Abstract Submitted
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**Coherent population trapping to measure magnetic fiøelds in hydrogen plasma**[1] J.M. MITRANI, Physics Dept., Princeton University, D.R. FARLEY, Innovative Energy Concepts LLC, Plainsboro, NJ, S.A. COHEN, Princeton Plasma Physics Laboratory — A laser-based diagnostic to measure weak magnetic fields in hydrogen plasmas using the quantum optics phenomenon of coherent population trapping (CPT) is described. In CPT, a bichromatic laser beam causes nonlinear optical-pumping of a 3-state ($\Lambda$) atomic system whose lower states' separation is set by the externally applied magnetic field (Zeeman effect). At CPT resonance, fluorescence from the upper state decreases significantly. The frequency difference of the bichromatic laser beam can be adjusted in search of the Zeeman splitting corresponding to magnetic field strengths present. Magnetic field direction can be obtained from polarization information. Critical physics issues, studied with Bloch equations, include the effects of all possible n=3$\rightarrow$2 transitions, Doppler broadening, hyperfine structure, and Stark shift. For sub-keV $H^0$ temperatures, CPT resonance does not depend on Doppler shift, but Doppler broadening of multiple transitions of the n=3$\rightarrow$2 manifold will decrease CPT contrast.

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