

Further Considerations on the Coler/Unruh Strömerzeuger

©Cyril Smith February 2025

1) Introduction

It is over 100 years since Unruh first demonstrated his Strömerzeuger (energy machine) that was witnessed to deliver more electrical power out than electrical power fed in. Not only witnessed by many but also carefully measured by the German Professors Schumann, Kloss and Franke. They used their own calibrated instruments and performed the measurements in different ways to ensure they were correct. They concluded that Unruh was not a fraudster, the machine did behave as claimed and utilized a hitherto unknown source of energy, but fearful for their reputations they forbade publication of their findings especially to the press. There have been many attempts to discover this obscure source since it could benefit mankind if it could be widely utilised. This paper discloses the author's latest attempt that seems to answer all the questions surrounding this device, such as

- a) Where does the anomalous energy come from?
- b) How does it create RF oscillations when it does not have any active components?
- c) How do those oscillations create DC output when it has no rectifiers?

The Hall effect is a well-known phenomenon in use today, but not in use 100 years ago. Also known is the Corbino effect where instead of a rectangular Hall plate being used to deliver Hall voltage, a circular plate is arranged such that the Hall effect induces circular current in the plate known as Corbino current. A further development that to the author's knowledge has never been explored uses a thin-walled cylinder where the Hall effect induces circular Corbino current around the cylinder. Current along the cylinder follows a helical path. This paper gives a quick tutorial on the Hall and Corbino effects, then proceeds to show that the Fe rods used in the Strömerzeuger have the correct conditions to make use of this cylindrical Corbino effect. Consideration is given to conduction electrons within Fe as they move past the atoms (ions) that have their magnetic dipoles aligned to the Hall magnetic field to show that the small Hall-effect divergence in velocity direction increases the electron's kinetic energy. This energy gain is supplied from the persistent electron spin within the nearby Fe atom that constitutes its magnetic dipole.

2) The Hall Effect

Figure 1 shows the Hall effect where a magnetic field is applied to a rectangular Hall plate. A DC source V_x is connected across the x dimension of the plate and the moving charges (electrons in this illustration) flowing along that dimension have a sideways force on them as they move through the magnetic field B_z that is normal to the plate surface. This follows Fleming's LH rule. The deflected flow creates a Hall voltage V_H across the y dimension.

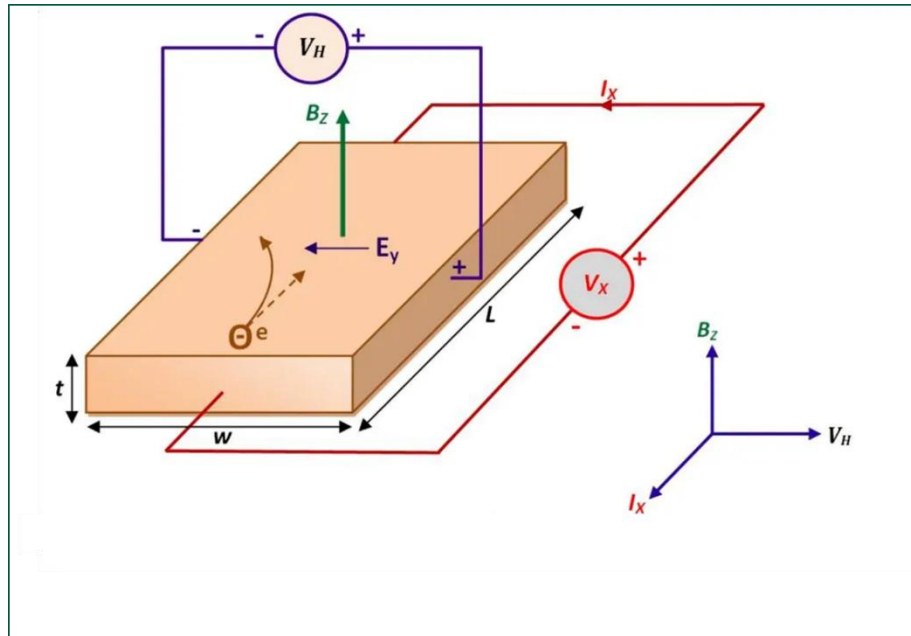


Figure 1. Hall Effect

3) The Corbino Effect

The Corbino Effect, which is related to the Hall Effect because the same physical principles apply, has been known for over 100 years. Essentially the Corbino system is a circular Hall plate where the induced Hall voltage appears in a closed circuit, thus the voltage disappears to be replaced by a circular current. The applied current is radial, everywhere following a curved path due to the Hall force. At any point the current flow direction can be resolved into a radial component and a circumferential component, the latter summing to the effective circular currents around the disc. This is summarized in Figure 2.

