Cravens, D. and D. Letts. *Practical Techniques In CF Research - Triggering Methods, PowerPoint slides*. in *Tenth International Conference on Cold Fusion*. 2003. Cambridge, MA: LENR-CANR.org.

Practical Techniques in CF Research

Dennis Cravens
and
Dennis Letts

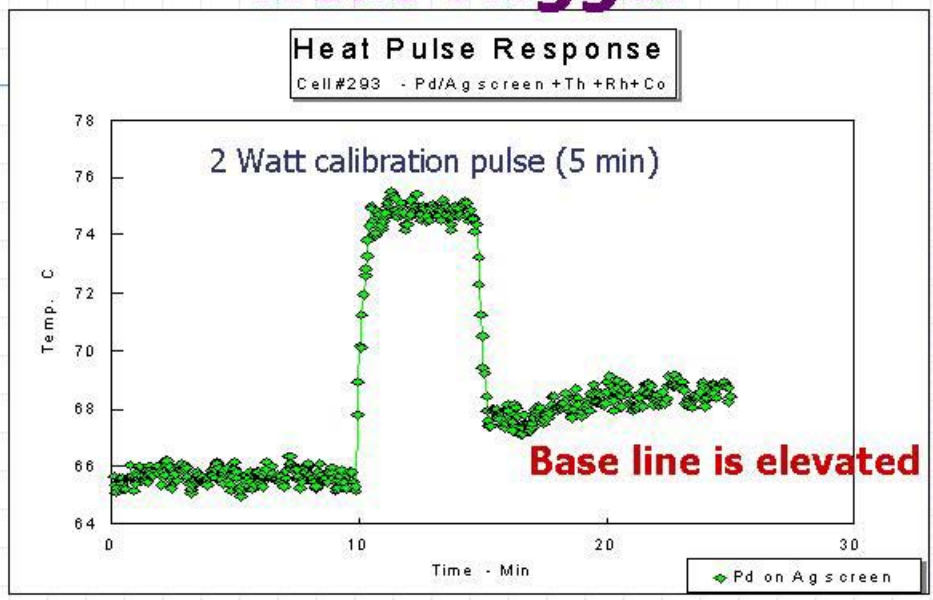
14 + years and 1000's* of experiments later……

- Patience is a must
- Tenacity

- High D ratios are good. (Loading)
- Dynamic conditions are good. (Triggering)
- Spin must be conserved (Aligning)

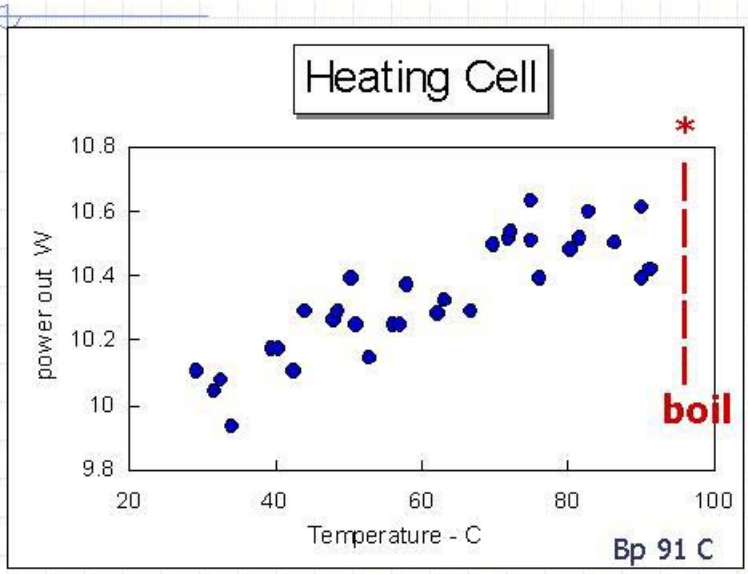
*(1000+for Cravens+1000+ for Letts)

