

The Detection of “Magnetic Element”

—Why we need an one-meter Space Solar Telescope

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The nature of magnetic element, the elemental structure of solar magnetic field, is one of the most important mysteries in solar physics. The intrinsic properties of magnetic element, such as field strength, filling factor, spatial scale, are unknown yet, though the history of solar magnetic measurement can go back to one hundred years ago.

With the development of technology, solar physicists have made a lots of attempts to resolve the magnetic element directly. For example, with the help of a set of techniques (adaptive optics, correlation tracker, image reconstruction, etc.), the one-meter Swedish Solar Telescope in the Canary Islands has nearly reached its diffraction-limit resolution ($\sim 0.18''$ @ 630.25nm), which roughly match the spatial-scale requirement of magnetic element detection. However, none current-used telescope can resolve magnetic element at this moment yet, as spatial resolution is just one of the requirements of magnetic element detection.

In this paper, the requirements of magnetic element detection will be discussed. By these discussions, we know that the spatial resolution, temporal resolution, and magnetic sensitivity are all important. The proposed Space Solar Telescope, an one-meter Chinese space telescope, can match these requirements.