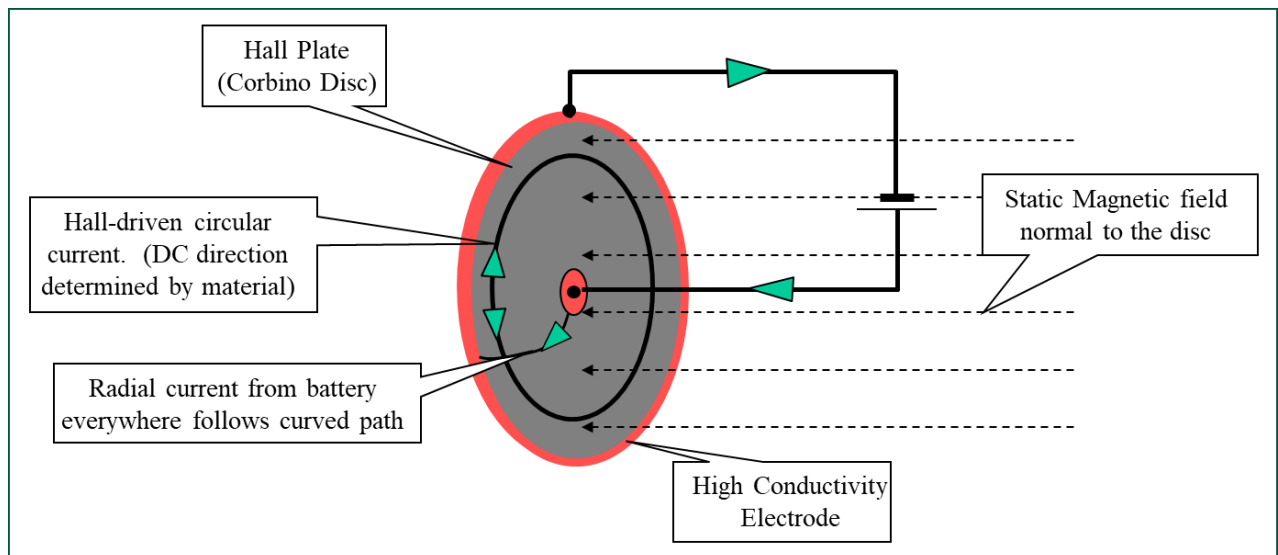


Figure 2. The Corbino Effect

4) The Cylindrical Corbino Effect

In the Strömmerzeuger the ferromagnetic geometry is not a disc but is cylindrical. The Cylindrical Corbino Effect applies when the Hall Plate becomes a thin-walled cylinder as

shown in Figure 3. This requires magnetic field lines to pass through the walls and this divergent field can be provided by a permanent magnet at one end of the cylinder (as occurs in the Strömerzeuger) or opposing magnets at each end. Longitudinal current in the cylinder induces, via the Hall Effect, circular current around the cylinder.