Heat Trigger



Cell # DJC-293: Pd on Ag screen, Plated with Co, Rh, Th
In LiOD, 20 C bath. K= 4.563, excess ~ 0.5 W on ~10 W base

Warmer is Better



Cells #456 – 468

Pd + (Ce,Th,Ni)

submerged

Note: 2,655 m elevation

High Temperatures

- **Reflux** systems – sustained boiling
  - Do flow on condenser cooling. (~85%)
- Consider using fluids **other than water**
  - DOT 5 silicone brake fluid (to 300+ C)

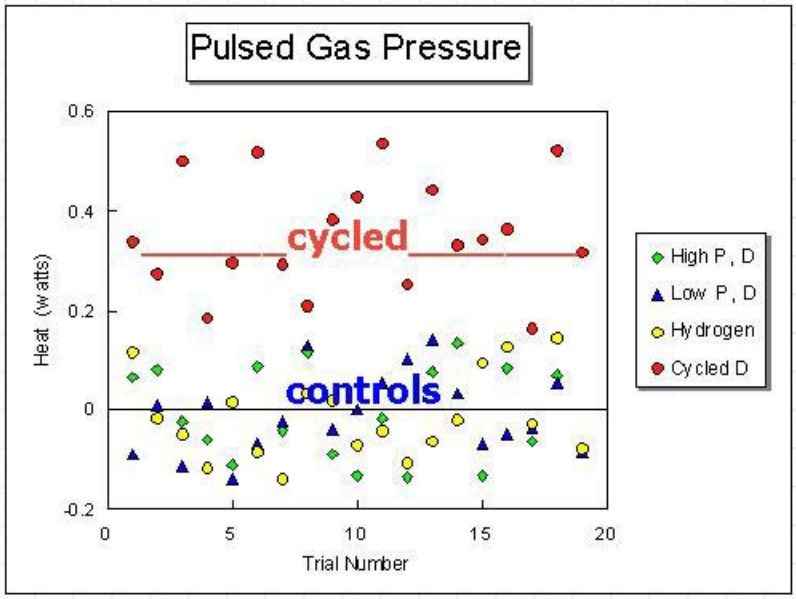
D Flux Across Layers

From high D chemical potential to Low D Potential

Phonons generated as D "fall" across energy gap

Example: Flux across Ni into Pd, Pd/Au into Pd/Ag

Pulsing D_2 Pressure



Doped Pd Black layered

Co-axial Cylindrical Siebeck

Cycled 800 torr to 20,000 torr 0.1 Hz

Cell series 1021-1043g

Acoustic stimulation – on going

Standing waves (like - Kundt's tube)

Doped Pd black in D2 gas

About 5 kHz (tuned for standing waves)

Compare node to anti-node temperatures

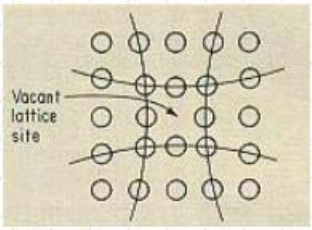
Co-axial tubes for constant temp water jacket

Problems: H and D have very different velocities
..... possible separation technique.

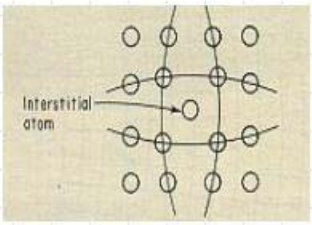
Flux of D

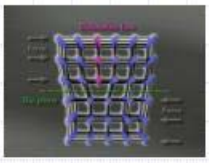
- Electro-migration down **thin wires** past point defects.
- Ragland " **triode**" – Pulsed from two directions with different current densities.
- Pushing through a **layered foil** –plated in layers and D pushed through high chemical potential to lower potential.

