

Abstract Submitted  
for the DPP09 Meeting of  
The American Physical Society

**Effect of Laser Beam Filamentation on Second Harmonic Spectrum in Laser Plasma Interaction** PRERANA SHARMA, R.P. SHARMA, Indian Institute of Technology, Delhi, India — This paper presents the laser beam filamentation at ultra relativistic laser powers, when the restriction on the beam is relaxed during filamentation process. On account of laser beam intensity gradient and background density gradients in filamentary regions the electron plasma wave (epw) at pump wave frequency is generated, this epw is found to be highly localized on account of the laser beam filaments. Interaction of incident laser beam with these epw leads to second harmonic generation. The second harmonic spectrum has also been studied in detail and its correlation with the filamentation of the laser beam has been established. Starting almost with a monochromatic component of laser beam propagation, the second harmonic spectrum becomes more complicated and broadened as the laser beam propagates further, and filamentation takes place. For the typical laser beam and plasma parameters:  $\lambda_0 = 1064$  nm, power flux ( $10^{22}$  W/cm<sup>2</sup>),  $\omega_p = 0.03\omega_0$ ,  $v_{th} = 0.1c$ ,  $n_0 = 1.9 \times 10^{19}$ . We found that conversion efficiency comes out to be  $(E_2/E_0) = 8 \times 10^{-3}$ , and the spectrum is quite broad which depends upon the laser beam propagation distance. The results (specifically, second harmonic spectral feature) presented here may be used for the diagnostics of laser produced plasmas.

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Date submitted: 20 Jul 2009

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