



***ONR Code 35  
Air Warfare and Weapons***

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28 Oct 2015***



# Power Projection & Integrated Defense

## STRATEGIC DRIVERS:

- Adversaries' asymmetric capabilities
- Need for survivable, scalable, cost effective weapons
- Reducing risk

## OBJECTIVES:

- Future Naval Fires
- Integrated Layered Defense Across the Entire Detect-to-Engage Continuum
- Time-Critical Precision Strike
- Extended Threat Neutralization Capabilities





# Solid State Laser



**Counter ISR**



**Counter UAV/Drone**



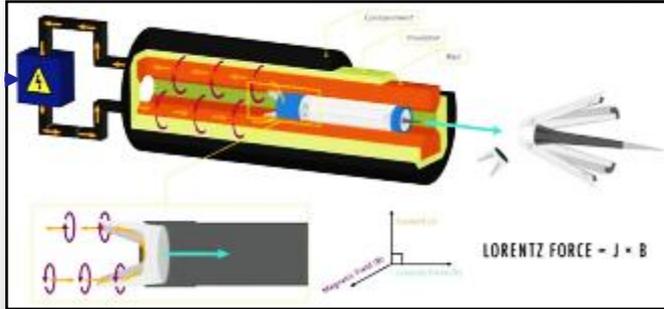
**Counter FAC/FIAC**



**Counter Swarm**



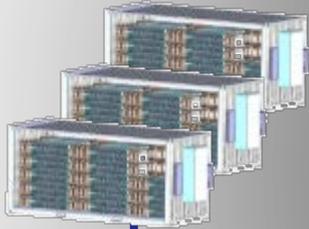
# Electromagnetic Railgun System Elements



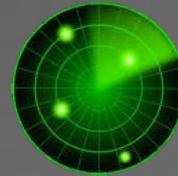
Hyper Velocity Projectile (HVP)



Battery Energy Storage



Railgun Barrel



Tracking Sensor

Uplink



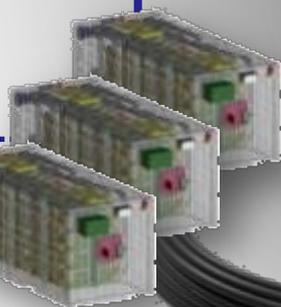
Fire Control System (FCS)



Railgun Mount



Pulsed Power System (PPS)

