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Combined Faraday Rotation and Cotton-Mouton Measurements on MST[1] B.H. DENG, D.L. BROWER, W.X. DING, T. YATES, UCLA, B.E. CHAPMAN, D. CRAIG, S.C. PRAGER, J.S. SARFF, M.D. WYMAN, UW-Madison — A three-wave FIR laser Faraday rotation-interferometer system is now routinely available on MST for simultaneous measurement of electron density and poloidal magnetic field profiles. For more accurate equilibrium reconstruction, the perpendicular (toroidal) magnetic field can be obtained by measuring the Cotton-Mouton (CM) effect (difference between O- and X-mode refractive indices). To test the feasibility of this measurement, two collinear, orthogonal, linearly-polarized laser beams with a slight frequency offset will be passed through the plasma and the phase difference between them directly measured to give the CM effect. By adding a second detector to each channel of the Faraday rotation-interferometer system, so that both linear components of circularly-polarized probe beams are detected, the CM effect measurement can be combined with the Faraday rotation-interferometer system to provide simultaneous measurement of plasma electron density, poloidal magnetic field, and toroidal magnetic field profiles. The principle of this three-wave Faraday rotation and Cotton- Mouton interferometer system will be described along with its importance for accurate equilibrium reconstruction.

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Bihe Deng
UCLA

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