Progress Report

POLARIZATION EFFECTS IN LASER-INDUCED PLASMA LASERS

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A prominent lasing effect in laser-induced plasmas (LIP) of various species has been recently demonstrated, with the aluminum LIP studied in most detail. It is found that at any resonant pumping of Al atoms from the $3s^2 3p(^2P)$ doublet states, the lasing is observed at either 394.4 nm or 396.2 nm (transitions $3s^2 4s(^2S_{1/2}) \rightarrow 3s^2 3p(^2P_{1/2})$ and $3s^2 4s(^2S_{1/2}) \rightarrow 3s^2 3p(^2P_{3/2})$, respectively). The polarization properties of the lasing light are studied, finding that the polarization degree strongly varies depending on the pumping transition chosen. Furthermore, it is shown that the polarization degree can be reliably controlled by applying a relatively weak ($\sim$0.2 T) external magnetic field. The results of a theoretical modeling closely match the experimentally observed phenomena.