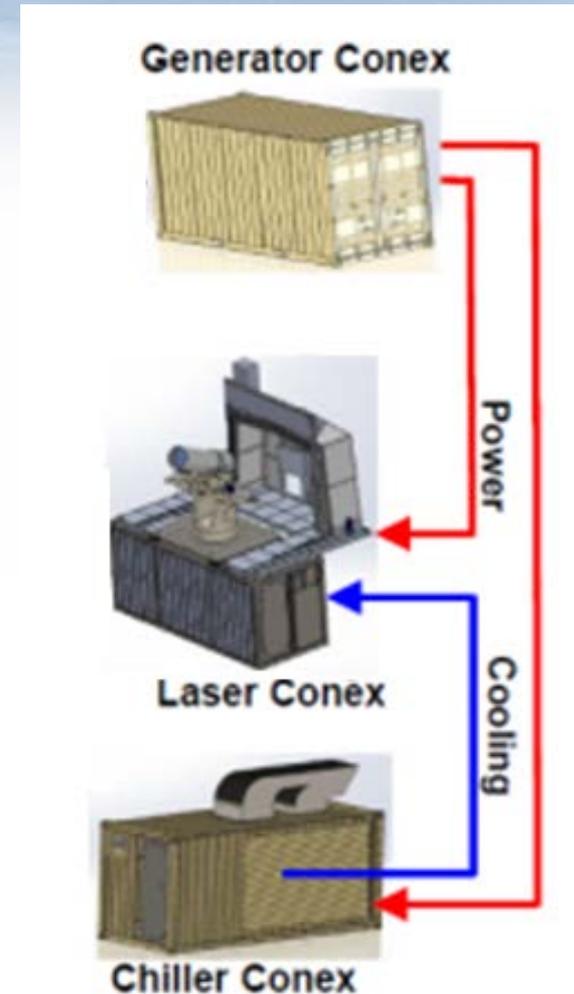




# Solid State Laser Weapons require Power and Energy Management to Provide Value

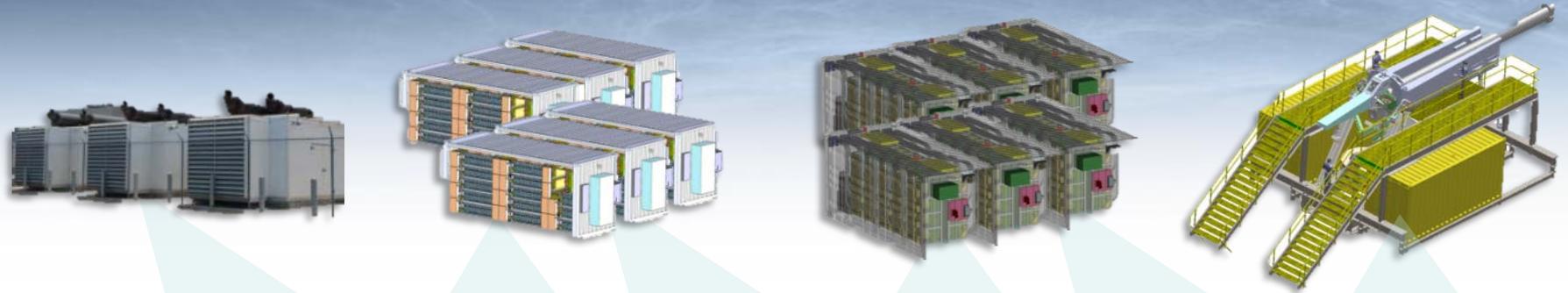
**Power and Cooling are driving factors in ship integration costs**

**2/3 of the Laser Weapon volume on the *USS PONCE* was for Power and Cooling**

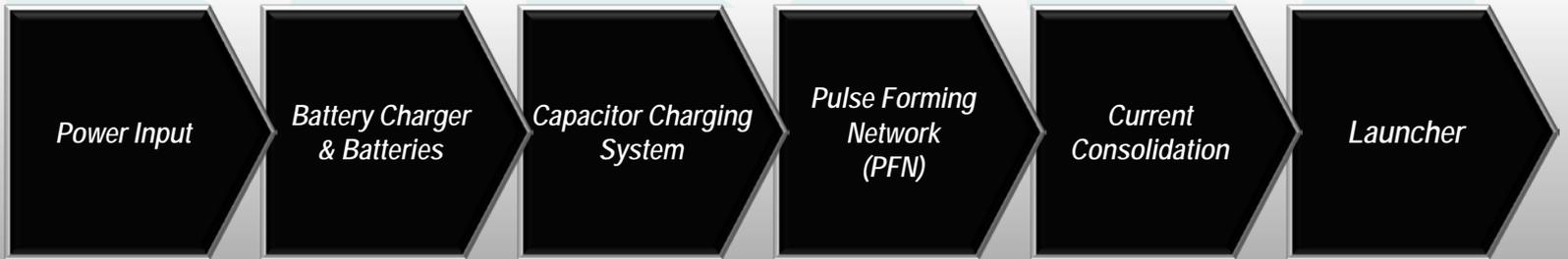




# Railgun Launch System Block Diagram



**SYSTEM ELEMENTS**



**PRIMARY FUNCTION AND DESIGN DRIVERS**

Available Power	Intermediate Energy Store	PFN Charge	High Power & Energy Pulser	Cable Reduction	HVP Launch
<ul style="list-style-type: none"> <li>Battery / PFN charge rate</li> <li>Rep-rate</li> </ul>	<ul style="list-style-type: none"> <li>PFN charge rate</li> <li>Rep-rate</li> <li># of Shots</li> </ul>	<ul style="list-style-type: none"> <li>PFN impedance</li> <li>PFN charge rate</li> <li>Rep-rate</li> <li>Shot timeline</li> <li>Fault management</li> </ul>	<ul style="list-style-type: none"> <li>Launch pulse forming</li> <li>Peak power</li> <li>Rep-rate</li> <li># of shots</li> <li>Total energy</li> <li>Gun impedance</li> <li>Fault management</li> </ul>	<ul style="list-style-type: none"> <li>Peak power</li> <li>EM forces</li> <li>Fault management</li> </ul>	<ul style="list-style-type: none"> <li>Velocity</li> <li>Kinetic energy</li> <li>EM forces</li> </ul>