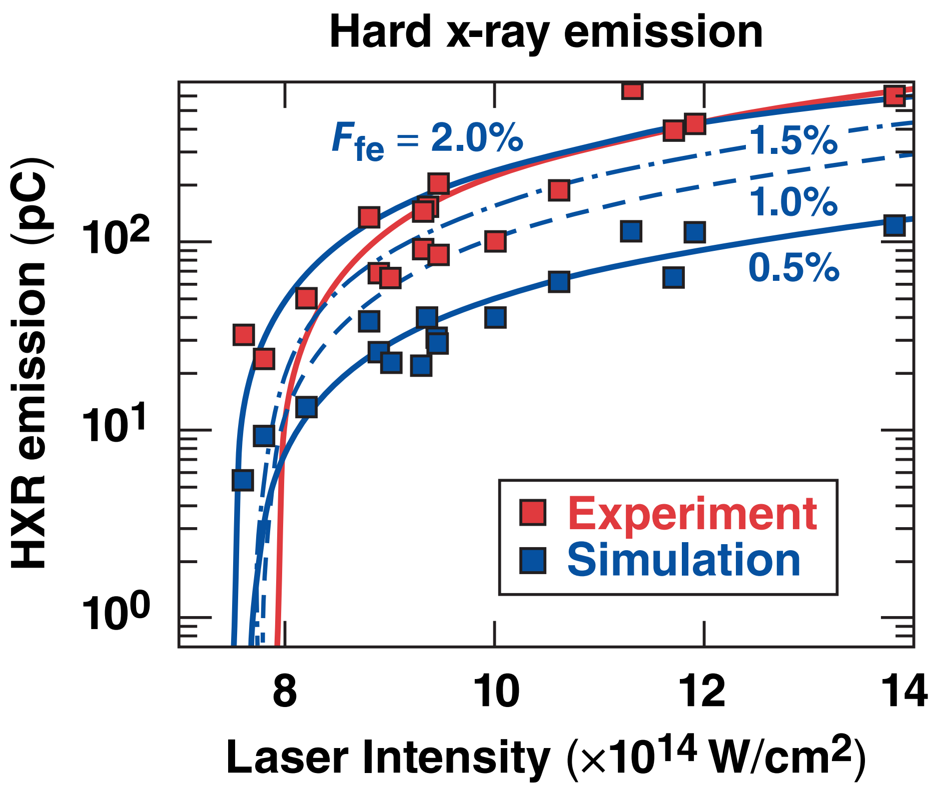
Transport of Energetic Electrons from Two-Plasmon Decay in the 1-D Hydrodynamic Code *LILAC*



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Summary

The fast electrons from the two-plasmon-decay instability have little effect on two-picket cryogenic implosions

- Relativistic fast-electron transport is modeled in *LILAC* with a radial straight-line model.
- The characteristics of the electron source were determined from warm CH shell implosions.
- A fractional energy of ~2% absorbed into fast electrons was determined to match the warm CH shells' areal densities.
- Simulations of cryogenic targets resulted in a different fractional energy between continuous and two-picket pulses to match the measured areal densities.

