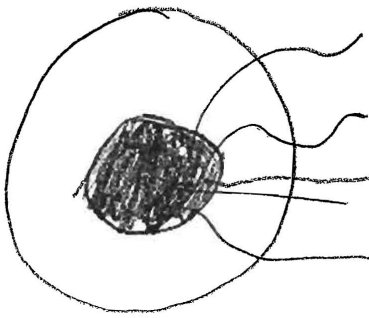


$\lambda \alpha \sim .3\ \omega/cm^2$

Burn propagate outward

ignite this hot spot

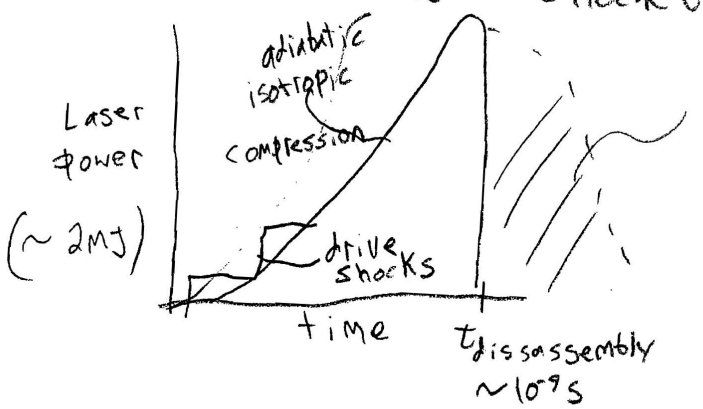
"How can you heat center and not inside?"

SHOCKWAVES convergent towards center - focused on center

$$G = \frac{\text{fusion Energy}_{out}}{in}$$

reduced by only heating

Let's talk about shockwave building



wasted power

We want smooth compression

"Essentially reversible"

Balance laser pressure against plasma pressure to not loose energy as heat.

I am going to violate what I just said.

I want to hit it hard with a pulse so $V >$ compression rate.

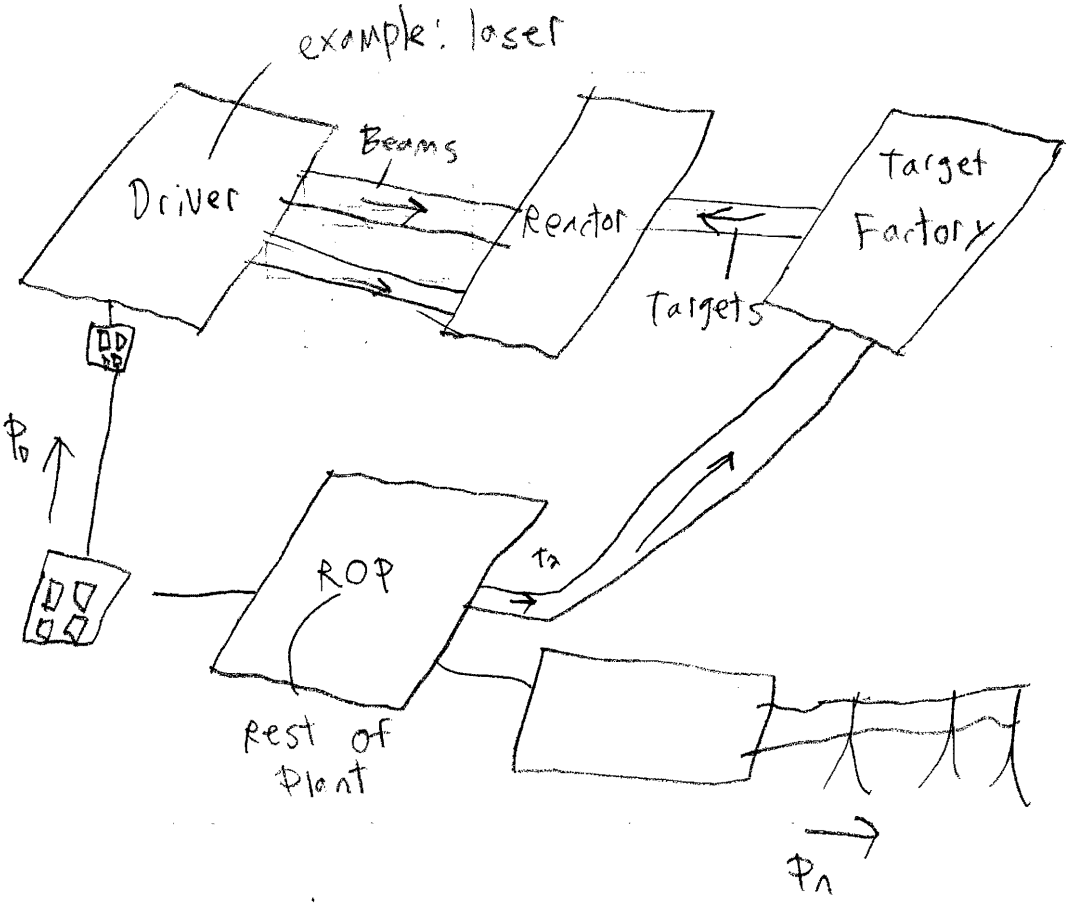
Each succesive shock has higher velocity, so they all reach center at same time.

