

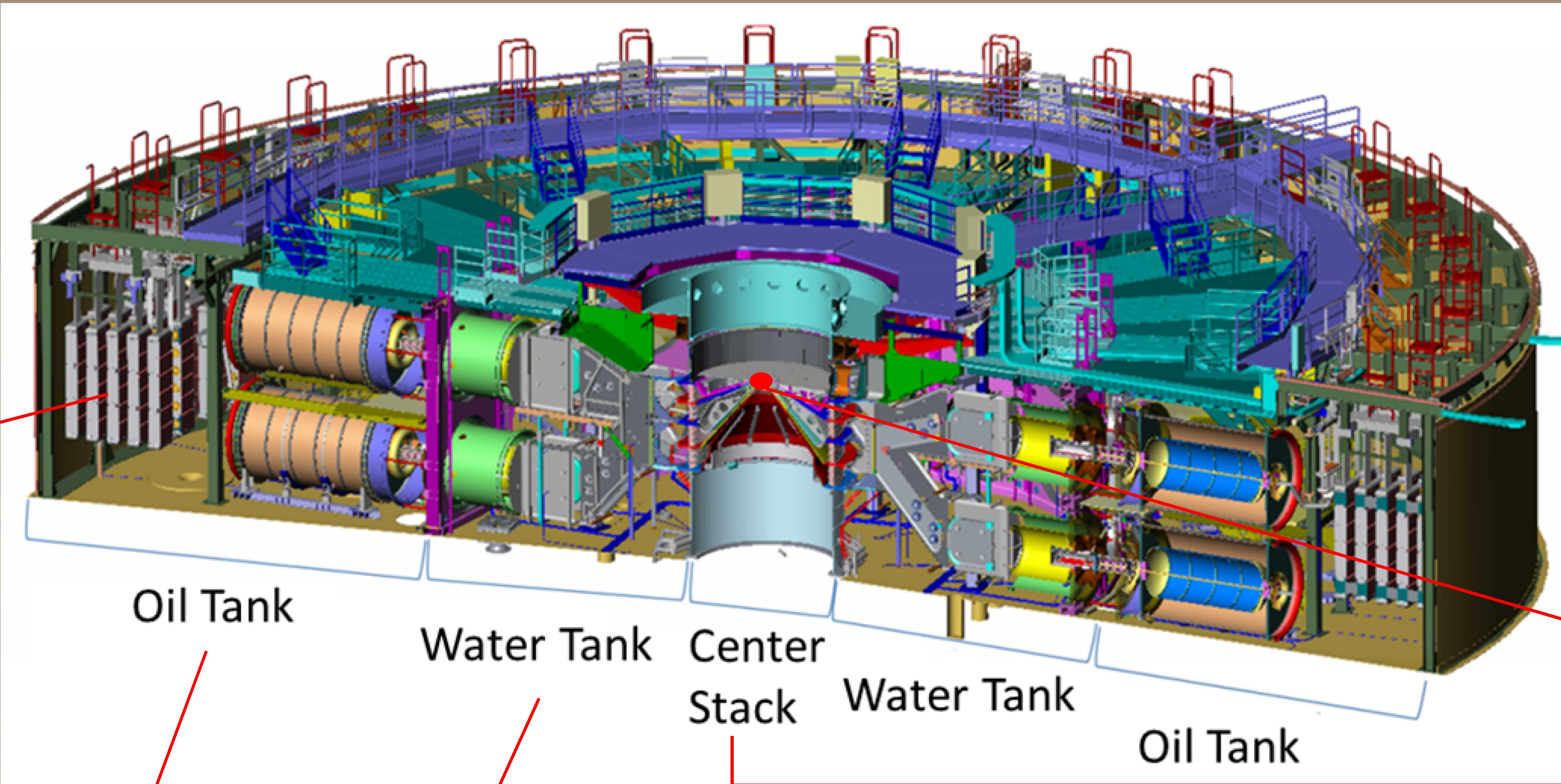
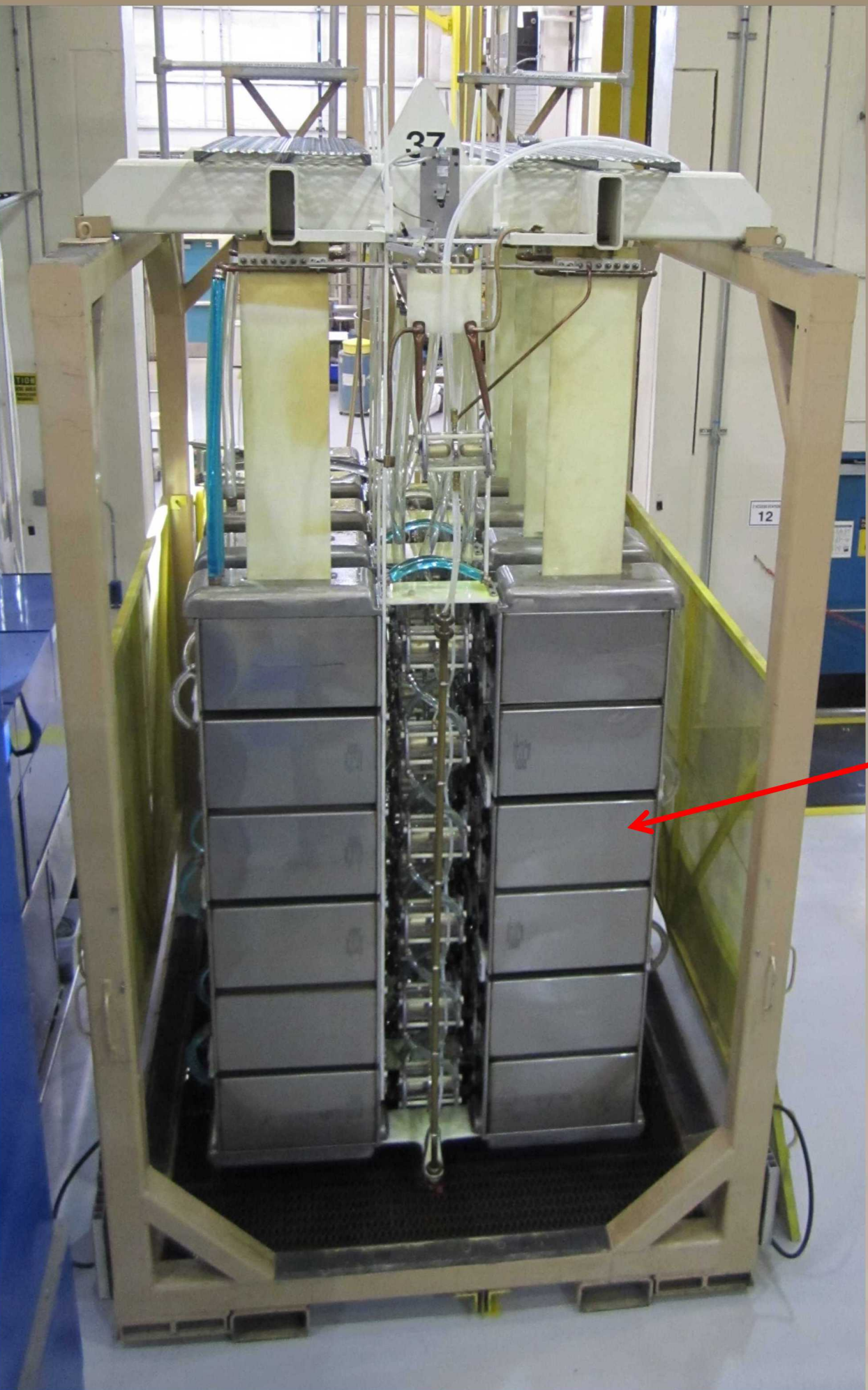
THE Z FACILITY AT SANDIA NATIONAL LABORATORIES