Collaborators

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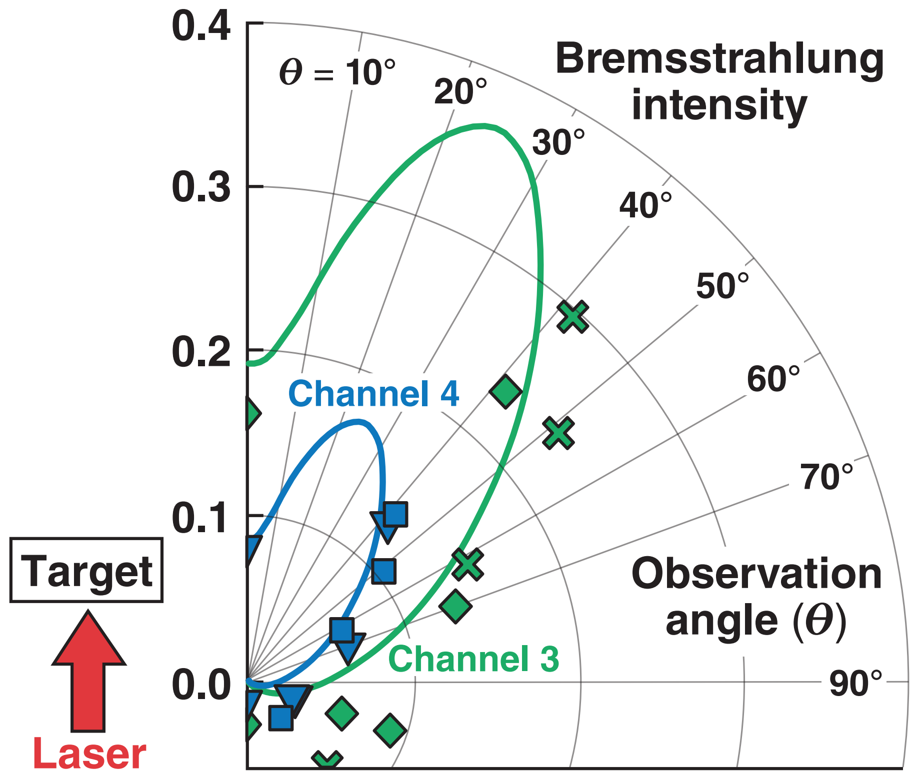
The fast electrons are transported with a straight-line model

- Fast-electron transport modeling depends on the source angular distribution and energy.
- Experimental results with planar targets suggest that electrons are produced nearly normal to the target surface.[1]
- The electrons are created at the $N_c/4$ surface and travel in the radial direction.



[1] J. F. Myatt (NO4.00013).

The fast-electron source parameters are normalized to the hard x-ray (HXR) emission from warm CH targets

- The energy source is taken to scale as

$$\frac{E_{\text{fast}}}{E_{1/4\,N_c}} = F_{\text{fe}}\, S(\eta).$$

- F_{fe}, the energy fraction taken from each ray in the laser ray trace, is a free parameter.

- $\eta = I_{14} L_{\mu\text{m}}/233\, T_c$ (kev) is the threshold parameter[1] evaluated at the $N_c/4$ surface.

- $S(\eta)$ is a source function determined from experiment results.

