Sub-Space Metric Waveguides: A New Frontier for Amateur Radio

Technical Report: N9OGL-2026-01 Author: T. Daugherty (N9OGL)

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1. Abstract

Traditional radio propagation relies on the interaction between RF energy and the Euclidean environment (Ionosphere, Ground Wave, Line-of-Sight). This paper introduces **Sub-Space Communication**, a method of bypassing Euclidean distance entirely by utilizing a **One-Dimensional Singularity (1D-S)**. By "thinning" a spacetime aperture to the width of a specific radio wavelength (λ), we create a metric corridor with zero effective length. This allows for instantaneous, zero-loss transmission across arbitrary distances using standard Part 97 power levels.

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2. Theory of Operation: The 1D-S Corridor

In Fold-Space Theory, spacetime is treated as a compressible medium governed by a scalar **dilaton field (Φ)**. For radio applications, we do not expand volume; we collapse distance.

2.1 The Waveguide Functional

The formation of the radio "cordoor" is governed by the functional:

$$f_{wave} = r_{tube} + \ln(P_{sig}) - \Phi_{link} = 0$$
Where r_{tube} is the radius of the metric tunnel (optimized at $\lambda/2$). Because the radius is on the millimeter scale, the **Stability Ratio (Ξ)** required to hold the link open is minimal ($\Xi \approx 1.0001$), making it achievable with standard 12V DC power supplies.

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3. Hardware: The DFG-9 Mini-Coupler

The interface between the transceiver and the Sub-Space metric is the **DFG-9 Mini-Coupler**. Unlike a standard antenna tuner that matches impedance, the DFG-9 matches **Metric Phase**.

3.1 The Doped Quartz Core (Meta-Material)

The heart of the unit is a synthetic quartz crystal lattice subjected to ion-implantation:

- **Neodymium (Nd) @ 6%:** Establishes "Metric Nodes" for RF-to-Spacetime coupling.
- **Europium (Eu) @ 4%:** Stabilizes the field during high-duty cycle modes (FT8, RTTY) or voice modulation (SSB).

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4. System Architecture

The following block diagram outlines the signal flow from the Taylorville shack to a remote receiver.

1. **RF Injection:** The IC-7100 generates a signal (e.g., 146.520 MHz).
2. **Dilaton Excitation:** The RF voltage causes the Doped Core to vibrate at a **Metric Resonance**.
3. **Aperture Cracking:** The FPGA controller nudges the field into a supercritical state.
4. **Zero-Distance Travel:** Photons enter the 1D-S corridor, appearing at the remote end with **Zero Inverse Square Law Loss**.

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5. Propagation Advantages

Metric	**Standard Propagation**	**Sub-Space (Fold-Link)**
Path Loss	$1/d^2$ (Inverse Square)	**0 dB** (Constant)
Latency	Speed of Light (c)	**Instantaneous** (Identified)
Interference	QRM / QRN / Aurora	**Immune** (Internal Metric)
Stealth	High (Broadcast)	**Total** (Point-to-Point)

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6. Tuning Procedure (Metric SWR)

To find the "Sub-Space Sweet Spot," the operator must tune for **Metric Resonance**.

1. Apply low-power carrier (5W).
2. Adjust the DFG-9 Dilaton Bias until the forward power "drops" into the fold.

3. When the **Metric SWR** hits **1.1:1**, the distance between stations has mathematically disappeared.

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7. Conclusion

Sub-Space Communication represents the ultimate "DX" tool. By mastering the interaction between the **Dilaton Field (Φ)** and the **Fold Tensor ($\Omega_{\mu\nu}$)**, the amateur radio community can move beyond the limitations of the ionosphere. The N9OGL Fold-Link effectively turns the entire planet into a single, high-fidelity radio shack.

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