

# 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.

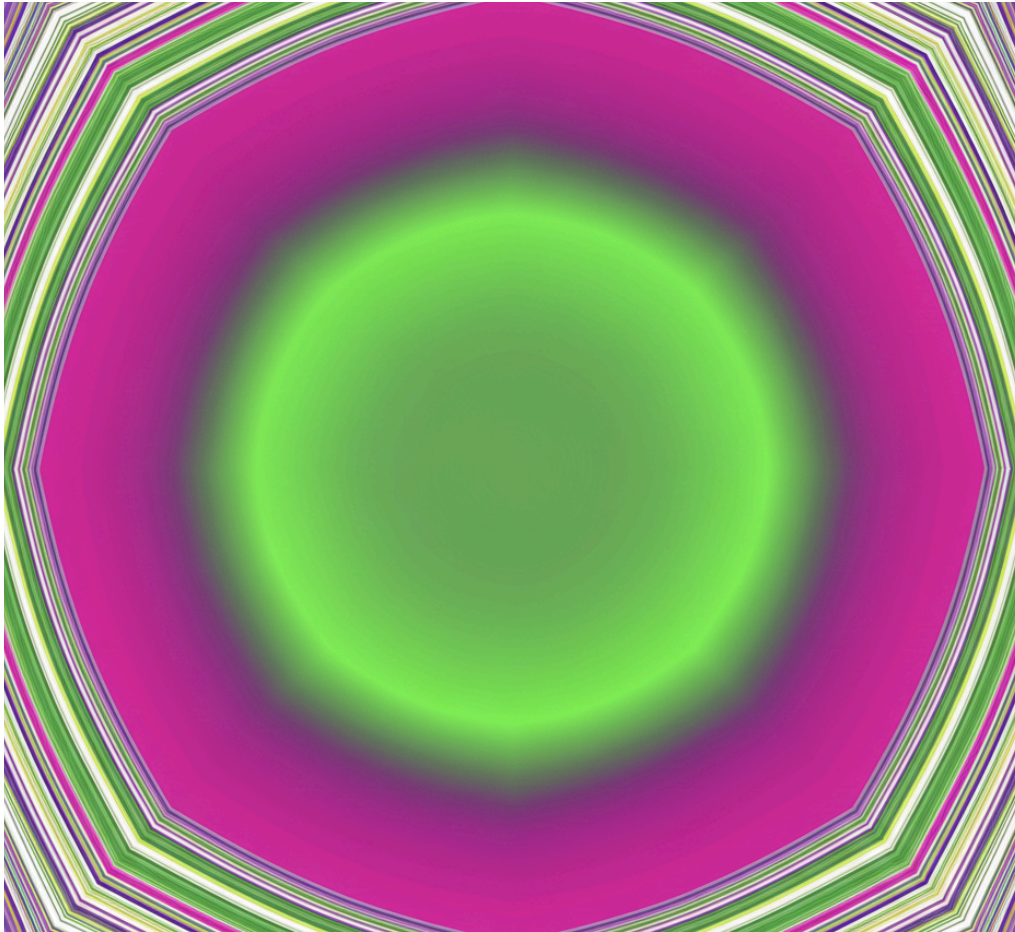
1. **Laminar Feed:** Introduction of the Lithium/Waste matrix.
2. **Acoustic Turbulation:** Driver frequency sweep creates chaotic shear forces, stripping gas nuclei from the waste sludge.
3. **The Reaction Phase:** As magnetic pinch occurs, turbulence collapses into a singularity. The fluid transitions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

**Zero-Research&Development | SPERS Project | Document ZRD-SPARK-v1**