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## 4.5 Plasma Current Profile Measurement by using improved Faraday rotation measurement of POLarimeter-INTerferometer for Long-Pulse Operation on EAST

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A double-pass, radially-view, 11 chord, POLarimeter-INTerferometer (POINT) system has been developed and routinely operated on the EAST tokamak, and provides important plasma current profile information for plasma control and physics understanding. Stray light originating from spurious reflections along the optical path and also direct feedback from the retro-reflector used to realize the double-pass configuration can both contribute to contamination of Faraday rotation measurement accuracy. Modulation of Faraday rotation signal due to interference from multiple reflections is observable when the interferometer phase (plasma density) varies with time. Direct reflection from the detector itself can be suppressed by employing an optical isolator consisting of  $\lambda/4$ -waveplate, and polarizer positioned in front of the mixer. A Faraday-effect phase oscillation observed during the density ramp can be reduced from  $5\sigma \sim 10\sigma$  to  $1\sigma \sim 2\sigma$  by eliminating reflections from detector. Based on internal Faraday rotation measurement using this improved POINT system, the equilibrium reconstruction with a more accurate core current profile constraint has been demonstrated successfully for long-pulse operation high-performance scenario research on EAST.

Primary author(s) : LIU, Haiqing (Institute of Plasma Physics, Chinese Academy of Sciences (ASIPP) )

Co-author(s) : ZOU, zhiyong ( Institute of Plasma Physics, Chinese Academy of Sciences)

Presenter(s) : LIU, Haiqing (Institute of Plasma Physics, Chinese Academy of Sciences (ASIPP) ); ZOU, zhiyong ( Institute of Plasma Physics, Chinese Academy of Sciences)

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