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A simple model for the generation and detection of a poloidal magnetic field in laser-target interactions DMITRI RYUTOV, BRUCE REMINGTON, Lawrence Livermore National Laboratory — When a linearly-polarized ultra-intense laser beam interacts with a target, it may generate not only toroidal but also poloidal non-oscillating magnetic field (D.D. Ryutov, B.A. Remington. AIP Conf. Proc., v. 827, p. 341, 2006; Astrophys. Space Sci., submitted, 2006). The poloidal field has a structure resembling the field of a group of four sunspots of alternating polarity. Its magnitude may reach the magnitude of an oscillating magnetic field in the incident wave. Effects of a pulse duration and ion expansion are discussed. Scaling laws determining this field are established. Detection of this field is feasible with side-on ion deflectometry. An optimum orientation of the probe beam is shown to form a 45-degree angle with the polarization plane. Examples of the distortion of an image of a rectangular grid are presented. It is concluded that the poloidal field can be identified even in the presence of the toroidal field of a comparable magnitude. Work performed for US DoE by UC LLNL under contract #W-7405-Eng-48.

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