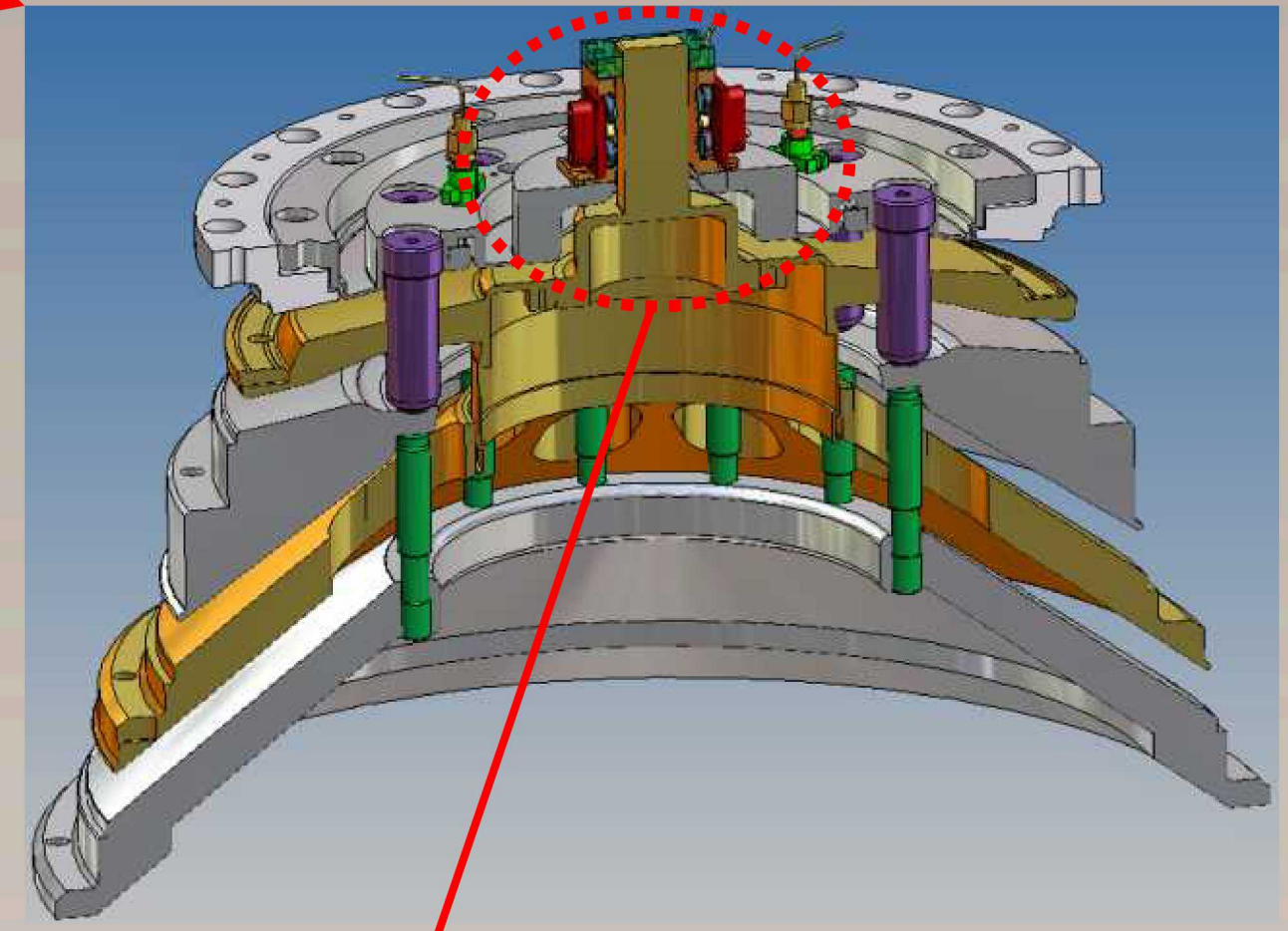
Pulsed Power

How Does Z Work?

Z delivers electrical current to a target via 36 identical lines. The machine is arranged concentrically; that is, in rings. The geometry of the machine can be thought of similar to a wheel: the spokes of the wheel are comprised of the 36 identical lines that drive current to the center target during an experiment, or shot.



Center Stack
The target of the experiment and most diagnostics are located in the Center Stack during a shot. The stack is about 10 feet in diameter and approximately 25 feet deep. This entire chamber is pumped down to a vacuum of approximately 10^{-5} torr during a shot.