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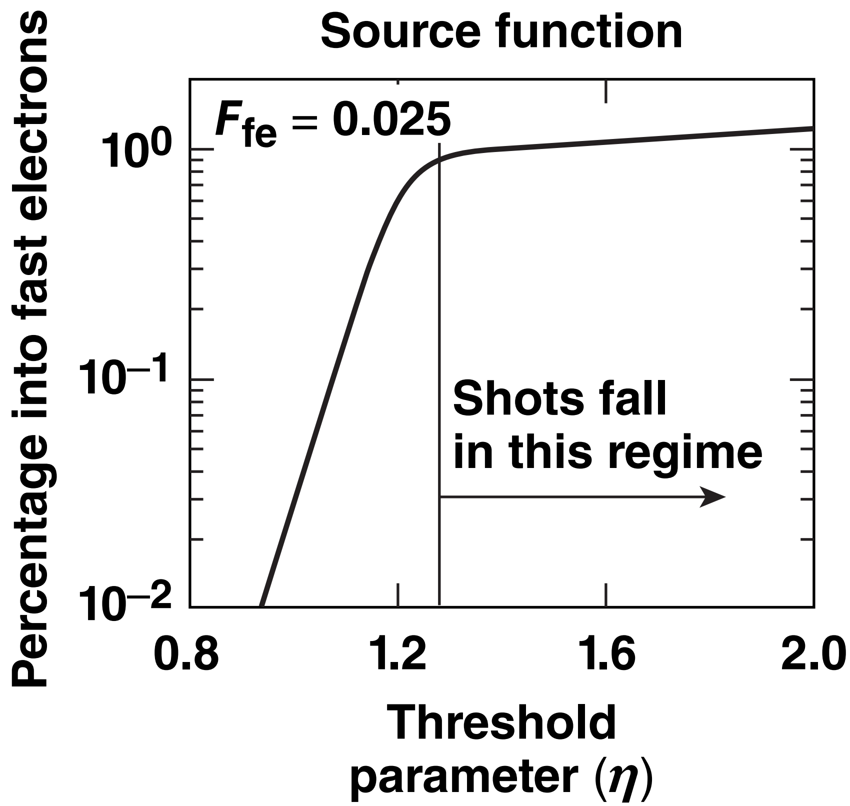
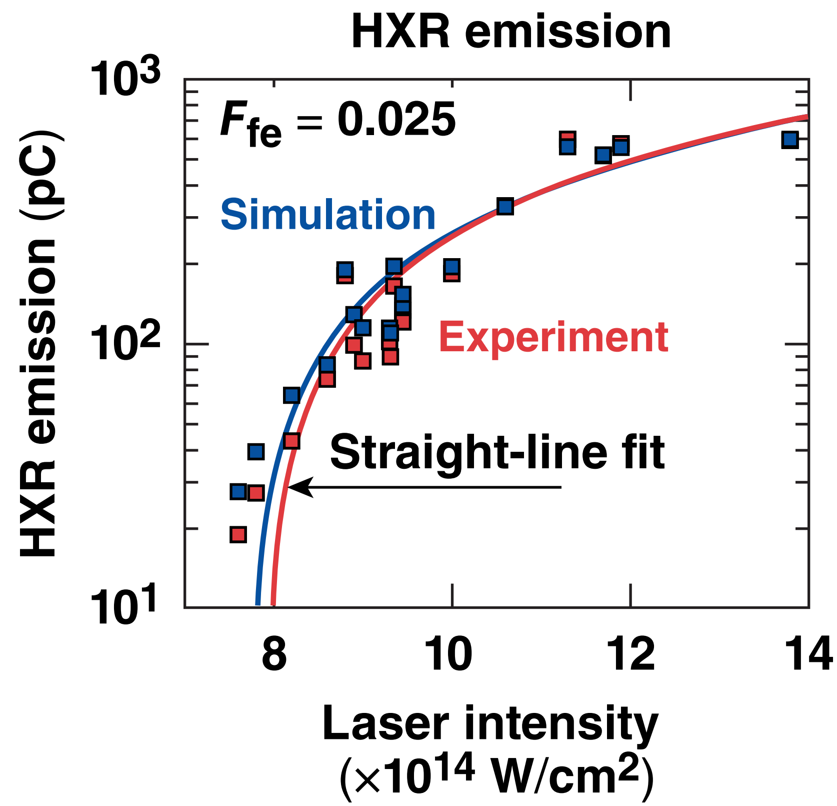
[1]A. Simon *et al*., Phys. Fluids 26, 3107 (1983).

The source function was chosen to match the integrated HXR emission from warm CH targets over all intensities





32 pC/mJ used to convert simulation emission*

*B. Yaakobi *et al.*, Phys. Plasmas 12, 062703 (2005) and private communication.

