outburst. WILLIAM K. ROSE, *Princeton University Observatory*.—Models of a hot, hydrogen-exhausted 0.75 $M_{\odot}$ star that is contracting toward the white dwarf state are studied. It is assumed that the star is a member of a close binary system and can accrete very small amounts of hydrogen-rich mass from