A "Few Defects" are good

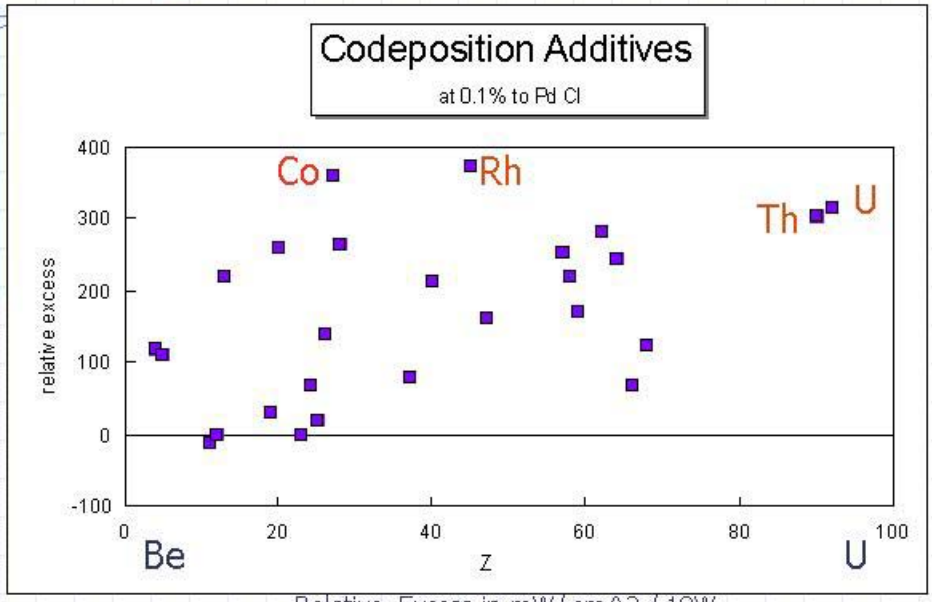


- **Impurities** -> Point Defects, Dislocations
- Sites where 2 and 3 D's may occur
- Th, U, rare earth's, Co
- Order of 0.1 to 0.001 %





Co deposition with Additives



Relative. Excess in mW/ cm^2 / 10W

Extreme Current densities

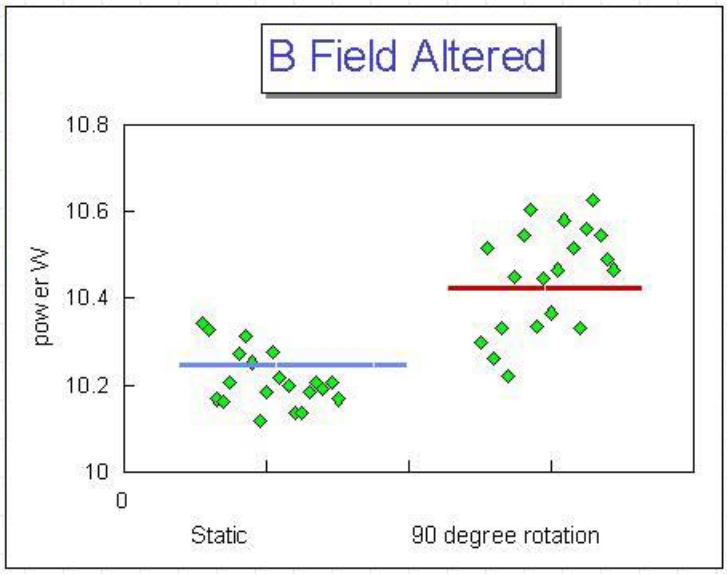
- Fluidized systems
- Embedded "whiskers" (in dielectrics)
- Single point electrolysis*
  - 10^4 Amps/ cm^2 possible.

