

## THE PRIMEVAL STRUCTURE TELESCOPE

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The Primeval Structure Telescope (PaST) will be used to study early ionization of the universe. The telescope will image and spectrally resolve hyperfine emission of neutral hydrogen at redshifts from about 6 to 20.

Recently released data, obtained with the WMAP satellite, indicate that the universe was ionized very early, at around redshift 15. Right now, there is very little information on this ionization, since the WMAP data do not tell us the ionization history or the energy source. If the energy source was emission from collapsed objects, perhaps ultraviolet radiation from the first stars, the ionization did not occur homogeneously. Earlier star formation in high-density regions causes these to be ionized first. Just when the ionization was half complete, the large-scale structure of the universe became visible in the ionization pattern. We will use redshifted 21 cm brightness to image the largest of the ionized bubbles in three dimensions, allowing us to determine the redshift of the early ionization. In addition, we will be able to study the evolution and merging of the ionized bubbles.

PAST will be a sparse array telescope consisting of 10,000 log periodic antennas, providing over 50,000 square meters of effective collecting area. These antennas will be grouped into 80 phased arrays of 127 antennas. Current plans have these phased arrays fixed, pointed at the North Celestial Pole. Later, we can add electronic beam steering. Signals from the 80 phased arrays will be processed using a correlator built from a network of about 100 PC computers.

The telescope will occupy ten square kilometers in the Ulaan Valley, Xin Jiang, China. The telescope will be built almost entirely of inexpensive commercially available off-the-shelf components.

A series of tests of prototypes, made on-site, have allowed us to study the performance of the telescope and its components. We will present these results and show sky images obtained with the prototypes.

We anticipate that one quarter of the array will be assembled by the time of the meeting and we will present an up to date progress report.

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2. J - Radio Astronomy
3. (a) Large Low Frequency  
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4. I - Invited Paper, Program  
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5. No special instructions