

Gravitational Shielding

Let us consider the system in figure1. The *shielding crust* (SC) is a superconductor material with high $T_c \cong 92$ K and high $J_c \cong 7000$ A/cm² it has an electric conductivity $\sigma_{SC} \approx 10^{22}$ S/m, a magnetic permeability $\mu_{SC} \approx \mu_0$, and thickness $z < (\pi f \mu_{SC} \sigma_{SC})^{-1/2} = 1.6 \times 10^{-7}$ m, ($z = 100$ nm), and area $S_{SC} \approx 1000$ m². The dielectric crust has 1-mm thickness. The ELF antenna material is a superconductor (the same as SC) it has 5-mm thickness, the antenna length is $z_0 = 33.3$ m. The SC + ELF antenna + secondary circuit is kept at a temperature below 70 K (N₂ liquid). The ELF supercurrent is $I = I_0 \sin 2\pi f t$ where $I_0 = 10^5$ A, $f = 1$ mHz. The antenna irradiation power is $P_a = \pi (I_0 f z_0)^2 / 3 \epsilon_0 c^3 \approx 4.8 \times 10^{-8}$ W and $D_{SC} \approx 10^{-11}$ W/m².

If the radiation frequency f is a frequency of the *emission spectrum* of the SC's atoms, we can easily show that the atoms absorb an electromagnetic energy $U = \eta P_a / f$, where η is a particle-dependent absorption coefficient and P_a is the incident radiation power on the atoms; $P_a = D S_a$ where D is the radiation power density on the atoms and S_a its cross section. So, we can write: $U = \eta D S_a / f$ and consequently, according to equation (1.04) (gr-qc/9910036), for $\omega = 2\pi f < \sigma_{SC} / \epsilon$, the gravitational masses of these atoms, will be given by:

$$m_g = m_a - 2 \left(\sqrt{1 + (\eta S_a D / m_a c)^2 (\mu_{SC} \sigma_{SC} / 4\pi f^3)} - 1 \right) m_a$$

We see that the gravitational masses (m_g) of the SC's atoms can be nullified for a value $D \approx 10^{-11}$ W/m², which is the same as the produced by the antenna in SC, (D_{SC}).

When the gravitational masses of SC's atoms are *nullified*, the SC works as a gravitational shielding for the system presented in figure 1.

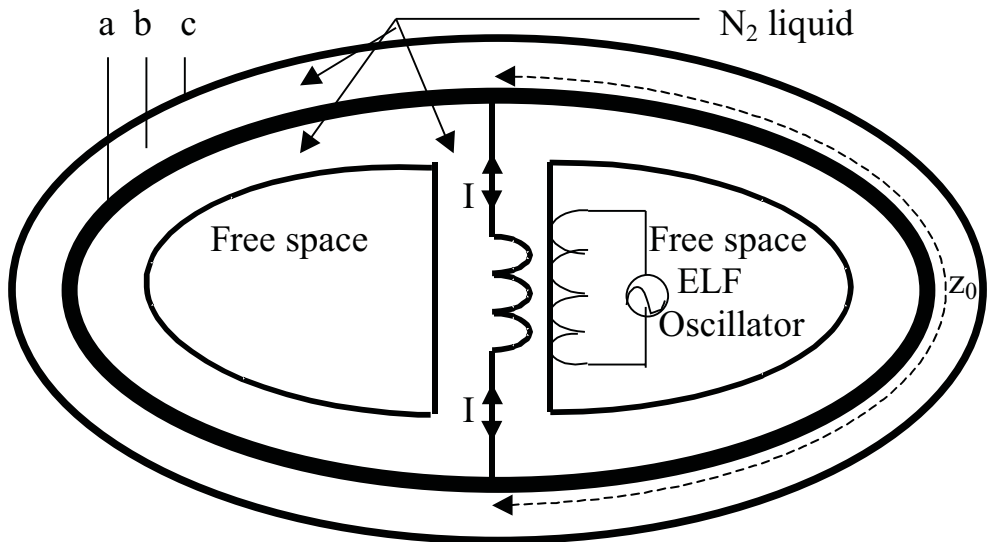


Fig.1-Gravitational Shielding System (Cross Section): (a) Superconducting Elliptical Crust(ELF antenna); (b) Dielectric Elliptical Crust ; (c) Superconducting Elliptical Crust (Shielding Crust).