*Note: doped Pd black
High viscosity electrolyte
Glass pin-hole

Magnetic Field Changes

- D + D > He4 requires spin conservation
- D's anti aligned -> load then reverse magnetic field to run.
- Allow for **spin exchange to lattice**– add rare earths, Co, Ni, etc for co-deposition

Change the Magnetic Field



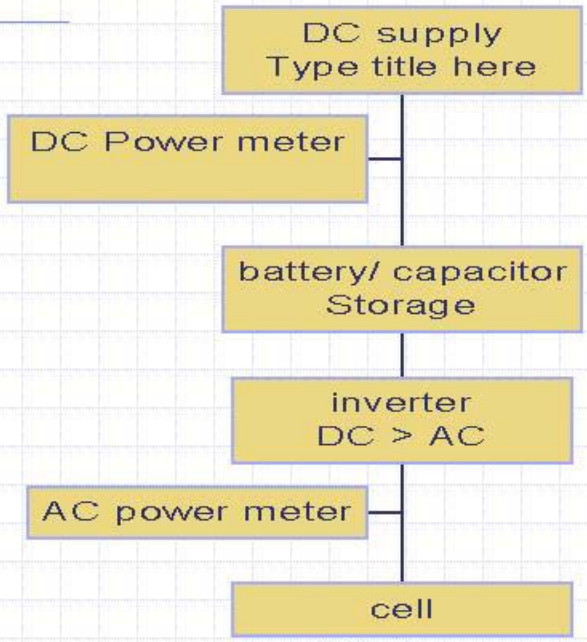
Loaded then Run with 90 degree rotation

Cells # 732-752

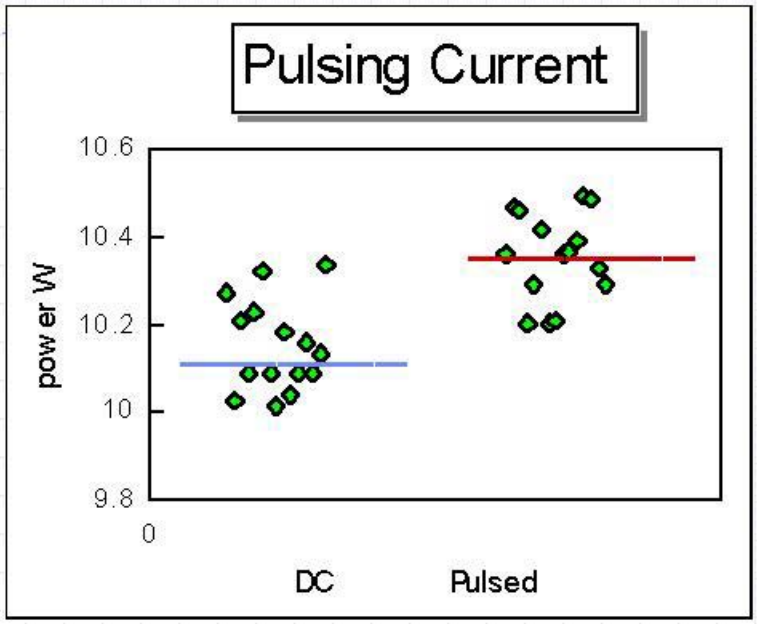
Pd + (Rh ,Fe)

