

Abstract Submitted  
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**Nonlinear saturation of laser backward Raman amplification in plasmas**<sup>1</sup> VLADIMIR MALKIN, Princeton University, ZEEV TOROKER, PPPL, NATHANIEL FISCH, Princeton University & PPPL — Relativistic electron nonlinearity can limit the backward Raman amplification (BRA) of laser pulses in plasmas through the self-phase-modulation instability splitting the pumped spike into several spikes which no longer grow in amplitude. It is assumed usually that this scenario is not sensitive to a small group velocity dispersion (GVD) of the pumped spike in strongly undercritical plasmas. It was not known, however, how much undercritical should be the plasma for the GVD effect on the nonlinear BRA saturation to be negligible. This work examines this problem analytically and shows that the GVD effect becomes important already in tenuous, 1000 times undercritical plasmas. The analytical solution also shows how the naturally arising frequency chirp and other parameters of the BRA output pulses can be manipulated.

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