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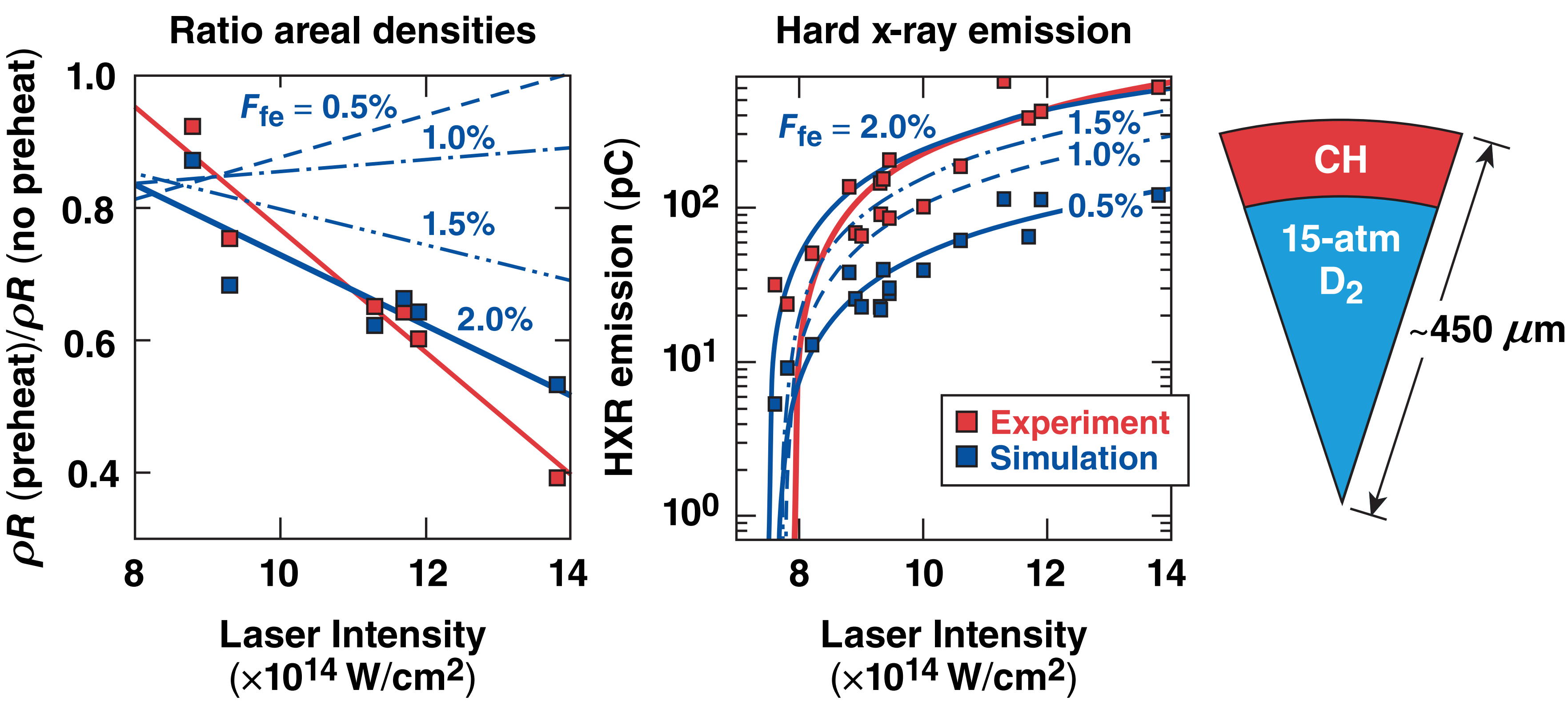
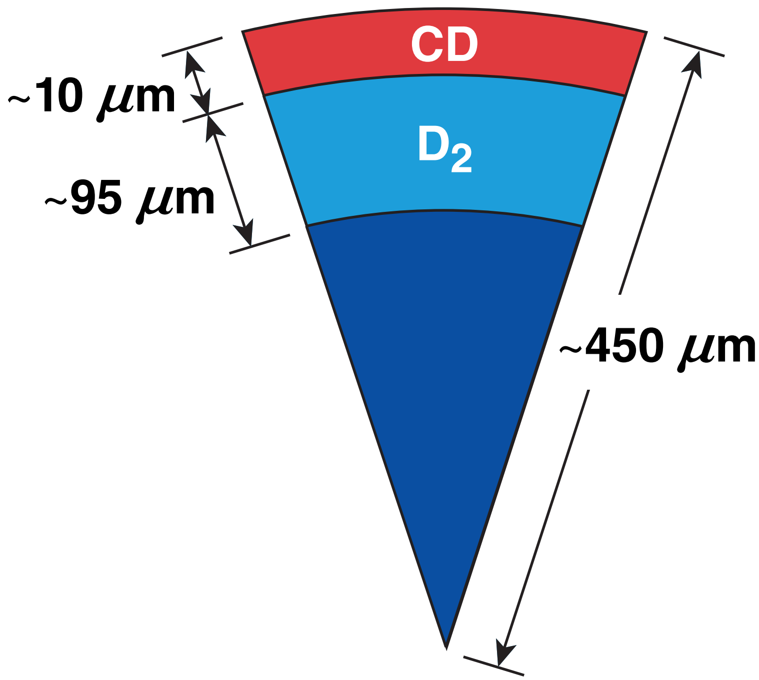
