Licensable Technologies

# *Lightslinger:* Superluminal Transmitting Antenna

**Applications:**

- RADAR
- Directed Energy
- Long-range communications
- Astrophysics
- Medicine (Oncology)

**Benefits:**

- RADAR imaging applications are countermeasure-resistant
- Communications can be spatially-encrypted
- 4-dimensional volumes of energy can be aimed at a single space-time point for directed energy applications
- Nonspherical decay of the cusp enables low-power communications and propagation over great distances

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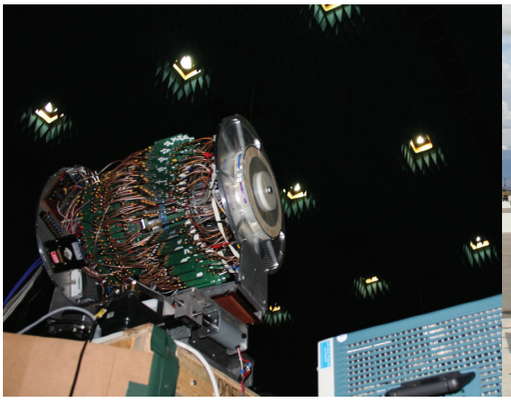

**Summary:**

Los Alamos National Laboratory (LANL) researchers have developed the *Lightslinger*, a completely new type of antenna that produces tightly-focused packets of electromagnetic radiation fundamentally different from the emissions of conventional transmitters. The device has potential applications in RADAR, directed-energy (non-kinetic kill), secure communications, ultra-long-range communications (e.g., deep-space), medicine (oncology) and astrophysics.

The Lightslinger functions by producing a moving polarization pattern in a ring of alumina. By careful timing of voltages applied to electrodes that surround the alumina, the polarization pattern can be made to move *superluminally*, i.e., faster than the speed of light in a vacuum. Nobel laureate Vitaly Ginzberg showed both that such superluminal polarization patterns do not violate the principles of special relativity and that they emit electromagnetic radiation. Once a source travels faster than the waves that it emits, it can make contributions at multiple retarded times to a signal received instantaneously at a distance. This effect is already well known in acoustics; when a supersonic airplane accelerates through the speed of sound, a violent "sonic boom" is heard many miles away, even if the airplane itself is rather quiet. The Lightslinger enables the same thing to be done with electromagnetic radiation; i.e., a relatively low-power source can make an "electromagnetic boom", an intense concentration of radiowaves at a great distance.

The "electromagnetic boom" is due to temporal focusing, that is, focusing in the time domain. Because of this effect, part of the emitted radiation possesses an intensity that decays with distance $r$ as $1/r$ rather than as the conventional inverse square law, $1/r^2$. These nonspherically-decaying wavepackets represent a game-changing technology in the applications of electromagnetic radiation.

**Development Stage:** Working prototype

**Patent Status:** Patent pending

**Licensing Status:** Available for exclusive or non-exclusive licensing

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