Gas kinematics in massive star-forming regions from the Perseus spiral arm

M.S. Kirsanova^1, A.M. Sobolev^2, M. Thomasson^3

^{1}Institute of Astronomy, Russian Academy of Sciences, Moscow, Russia, ^{2} Ural Federal University, Ekaterinburg, Russia , ^{3} Department of Earth and Space Sciences, Chalmers University of Technology, Onsala Space Observatory, Onsala, Sweden

We present results of a survey of 14 star-forming regions from the Perseus spiral arm in CS(2-1) and 13CO(1-0) lines with the Onsala Space Observatory 20 m telescope. Maps of 10 sources in both lines were obtained. For the remaining sources a map in just one line or a single-point spectrum were obtained. On the basis of newly obtained and published observational data we consider the relation between velocities of the "quasi-thermal" CS(2-1) line and 6.7 GHz methanol maser line in 24 high-mass star-forming regions in the Perseus arm. We show that, surprisingly, velocity ranges of 6.7 GHz methanol maser emission are predominantly red-shifted with respect to corresponding CS(2-1) line velocity ranges in the Perseus arm. We suggest that the predominance of the "red-shifted masers" in the Perseus arm could be related to the alignment of gas flows caused by the large-scale motions in the Galaxy. Large-scale galactic shock related to the spiral structure is supposed to affect the local kinematics of the star-forming regions. Part of the Perseus arm, between galactic longitudes from 85deg to 124deg, does not contain blue-shifted masers at all. Radial velocities of the sources are the greatest in this particular part of the arm, so the velocity difference is clearly pronounced. 13CO(1-0) and CS(2-1) velocity maps of G183.35-0.58 show gas velocity difference between the center and the periphery of the molecular clump up to 1.2 km/s. Similar situation is likely to occur in G85.40-0.00. This can correspond to the case when the large-scale shock wave entrains the outer parts of a molecular clump in motion while the dense central clump is less affected by the shock.

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Comments:

Email: kirsanova@inasan.ru