The Structure and Kinematics of the Milky Way from Parallaxes of High Mass Star Forming Regions

J. J. Li[1,2], Y. Xu[1], M. J. Reid[3], K. M. Menten[2], X. W. Zheng[4], A. Brunthaler[2], T. Dame[3], Y. W. Wu[2], B. Zhang[2], Y. K. Choi[2], L. Moscadelli[5], K. Rygl[6], K. Hachisuka[7], and A. Bartkiewicz[8]

[1] **Purple Mountain Observatory, Chinese Academy of Sciences, Nanjing 210008, China**

[2] **Max-Planck-Institut für Radioastronomie, Auf dem Hügel 69, 53121 Bonn, Germany**

[3] **Harvard-Smithsonian Center for Astrophysics, 60 Garden Street, Cambridge, MA 02138, USA**

4 **Nanjing University, Nanjing 20093, China**

5 **INAF-Osservatorio Astrofisico di Arcetri, Largo E. Fermi 5, 50125 Firenze, Italy**

6 **Istituto di Astrofisica e Planetologia Spaziali (INAF-IAPS), via del Fosso del Cavaliere 100, 00133, Roma, Italy**

7 **Shanghai Astronomical Observatory, 80 Nandan Rd, Shanghai, China**

8 **Torun Centre for Astronomy, Nicolaus Copernicus University, Gagarina 11, 87-100 Torun, Poland**

Over 100 trigonometric parallaxes and proper motions for masers found in high-mass star-forming regions (HMSFRs) have been measured with the BeSSeL Survey and the Japanese VERA project. The measurements accurately locate several spiral arms and yield global pitch angle typically $\sim 10°$, and give the 3-dimensional motions of these HMSFRs in the spiral arms over the entire northern sky. Unless $V_{\odot} \geq 18 kms^{-1}$, HMSFRs lag circular Galactic orbits.