Transition to Filamentary Regime in Laser-Plasma Interaction Evidenced by $2\omega$ Emission.

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Abstract. – The level of second-harmonic light emitted from a laser-exploded foil plasma at nominal irradiance up to $3 \times 10^{13}$ W/cm$^2$ was found to be extremely sensitive to both target position and irradiance on target. Either a small target displacement or a small increase in irradiance resulted in a jump of the $2\omega$ level of more than three orders of magnitude. Correspondingly, a transition was observed from a $2\omega$ source pattern clearly signed by the original laser spot pattern to unstable patterns of filaments whose size is consistent with the maximum growth of the instability.