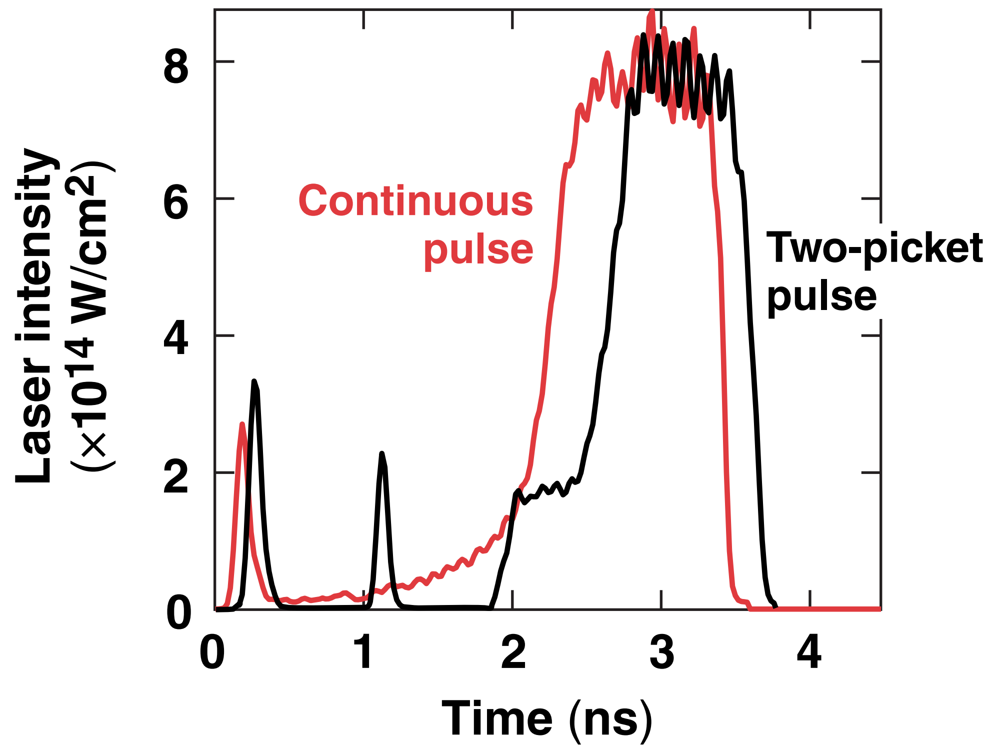
A free parameter F_{fe} value ~2% fits the measured areal densities and the HXR emission for warm CH implosions