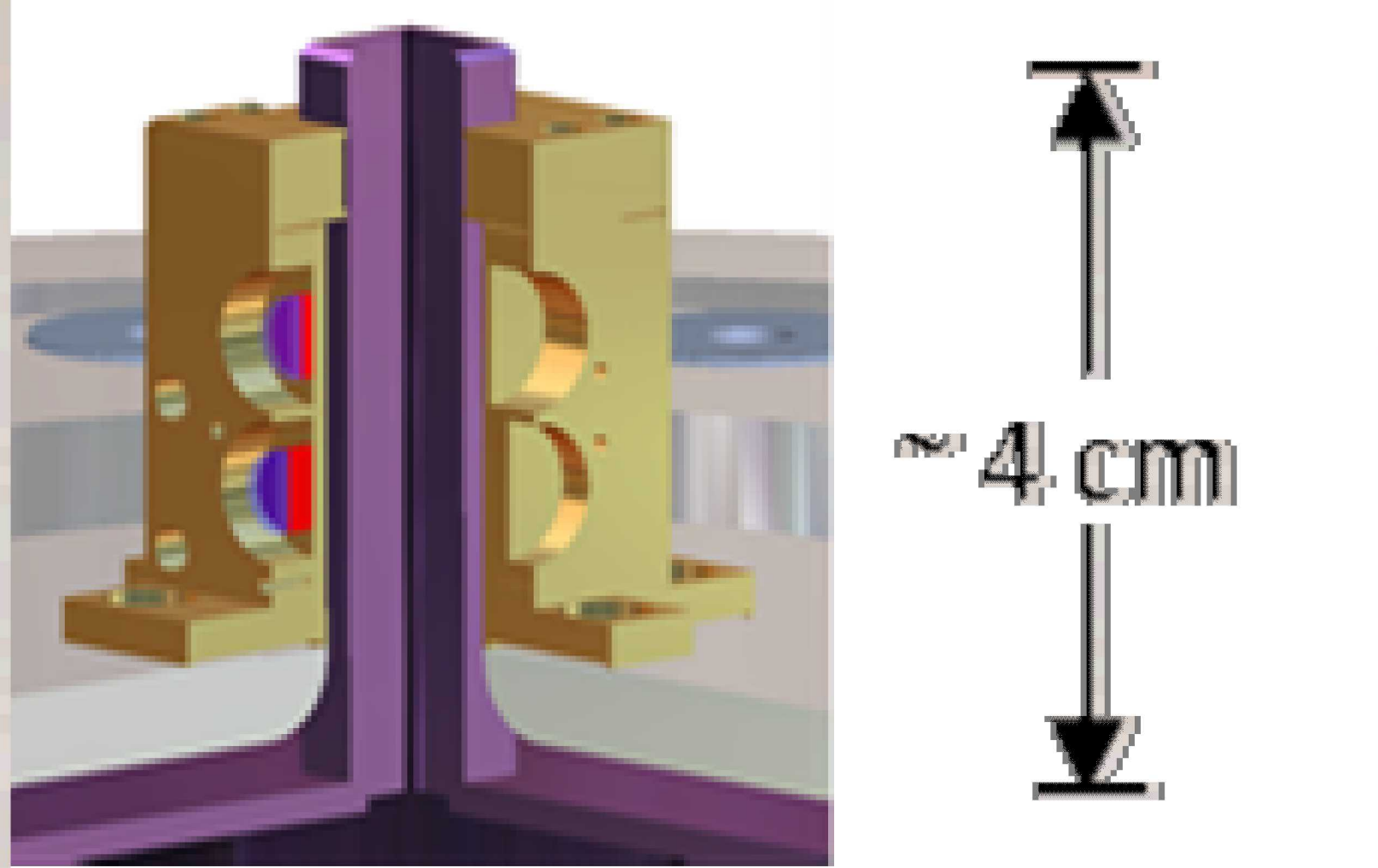
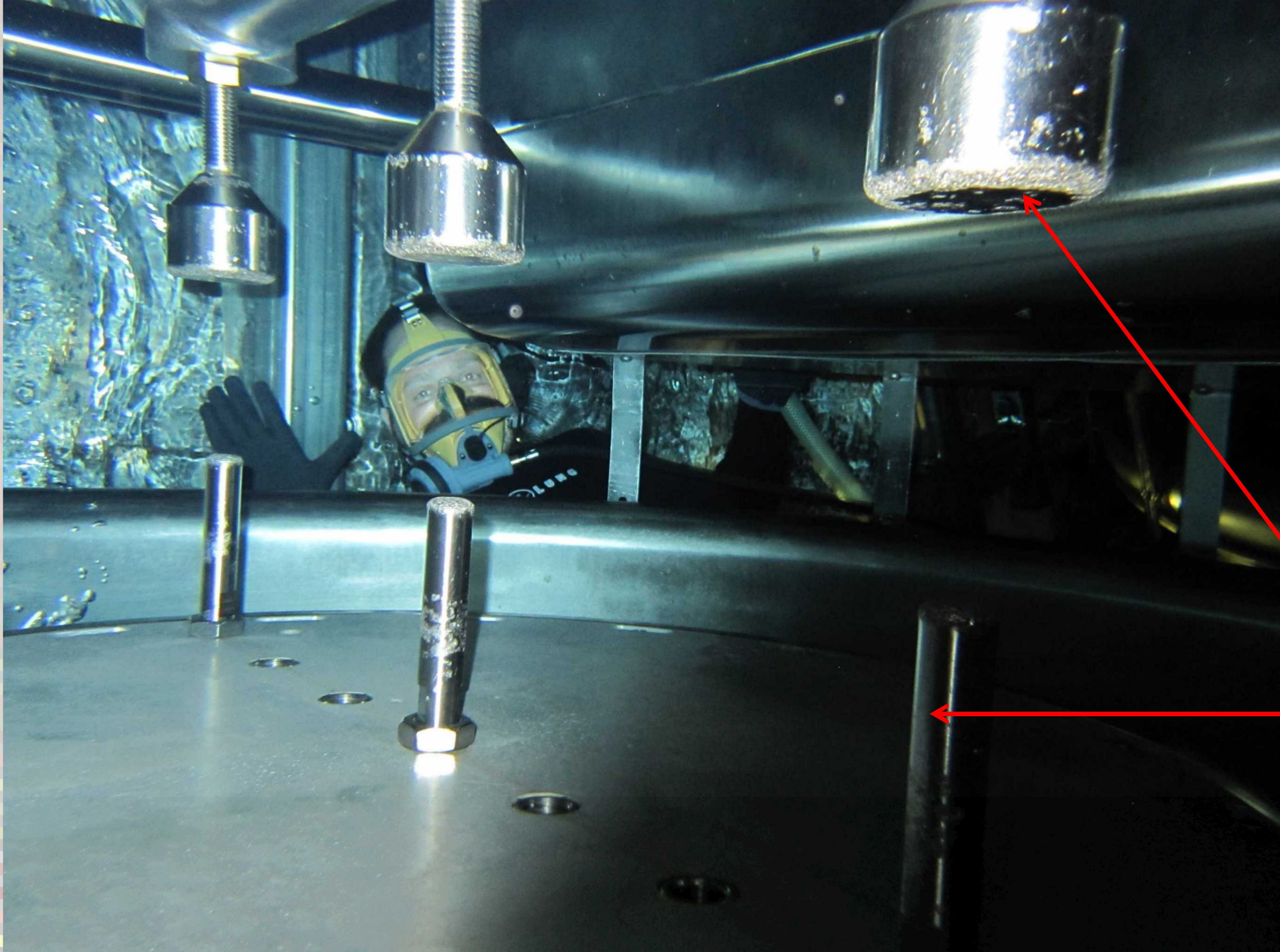


Each line contains a series of energy storage banks and switches. Each switch compresses the electrical energy in space and time to a subsequent energy storage bank, increasing the power of the pulse as it continues to the target. The combination of all these energy storage banks and switches allows Z to transform enough power to light approximately 100 homes into greater than 80 times the electrical generating capacity of all power plants on Earth.

Marx Bank
The Marx bank is the first energy storage tank of Z. It is a series of capacitors that are charged in parallel and discharged in series during a shot. The Marx banks take a few minutes to charge and a few microseconds to discharge.

Oil Tank
The oil tank houses two types of energy storage banks, including the Marx banks, and one type of switch. It holds approximately 600,000 gallons of oil.

Water Tank
The water tank houses three types of energy storage banks and two sets of water switches. It holds approximately 400,000 gallons of water. Every day, two divers complete a "debubble" dive in this tank. Their job is to remove bubbles from key components because otherwise, electrical current will preferentially arc to those bubbles, causing damage and reducing the power of the shot.



Water Switches
There are two sets of water switches per line. Each water switch consists of pairs of electrodes (as shown) separated by a specified gap. Current builds up on one electrode and crosses this gap during a shot.