Modification of high intensity laser plasma interaction by Stimulated Raman Scattering

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This work was supported by the U.S. DOE under contracts DE-FC02-04ER54789, DE-FG02-05ER54834, and allocations of computing time from the Lawrence Livermore National Laboratory Institutional Computing Grand Challenge program

Laser Interaction Critical to HEDP



2D PIC (LSP) Simulations



Start with uniform (2*10720 cm)-3) underdense plasma



Raman scattering generates plasma waves





Take radiation spectrum in vacuum at later time



Plasma wave is from Raman scattering



 $\omega \downarrow L = \omega \downarrow P + \omega \downarrow R$

Plugging in values:

 $\omega \downarrow R / \omega \downarrow L \cong 0.7$



2

1.5

Look at more realistic cases now



E

Start with $L = 5 \mu m$

0.5

0

-0.5

-1



Red =
$$n \downarrow c /4$$

Green = $n \downarrow c$

Axes move with laser



$L = 10 \mu m$

0.5

0

-0.5

-1



Raman starts at slightly lower density due to longer scale length

Main interaction still occurs near *nJc*/4 resonance









So What?



Conclusions

• Raman scattering important for $L \ge 5 \mu m$

• Transition to chaotic behavior spurred on by Raman for $L \ge 5 \mu m$