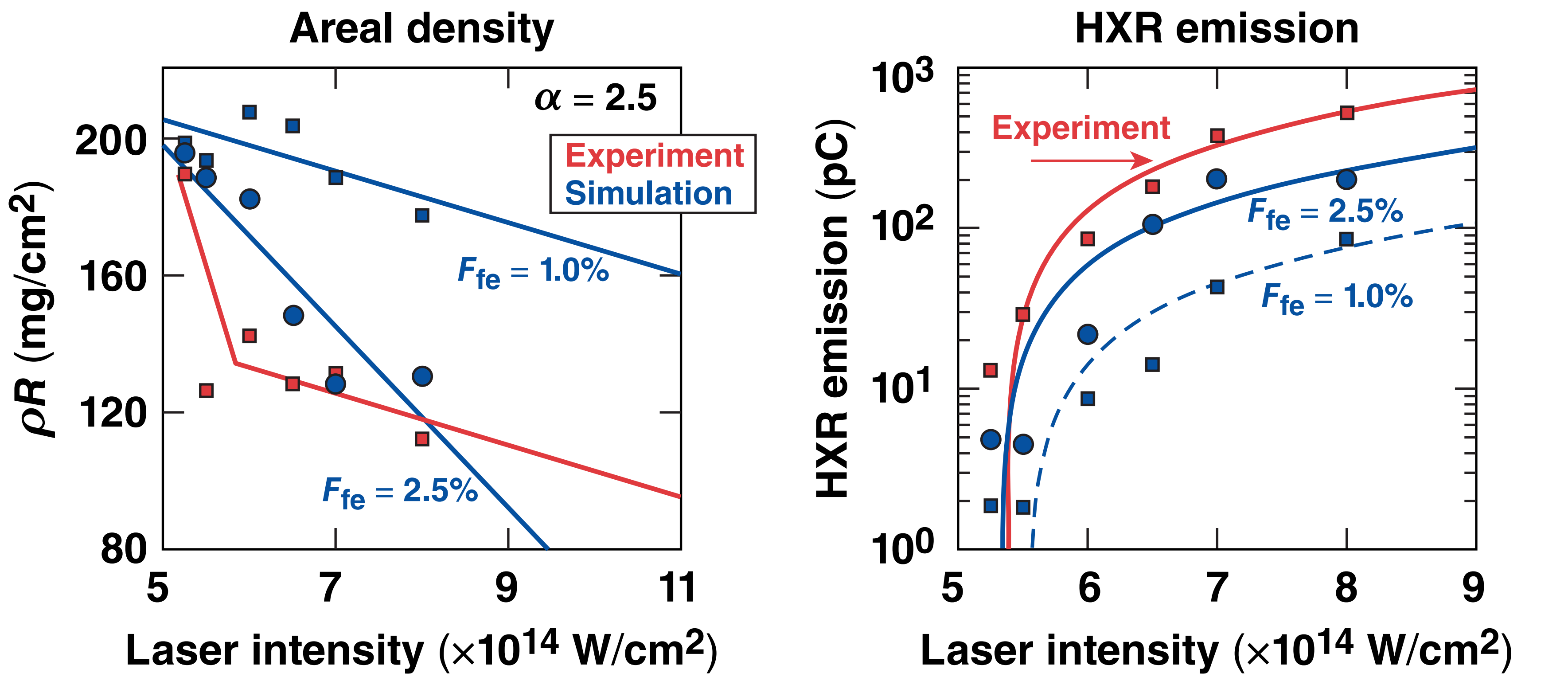
Data points from shots with various shaped pulses and target thicknesses (15 to 28 μm).