73 C , 10 W

Pulsing the Current



Pulsed to Trigger



400 Hz
"Square" wave
20% duty

+/- ~0.2A
On DC ~1A

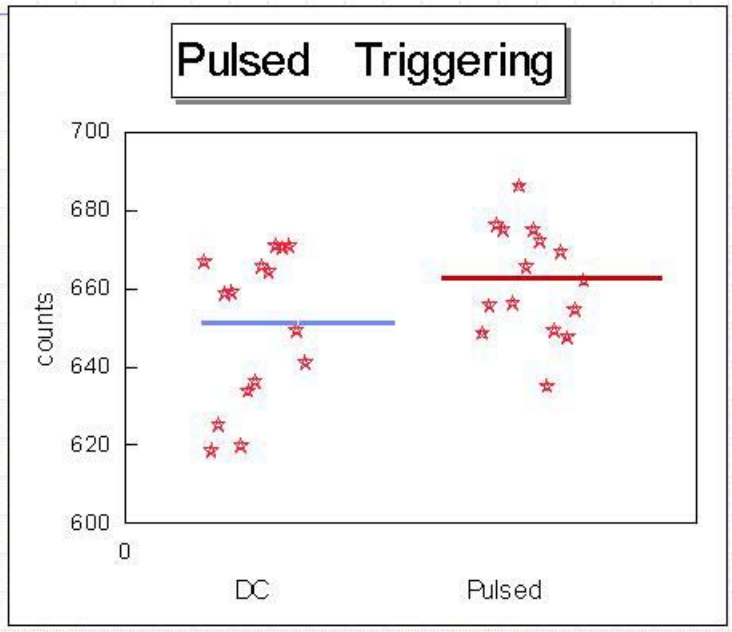
Cells # 832-863

Pd + (U,Co)

LiOD +(Be SO4)

83 C, 10 W

Triggered Counts



400 Hz

10 minute

GM Counts

651 vs 662 avg

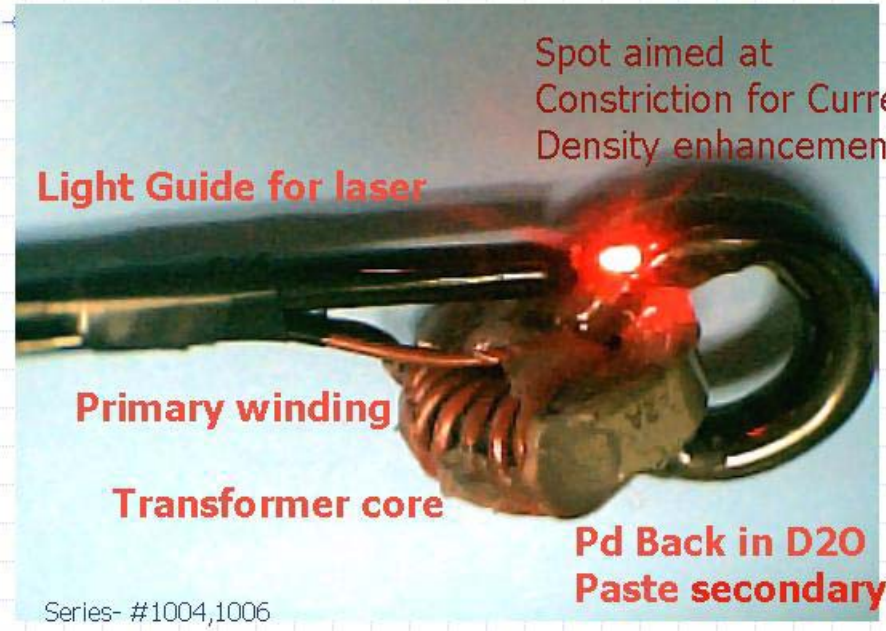
0.4 sigma

Cells #832-863

Pd + (U,Co)

