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Title: Solitary-Wave emission fronts, spectral chirping, and coupling to beam acoustic modes in RPIC simulation of SRS backscatter

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Solitary-wave emission fronts, spectral chirping, and coupling to beam acoustic modes in RPIC simulations of SRS backscatter*

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Detailed diagnostics of quasi-2D RPIC simulations of backward stimulated Raman scattering (BSRS), from single speckles under putative NIF conditions, reveal a complex spatio-temporal behavior. The scattered light consists of localized packets, tens of microns in width, traveling toward the laser at an appreciable fraction of the speed of light. Sub pico-second reflectivity pulses occur as these packets leave the system. The LW activity consists of a front traveling with the light packets with a wake of free LWs traveling in the laser direction. The parametric coupling occurs in the front where the scattered light and LW overlap and are strongest. As the light leaves the plasma the LW quickly decays, liberating its trapped electrons. The high frequency part of the $|n_e(k,\omega)|^2$ spectrum, where n_e is the electron density fluctuation, consists of a narrow streak or straight line with a slope that is the velocity of the parametric front. The time dependence of $|n_e(k,t)|^2$, shows that during each pulse the most intense value of k also "chirps" to higher values, consistent with the k excursions seen in the $|n_e(k,\omega)|^2$ spectrum. But k does not always return, in the subsequent pulses, to the original parametrically matched value, indicating that, in spite of side loss, the electron distribution function does not return to its original Maxwellian form. Liberated pulses of hot electrons result in down-stream, bump on tail distributions that excite [1] LWs and beam acoustic modes deeper in the plasma. The frequency broadened spectra are consistent with Thomson scatter spectra observed in TRIDENT single-hot-spot experiments [2] in the high $k\lambda_D$, trapping regime. Further details including a comparison of results from full PIC simulations, and movies of the spatio-temporal behavior, will be given in the poster by L Yin *et al.*

[1] L.Yin *et al*, J. Geophys. Res., 103, 29,595 (1998)
[2] J. Kline *et al,* submitted manuscript and presentation at this conference.

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