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COLLISIONS OF HIGH-VELOCITY CLOUDS WITH A GALACTIC DISK

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ABSTRACT. Two-dimensional hydrodynamic simulations for the interaction of neutral hydrogen high-velocity clouds and a galactic disk are presented. The models consider spherical and cylindrical clouds (with densities $0.1\ cm^{-3} \leq n_c \leq 100\ cm^{-3}$, sizes $10 \leq R_c \leq 100$ pc, and velocities $50\ km\ s^{-1} \leq V_c \leq 300\ km\ s^{-1}$) colliding with a disk represented by i) a constant density slab and, ii) a gaussian density distribution. When the infalling clouds are completely shocked in a time short compared with the crossing time of the disk, the leading shocks continue to penetrate into the disk, generating large scale and massive structures which have the appearance of curved arcs. When the cloud is shocked in a time scale longer than or comparable to the crossing time, a cylindrical hole with the dimensions of the impinging cloud is simply drilled across the entire disk. Cloud-galaxy collisions are compared with other energy sources and the resultant structures are suggested to resemble, in some cases, the large scale structures observed in H I.

Key words: GALAXIES-DISK — INTERSTELLAR-CLOUDS-HIGH VELOCITY

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