Goto: Lawrence Livermore LAB site to see Lasers

We know $t \sim \frac{2R_0}{V_{sound}}$ See chapter 11

Handling targets the size of your hair introduces interesting issues.

New ways of putting energy on target have come out of ICF



Rep rate ~ 60 Hz

Perfect targets nearly, delivered everytime we have a "target factory"

needs to be < 5¢ a target

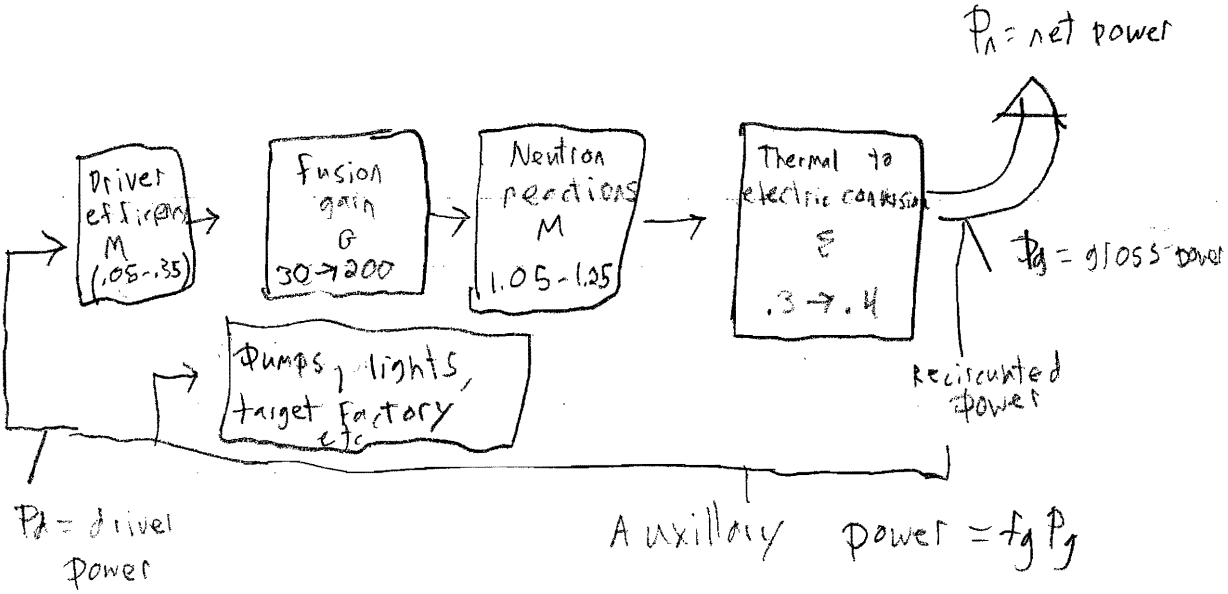
Vendors: LANL, General Atomics, others

Company that ends up making targets will be big $ maker

ROP = 2/3 of cost and "where the trouble is"

One thing about ICF.., we can study pellet burn separately which investigating new technologies of drivers.

