DENSE CORES IN DARK CLOUDS. II. NH_3 OBSERVATIONS AND STAR FORMATION

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We present partial results of a survey of 100 visually opaque regions in nearby dark clouds in the 1.3 cm (J,K) = (1,1) line of NH_3, with mapping of all strong sources ("dense cores") and (2,2) line observations in selected positions. For 27 dense cores with distance estimates, mean properties are: FWHM diameter, 0.1 pc; density, 3×10^4 cm^{-3}; mass, 4 $M_\odot$; kinetic temperature, 11 K; and FWHM velocity width, 0.3 km s^{-1}. We compare line shapes with cloud motion models, and source density, size, and temperature with equilibrium and stability requirements. These indicate that most dense cores are in the early stages of collapse, or in near-critical equilibrium; if in equilibrium they are probably supported by a combination of thermal and subsonic turbulent motions. In Taurus-Auriga, positions of the ten known dense cores are well correlated with positions of emission-line star groups. In the next dense core free-fall time, 2×10^5 yr, the Taurus-Auriga complex is expected to form 25-50 emission-line stars. This is consistent with the estimated number of dense cores, 25. Taken together, these results suggest that most of the dense cores described here will form low-mass stars in the next $\sim10^6$ years.

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SELF-REGULATED STAR FORMATION IN THE GALAXY

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The stellar birthrate is obtained under the assumption that the regions of star formation are supported against gravity by winds from low-mass young objects. For winds interacting in the momentum conservation stage (i.e., the shell radius is proportional to $t^{1/4}$), it is found that the rate is correlated with the *molecular* gas density of the *parent fragment* as $n^{13/8}$ or $n^{5/8}$, for rates per unit volume or per unit mass, respectively. In particular, the birthrates derived from protostellar rotationally driven winds are in good agreement with the observed star production in the cloud B 18. Also, with the aid of the observed properties on the Taurus-Auriga complex, the model is extrapolated to the Galaxy as a whole. The predicted average rate for the Milky Way is in good agreement with standard estimates based on observations of the solar neighborhood. This paper will appear in the *Ap. J.*, 273, Oct. 1, 1983).

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