83 C , 10 W

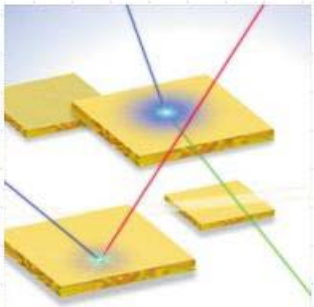
Current Work – Toroidal Transformer



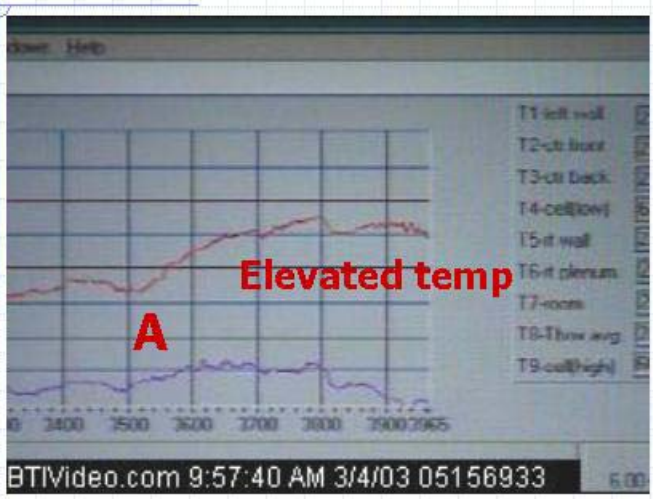
Pd + U,Er,Rh,Be Au, LiOD, $NaBH_4$

Surface layer effects

- Surface Plasmons
- Phonons
- Band gaps for D flux (analogy to e's and semiconductors)



Chemical trigger at surface



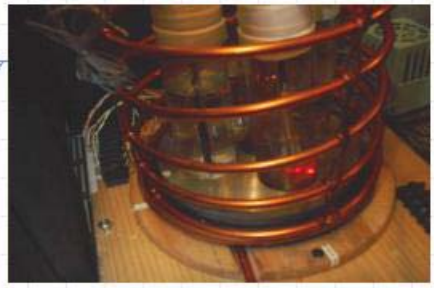
DGL #587

A

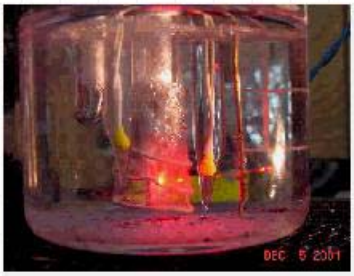
Addition to electrolyte

Pd with U, La, Ce,and Rh salts

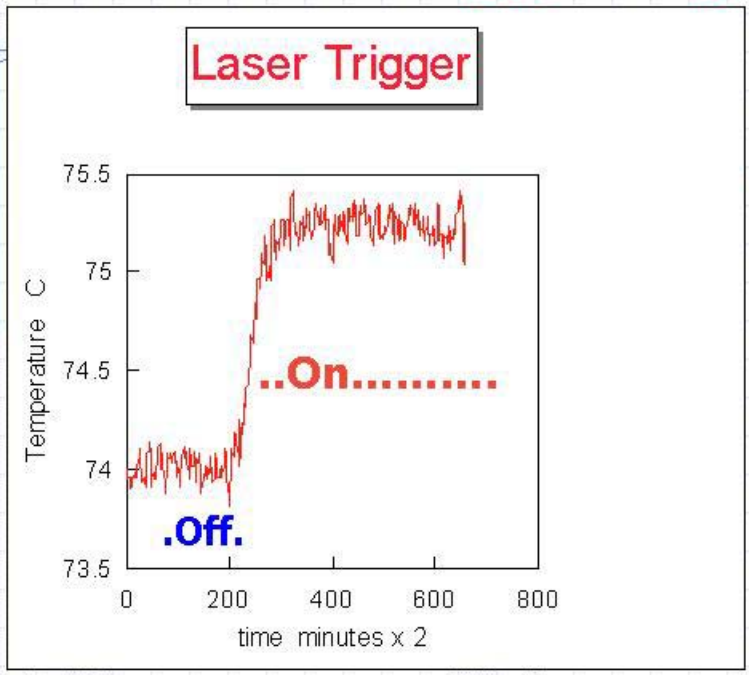
Laser Triggering



Laser directed at
Loaded cathode



Laser Triggering



~670 nm

300 gauss B
Orthogonal to Laser polarization (E x H >0)

