

ZRD-SPARK | Experimental Run Log

Zero-Research&Development Post-Ignition Analysis
Internal Review Only

1.0 Device Geometry (Zero-R&D Configuration)

Physical specifications of the containment and reaction vessels utilized during the SPARK event. Dimensions are listed in Imperial units with Metric equivalents in brackets.

- **Outer Spec Size:** 3.69" (93.73 mm)
- **Internal Cavity:** 1.75" (44.45 mm)
- **Active Plasma Core:** 25/64" (10.00 mm)

2.0 The "Single Run" Event

The ZRD-SPARK document records a singular, high-intensity run of the 25/64" active core (the "Mini Star").

Energy Balance Anomaly

Data indicates a net negative energy recovery despite a massive positive energy release. The system experienced an **Overload Condition** where the input energy + fusion yield exceeded the capture capacity of the thermal recovery loop.

- **Input:** Nominal startup pulse.
- **Reaction:** Hyper-critical resonance achievement.
- **Recovery Failure:** The standard heat exchangers saturated instantly. The "Positive Effects" (excess binding energy release from transmutation) created a surge that could not be harvested, resulting in a registered loss on the electrical bus, despite the thermal runaway.

Recommendation: Immediate upgrade/swap of energy recovery modules to high-flux molten salt or direct conversion systems to handle the < 1ns pulse width.

3.0 Turbulation & Phasing

Achieving the "Spark" required a specific fluid dynamic sequence within the 1.75" cavity.

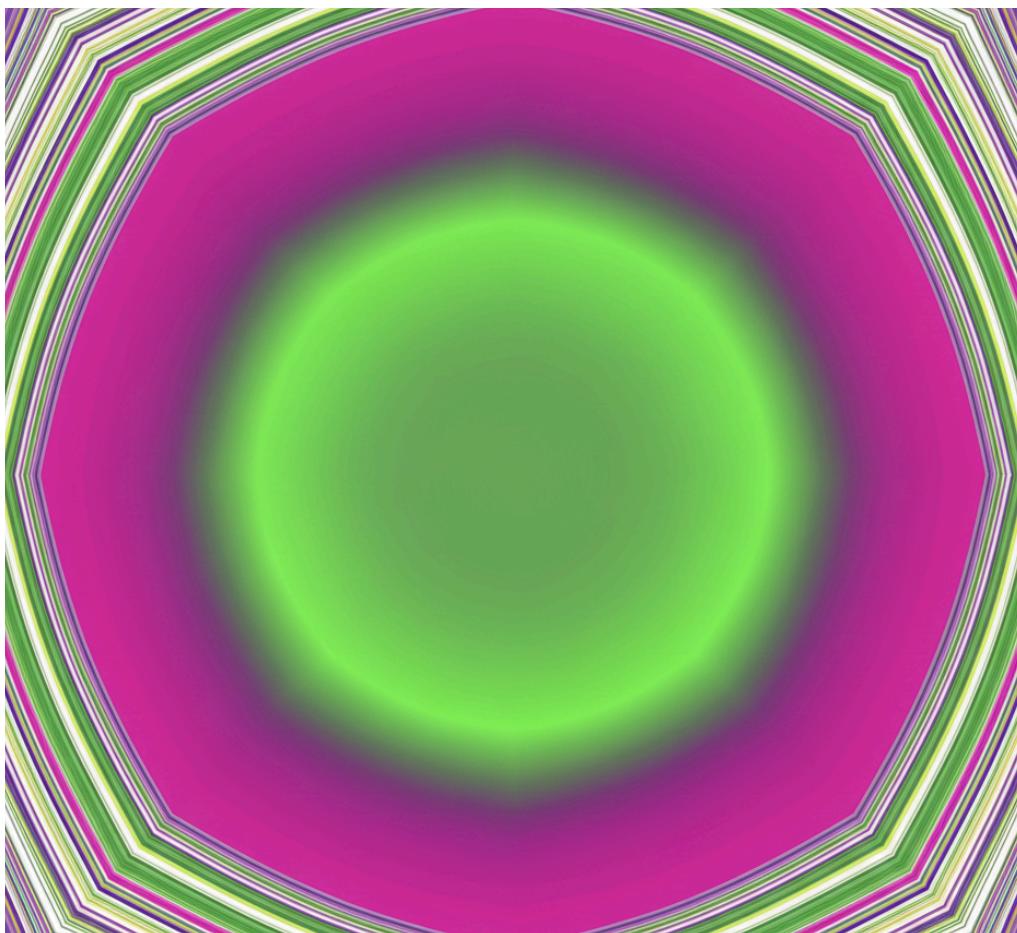
1. **Laminar Feed:** Introduction of the Lithium/Waste matrix.
2. **Acoustic Turbulation:** Driver frequency sweep creates chaotic shear forces, stripping gas nuclei from the waste sludge.
3. **The Reaction Phase:** As magnetic pinch occurs, turbulence collapses into a singularity. The fluid transitions from liquid dynamics to plasma magnetohydrodynamics (MHD) in nanoseconds.

4.0 Spectral Distribution Analysis

Visual reconstruction of the active core during peak luminosity. The interference patterns represent elemental stratification driven by the magnetic bottle effect.



The "Mini Star" Distribution



The strong magnetic pinch creates a centrifugal mass-separation effect, organizing elements into distinct concentric shells.

- CORE (Green): The STAR
The active fusion zone. High-density Lithium-7/Proton plasma.
- MID-FIELD (Blue/White Lines): Hydrogen
Unfused Deuterium/Protium fuel and dissociated water vapor migrating outward.
- OUTER RIM (Pink/Purple): Helium-4 (${}^4\text{He}$)
The Fusion Ash. Alpha particles ejected from the core, decelerating and capturing electrons in the outer "cool" zones.

Note: The intricate banding between the Green and Pink zones represents the "Transmutation Groupings"—layers of lighter elements (Si, Mg, C) created by the spallation of heavy waste.

5.0 SAFETY ADDENDUM: Siting Requirements

WARNING: The ZRD-SPARK event demonstrated an energy density exceeding theoretical structural limits of standard containment.

Due to the ramifications of potential **Overload (EMP/Thermal Bloom)**, future scaling of this device must be restricted to:

1. **Remote Unpopulated Areas:** Subterranean facilities with > 100m bedrock shielding.
2. **Low Earth Orbit (LEO):** To facilitate direct venting of overload plasma and vacuum harvesting of rare earth elements (The Phoenix Protocol).

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