Superconductivity and the Equivalence Principle

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The first statement of this problem stems from a question:

"How does the equivalence principle manifest in superconducting magnetic levitation and free space interaction between a magnet and a superconductor so as to maintain the Meissner effect?"

The first given accords with the equivalence principle, and the second with quantum mechanics:

1.) The speed of light is taken to be an invariant fixed quantity, known as 'c'.
2.) The Meissner effect is taken to be the absolute diamagnetism of superconductivity.

This admits us to make a few conclusions:

1.) Non-Inertial support or accelerative frame:
    a.) Under the provisions of a curved gravitational field, the system is static.
    b.) Under the provisions of a non curved accelerative frame, the system is static.

2.) Inertial free fall or free space:
    a.) Under gravitational free fall, the system is static but inertial.
    b.) In free space, the system is static but inertial.

These are supported by the notion that:

Due to the dot product of magnet with superconductor being a pure scalar, the dot product must remain fixed. For if we presume there to be a differential, we find that either energy conservation in the frame of the superconductor or magnet are violated if the dot product is not preserved under the presence of a gravitational field, or it also follows that if the dot product is preserved, but the differentials are opposite, there will be a violation of the Meissner effect.

This is consistent with the laws of electromagnetism, whereby a changing magnetic field from motion will convert into an electric field curl and therefore a changing magnetic field of opposite nature. Thus the nature of the Meissner effect and energy conservation are only satisfied if and only if the differentials of these quantities are zero in the case of static levitation or non-zero but equal and opposite in the case of inertial separation in space.

Thus we find that if the motion is inertial, and gravitationally free, the magnet and superconductor will separate conserving energy and momentum and preserving the Meissner effect in a Lorentz invariant fashion, and if the motion is non-inertial and accelerated, with or without a gravitational field, the effect will only be satisfied by the inclusion of general covariance, for which the Meissner effect can be seen as a prediction and a consequence.

Thus we can surmise that in general a magnet and superconductor interact as if the magnet's magnetic field is the displacement of a generally covariantly evolving electromagnetic field, and that in general the motion is inertial, as the generalization of the static property of the system. Finally we find that if the electromagnetic field displacement is equivalent and opposite by virtue of sign compared to the gravitational displacement, a magnet and superconductor will remain static at any distance.

It follows that if a superconducting magnet system is appropriately established, there will be an inertial orbital mechanic analogous to the motion of the Moon about the Earth.