Thick CD shell cryo targets implosions were carried out with continuous and multipicket pulses





For the continuous pulse a value of 2.5% for F_{fe} gives good agreement for both ρR and HXR emission in cryo implosions



- The ρR is affected by shock timing[1] and sampling[2].
- The measured HXR emission is a factor of two to three too high due to x rays produced outside the target.

[1] V. N. Goncharov (TO5.0006).
[2] P. B. Radha (NO5.0003).

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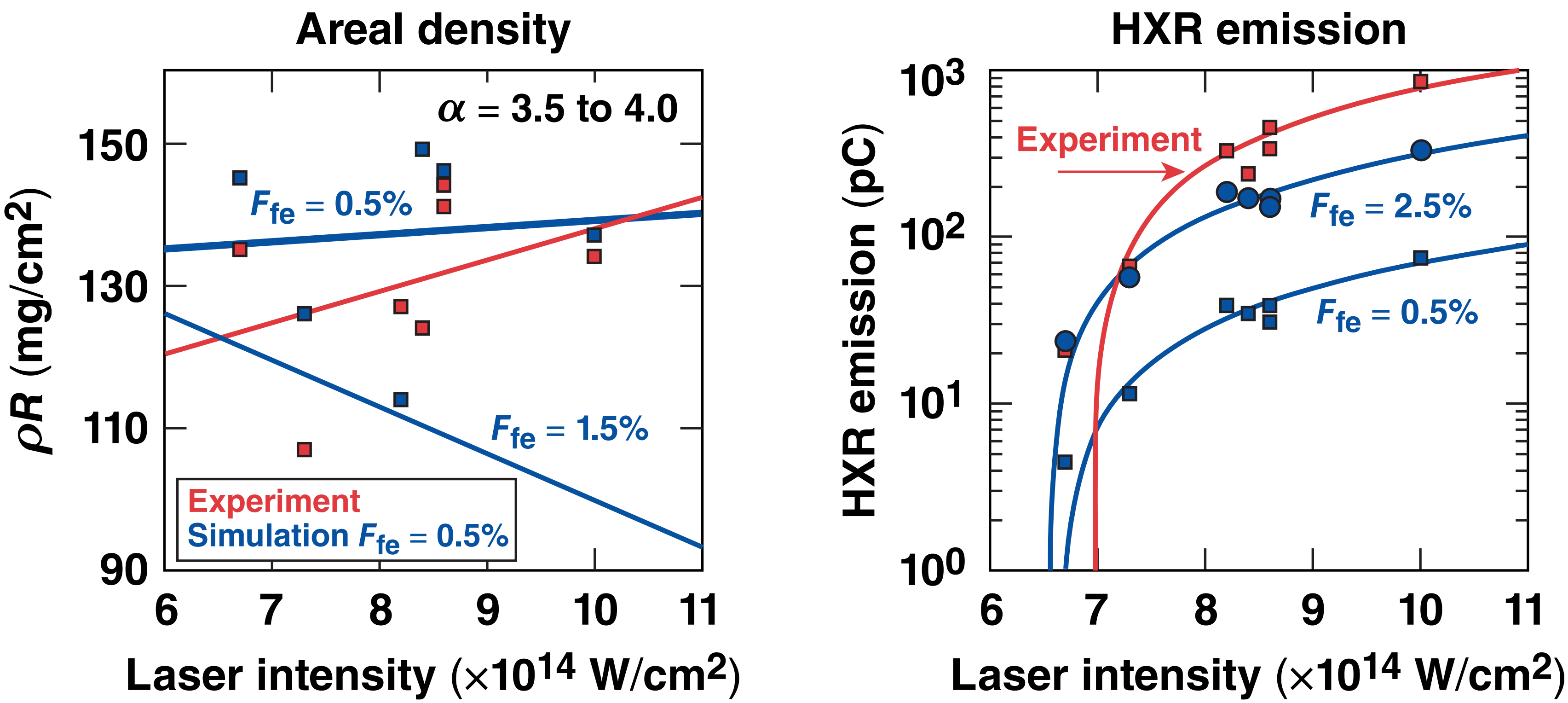
For the two-picket pulse, F_{fe} = 0.5% reproduces the insensitivity of the ρR to the two-plasmon decay instability



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[1]V. N. Goncharov (TO5.0006).
[2]P. B. Radha (NO5.0003).

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Summary/Conclusions

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