Shanghai 65m Tianma Radio Telescope

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Abstract

The Shanghai 65m radio telescope, named Tianma radio telescope, is a general purpose, fully steerable radio telescope. It has a main reflector of 65-m in diameter with a shaped Cassegrain configuration, and operates in a wide frequency coverage from 1.4 GHz to 50 GHz with eight frequency bands (namely L, S, C, X, Ku, K, Ka and, Q). The frequency switch can be accomplished within one minute. A novel technology known as active surface control scheme was adopted for assembling the main reflector with a total of 1104 actuators installed so as to compensate for gravity deformation in the reflecting surface during tracking observations. This greatly improves the observing efficiency at high frequencies.

Relying on its superiorities such as better sensitivity and wider frequency coverage, TMRT can play an important role in the astronomical observations of molecular spectral line emission and pulsar. When used in the single-dish mode, TMRT will be able to perform observation of various radio sources, with specific targets including radio-loud blazars, micro-quasars and X-ray binaries. Research activities on the fast time variation of Active Galactic Nuclei and the transient phenomenon of X-ray binaries are key topics for high-sensitivity single-dish observations. As a key element of the VLBI network in China and the world, TMRT can significantly improve the sensitivity of VLBI observations. This is China's first radio telescope capable of observing at the 7 mm wavelength, and then will open up new areas of millimeter wave VLBI observations.

The Tianma radio telescope (TMRT) saw its first light on October 26, 2012. Since then, quite comprehensive commissioning observations have been done over the past 4 years or so. During that 4-year period, we also had made 3 calls for science observations. TMRT is almost ready for its full scientific operation.

I will report current TMRT-related activities including first science results (e.g., Yan et al. 2015; Li et al. 2016) and some technical developments.

1. Yan Z., Shen Z.-Q., Wu X.-J., Manchester R. N., Weltevrede P., Wu Y.-J., Zhao R.-B., Yuan J.-P., Lee K.-J., Fan Q.-Y., Hong X.-Y., Jiang D.-R., Li B., Liang S.-G., Ling Q.,-B., Liu Q.-H., Qian Z.-H., Zhang X.-Z., Zhong W.-Y., Ye S.-H. "*Single-pulse Radio Observations of the Galactic Center Magnetar PSR J1745--2900*", 2015, The Astrophysical Journal, Volume 814, Issue 1, article id. 5, 8 pp.
2. Li J., Shen Z.-Q., Wang J., Chen X., Wu Y.-J., Zhao R.-B., Wang J.-Q., Zuo X.-T., Fan Q.-Y., Hong X.-Y., Jiang D.-R., Li B., Liang S.-G., Ling Q.-B., Liu Q.-H., Qian Z.-H., Zhang X.-Z., Zhong W.-Y., Ye S.-H. "*TMRT Observations of Carbon-chain molecules in Serpens South 1A*", 2016, The Astrophysical Journal, Volume 824, Issue 2, article id. 136, 8pp.