

# Design scheme of line array detection for Polarimeter-interferometer System on EAST

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**Abstract**—A multi-channel Polarimeter-INTERferometer (POINT) system has been constructed on the core region of Experimental Advanced Superconducting Tokamak (EAST) plasmas for electron density profile and current density profile measurements, with a spatial resolution of 8.5cm. Aiming to explore the small spatial scale density phenomena in the core plasma induced by MHD instabilities effects, a higher spatial resolution measurement is required. A novel line array detection scheme of POINT is proposed. By replacing the original single Schottky mixer with a line array HEMT detector at the central channel position, the original single channel can be extended to 5 channels for spatial continuous measurement, which has a significantly simplified structure design compared with the discrete upgrade scheme. Related optical design, components selection and bench test have been carried out to validate the feasibility and reliability of the novel scheme. The high responsivity and low noise of the detector can meeting the essential requirements of coherent signal measurement. Additionally, a circular plano cylindrical lens is designed as a beam-shaping component to compress the Gaussian beam into stripe. Bench test results obviously displayed the well performance of the cylindrical lens designed to convert the shape of laser beam. Furthermore, the coupling effect between the cylindrical lens and the line array HEMT detector in signal detection is optimized to verify the reliability of the scheme.

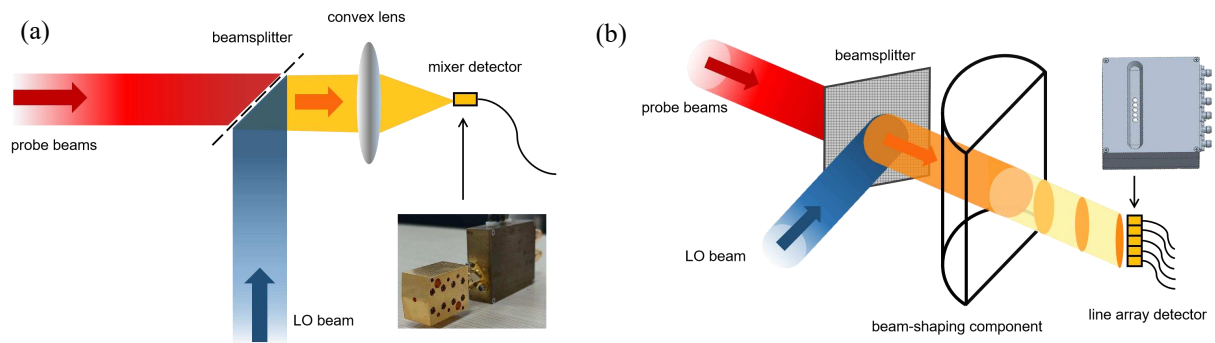


Figure 1. (a) original detection system , (b) a novel line array detection scheme .

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