(Astrophys. J., in press) have found that the parent stars of pulsars lie in about the same mass range and that pulsars are remarkably similar to one another. We have investigated two problems relating to the possible connection between these nearly identical cores and pulsars. An independent investigation of carbon detonation in the cores has shown that a detonation wave will leave the material in nuclear statistical equilibrium. A dynamical calculation has shown that this result will not affect the final outcome of the detonation originally stated by Arnett (Astrophys. Space Sci. 5, 180); if a detonation originates in one of these cores the star will be completely dispersed, leaving no remnant. If carbon burns without detonating (due, perhaps, to convection) the core will be composed of $^{24}\text{Mg}$ and $^{16}\text{O}$. The magnesium will undergo increasingly rapid electron capture as the star evolves, causing the core to become unstable and to collapse. Another dynamical calculation has shown that this collapsing core will ignite oxygen. A detonation wave will then transform the material of the core into nuclear statistical equilibrium and send a shock wave into the envelope with enough energy to eject it. Rapid electron capture on iron-peak nuclei and free protons will cause the core to collapse toward a neutron-star state. We propose that the cores of stars in the mass range $\sim 3.5-8 M_\odot$ collapse after nonviolent carbon burning and that the result is oxygen detonation, the ejection of the envelope, and the formation of a pulsar.

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Radio Emission Related to the Kinematics of the Tau-Shaped Flare of 21 November 1969. K. P. White III, E. J. Rhodes, Jr., P. M. Woiceshyn, Astronomy Department, University of California at Los Angeles, and E. B. Mayfield, Aerospace San Fernando Observatory, The Aerospace Corporation, El Segundo, Calif.—A distinctively shaped class 2B solar flare of 21 November 1969 is described as it was observed in tuned Hα filtergrams, an $\Omega \nu \lambda$ 1032 spectroheliosgram, monochromatic microwave and millimeter-wave traces, and radio spectral scans. The Hα filtergrams show a flare surge and subsequent falling back of absorbing material above the flaring region. Using an escape-height model of Hagen and Barney (Astrophys. J. 153, 275), an analysis of the material’s velocity, assuming constant acceleration, placed it at the appropriate heights coincident with the production of microwave radio bursts, millimeter bursts, and an inverted U burst at 380 MHz.

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The Transfer of Formaldehyde Microwave Line Radiation in an Interstellar Cloud. Richard E. White, Columbia University, and Patrick Thaddeus, NASA–Goddard Institute for Space Studies.—The excitation of interstellar H$_2$CO by isotropic microwave background radiation and collisions has been treated theoretically for column number densities ranging from $10^{13}$ cm$^{-2}$ to greater than $10^{17}$ cm$^{-2}$. The cloud is treated as a homogeneous slab at a uniform kinetic temperature, illuminated by isotropic background radiation, and the equations of transfer for the formaldehyde lines are solved simultaneously with the equations of statistical equilibrium by the complete linearization method developed by Auer and Mihalas for non-LTE radiative transfer problems in stellar atmospheres. Pure Doppler broadening and completely noncoherent scattering are assumed.

Collisional cross sections for electron excitation have been calculated in the Born approximation; the cross sections for excitation by neutral particles have been calculated quantum mechanically: (a) from a “hard sphere” model of the collision (following the model of Townes and Cheung), and (b) from Anderson’s theory of rotational excitation of molecules.

The calculations have been performed for a variety of densities and temperatures for the cases: (a) 2.7 K blackbody background radiation, and (b) background radiation with a 2.7 K spectrum throughout the centimeter region, but a non-blackbody spectrum in the millimeter region. Excess radiation (over the 2.7 K blackbody spectrum) in the millimeter region is capable of producing an excitation temperature of less than 2.7 K in the 4830-MHz transition (as observed) if the densities are sufficiently low that collisional heating is unimportant.