Cell # 932b

Pd on Ag coated Magnet

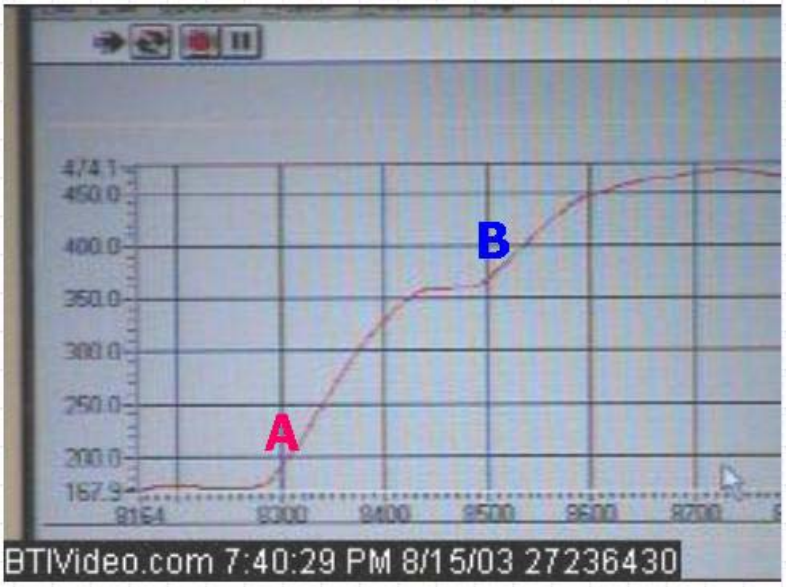
Au plated

Pd +(Rh,La,Th)

Laser Uses

- Allows for probing surface !!
- Easier to see changes than absolutes
- Tests of theory

Frequency sensitivity ???

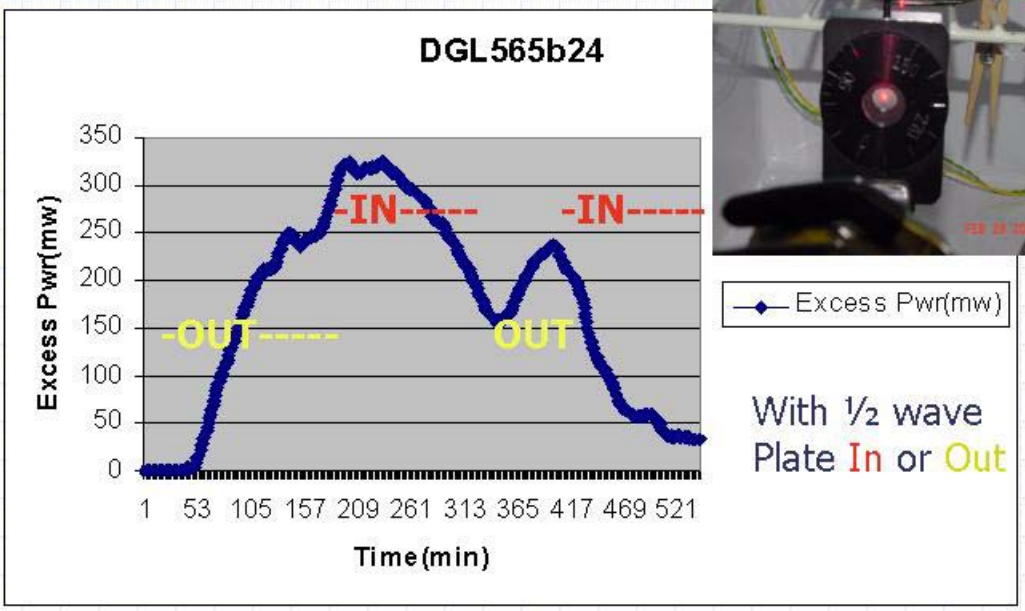


A
Laser ON
679.6 nm

B
Frequency
Changed
680.2 nm

Cell #
DGL 602

Polarization sensitivity ???



Dynamic Triggers

- Heat
- Pressure
- Current
- RF
- Chemical
- Laser
- Acoustic
- Magnetic Field

Conclusion

- Do nothing and you see nothing
- You need **dynamic** conditions
- Have Deuterium in abundance
- Have some impurities
- "Fill and slosh"
- Work warmer
- **Lasers will be a good tool to help our understanding**