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Research progress on MUSER and IPS telescope for space weather

Wei Wang[(1)], Yihua Yan[(1,2,3)] , Ming Xiong[(1)], Linjie Chen[(1,2)] , Jin Fan[(2)],Zhijun Chen[(1,2)], Cang Su[(1,2)]
(1) National Space Science Center, Chinese Academy of Sciences, Beijing, China; wangwei1@nssc.ac.cn
(2) National Astronomical Observatories, Chinese Academy of Sciences, Beijing, China; yanyihua@nssc.ac.cn
(3) School of Astronomy & Space Science, University of Chinese Academy of Sciences, Beijing, China; yanyihua@nssc.ac.cn

The Mingantu Spectral Radioheliograph (MUSER), initially named the Chinese Spectral Radioheliograph (CSRH), was developed from 2009 - 2016. Located at the Mingantu Observing Station in Inner Mongolia, it covers the 400 MHz to 15 GHz frequency range. Currently, it consists of two arrays: MUSER - I (400 MHz to 2.0 GHz with 40 4.5 m mesh antennas) and MUSER - II (2 to 15 GHz with 60 2 m dish antennas). Under the Meridian - II Project, it has been expanded with MUSER - L (30 to 400 MHz using 224 Log - Periodic Dipole Antennas). MUSER's mission is to provide solar radio images for monitoring solar bursts from the solar surface to interplanetary space. So far, MUSER has observed dozens of solar radio burst events, which have provided valuable data for solar physics and space weather research.

The Interplanetary Scintillation (IPS) telescope, a significant facility of the Meridian Project, has been successfully completed last year. Focused on space weather research, this telescope plays a crucial role in enhancing our understanding of the space environment. The telescope has three 140 m by 40 m cylinder antennas at the MUSER site, and two 30 m dish antennas about 200 km away in nearby counties. The cylinder antennas operate at 327 MHz and 654 MHz with dual - linear polarizations, a 40MHz adjustable bandwidth, and a sky zenith angle of 60 degrees, enabling observation of thousands of radio sources. The 30 m dish antennas work at 327MHz, 654MHz, and 1.4GHz with dual - line polarization and can scan the entire sky. The IPS telescope has already carried out daily observations and can observe the speed of the solar wind. Relevant observational examples will be presented in this paper as well.

Both MUSER and IPS telescopes will play important roles in solar and space weather research. This paper aims to detail their hardware, construction process, and present preliminary observation results, along with the observed events of these two advanced telescopes.

Figure 1. The view of IPS telescope and MUSER

References

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