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Geometrical Constraints on Plasma Couplers for Raman Compression[1] ZEEV TOROKER, NATHANIEL FISCH, Princeton Plasma Physics Laboratory — One of the key issues in achieving the next generation of laser intensities through resonant Raman compression in plasma is the plasma geometry. Since the plasma mediates a resonant interaction of counterpropagating lasers, only the plasma density at resonance achieves the compression effect. On the other hand, the lasers must pass through tenuous plasma as well, which, if extensive, can produce deleterious effects. Here we consider compression in a plasma slab, composed of a homogeneous middle section and two symmetrically placed inhomogeneous end sections, such that the electron density in each end section decreases to zero. We show that at high plasma densities and high pump intensity (close to the wave-breaking threshold) the gain of the seed pulse is limited by its dispersion. However, chirping both the seed and the pump pulse enables compression with a self-contracting seed, at least partially overcoming the dispersion effect.

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