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# Multiple laser system for high resolution Thomson scattering diagnostics on the EAST tokamak

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The high temporal and spatial resolution of laser Thomson scattering (TS) diagnostics is an important research subject of fusion plasma diagnostics. Currently, the temporal resolution of TS based on single laser in EAST is limited to 20 ms, which is too low to resolve the evolution of pedestal structures directly. A critical part of this diagnostic is the high-frequency laser source. A multiple laser system for high resolution TS diagnostics has been designed and installed on the EAST tokamak in ASIPP (Institute of Plasma Physics, Chinese Academy of Sciences). To achieve the specified parameters, a multilaser solution including four 10-50 Hz 5 J Nd:YAG laser systems with the fundamental wavelength of 1064 nm, at a distance of ˜40 m from the tokamak, is utilized. The design of the laser beam transport path is presented, using multi-beam combiner technology to improve the time resolution(up to 8 microseconds) and real-time monitoring of laser power to improve density measurement accuracy of the system. The requirements for this system are very stringent with approximately ˜7mm spatial resolution at the edge region. After several weeks trial running on the superconducting EAST tokamak, the system was proved to be capable of measuring plasma electron temperature and density with high resolution. The setup of multiple laser system is described in detail in this paper, as well as the analysis of the measurement capability. Finally, the experimental results are presented. The completion of this project will provide the basic tools for other fast physical processes study, such as L-H transition.

## Eligible for student paper award?

No

**Authors:** Dr HAN, Xiaofeng; ZANG, Qing; Dr HU, Ailan; Dr LI, Da; Dr XIAO, Shumei; Mr TIAN, Baogang; Mr ZHOU, Handong; Mr ZHAO, Junyu; Dr GONG, Xianzu; Dr HU, Liqun; Dr XU, Guosheng; Dr GAO, Xiang

**Presenter:** Dr HAN, Xiaofeng

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