Parallel development

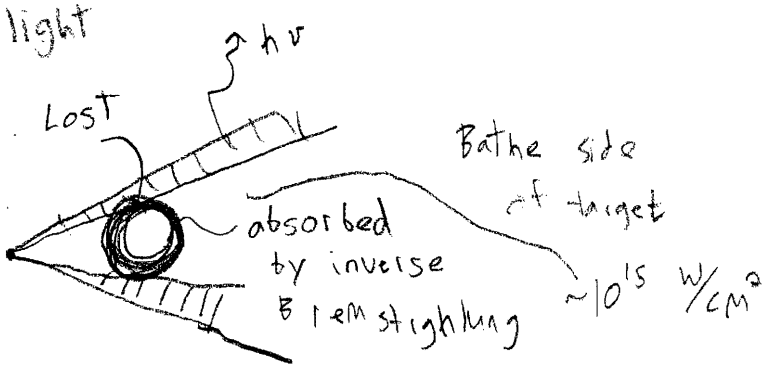


How is energy absorbed in a target?

Classical absorption is inverse bremstrahlung which is short wavelength light driving electrons which interact, leading to heat

Why are we worried about this?

absorption of light



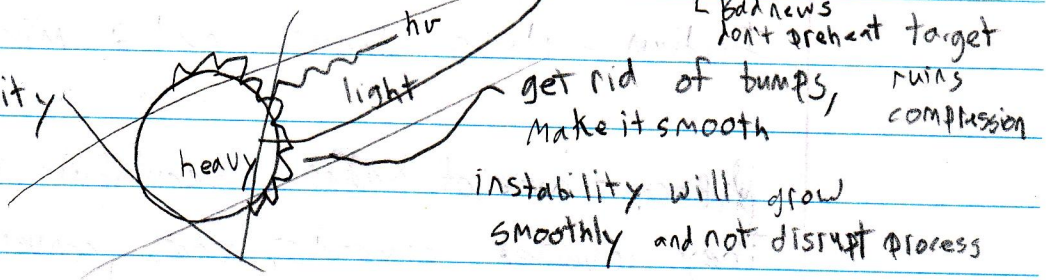
Depending on intensity of light, scattering of photons without absorption can occur

Nonlinear processes can occur
- parametric scattering
- transfer energy to photons and phonon

Summary:
We lose light by poor focus and various non-linear processes. Energy that ends up in target is by inverse-Bremstraglung

Second challenge! uniform beam coverage

We always want surface of B-field to be concave out towards plasma



Perturbations: Target not round, laser not uniform

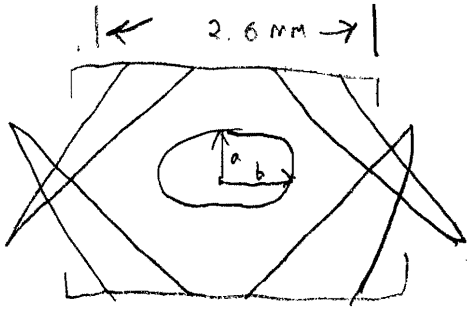
Two R-T instabilities to worry about
- outer surface
- inner surface

=> (4)

NIF has 192 beams ! ! !
"It's still very hard to do what I told you." two approaches to ICF
NIF indirect drive
URoch - direct drive
NRL /

Two Nobel Prizes on non-linear optics
People realized certain lasers like CO_2 lead to production of hot electrons
we need blue light lasers ~ .6 micron lasers
example: KrF laser is close
└ tough to build
Iridium - glass lasers ~1.2 micron laser (near infrared)

U Roch - home of Kodak, beautiful lasers
They invented crystals that convert 1.2 micron to green and another that does to blue, and do so very efficiently
Blue light hits target



X-ray density method is easier than direct hit from beam.