Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

White light Parametric Instabilities L. SILVA, GoLP — Different techniques capable of describing the propagation and modulation instability of partially coherent/incoherent "white" light in nonlinear media are based on the paraxial wave approximation. In general, this approach is not valid for instabilities associated with the partially reflected backscattered radiation critical in many laser-plasma scenarios, such as ICF or fast ignition, and astrophysical scenarios. Inclusion of bandwidth/incoherence effects in laser driven parametric instabilities in plasmas can be described, for forward scattering by the standard Wigner-Moyal formalism, or by a generalized Wigner-Moyal statistical theory of radiation, or generalized photon kinetics, formally equivalent to the full wave equation, valid for partially coherent electromagnetic wave propagation in nonlinear dispersive and diffractive media. With this approach a generalized dispersion relation for Stimulated Raman Scattering driven by a partially coherent pump field has been derived, revealing a marked difference between backscattering (three-wave process), and direct forward scattering (four-wave process). This qualitative difference illustrates a fundamental difference between these two processes. The results, which generalize the classic results for plane wave pumps, demonstrate the possibility to control the growth rates of these instabilities by properly using broadband pump radiation fields.

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Date submitted: 01 Jun 2007 Electronic form version 1.4