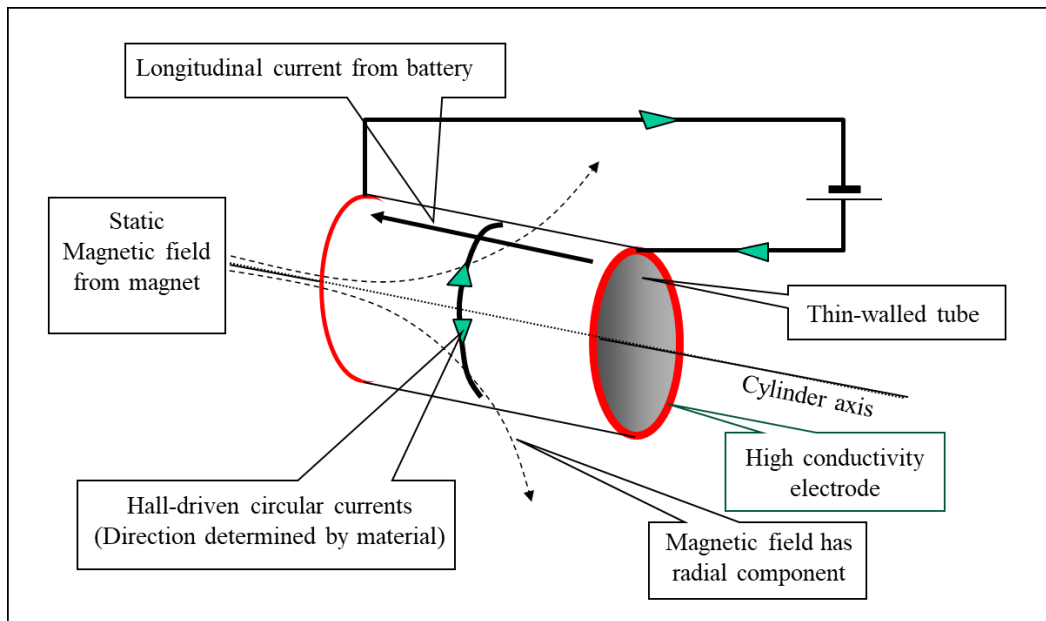


Figure 3. Cylindrical Corbino Effect

The current paths everywhere follow a helical pattern as shown in Figure 4.

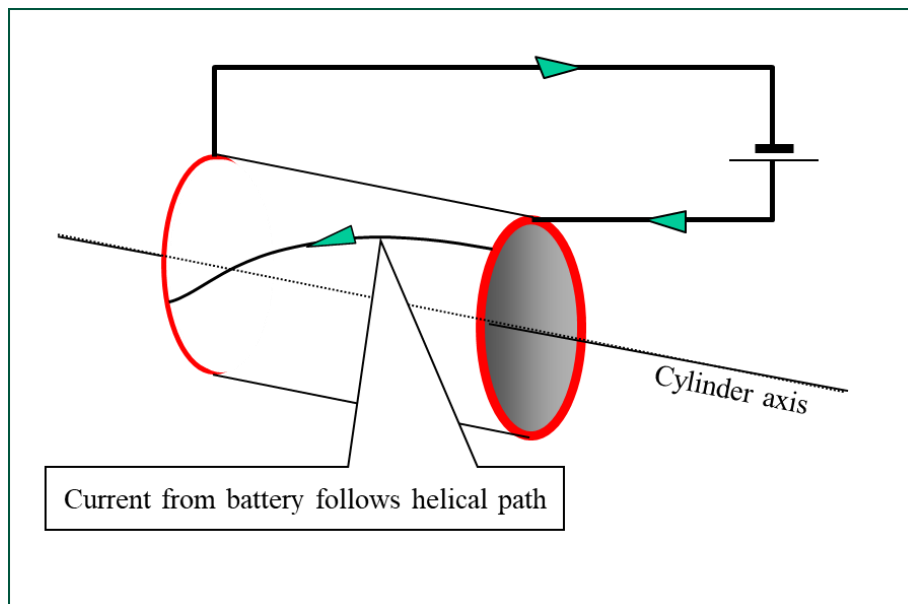


Figure 4. Helical current path

We can now see that the FE rods in the Strömerzeuger have the correct conditions for this cylindrical Corbino effect to occur. A permanent magnet attached to one end of each rod creates magnetic field lines within the rod that enter at the junction with the PM then exit radially along the surface of the rod. DC current along the rod thus flows in a helical manner at the surface due to the Hall effect. The DC current has superimposed on it RF current that is constrained by skin depth to flow as surface current, that RF current also following a helical path.

The Strömerzeuger rods also have coils wound on the rods, so the RF circular magnetic field created by the Hall effect will induce voltage in those coils. That voltage can feed RF current to a load resistor, the system then acting like a RF transformer. But this is not a classical transformer having primary and secondary coils, here the primary “coil” is the helical current flow along the cylinder. In classical transformer action using helical coils for input and helical coils for output, we know that the load will reflect to the input coil and require input power to drive it. It appears that the Hall driven electron current in the Strömerzeuger adds energy to make this transformer action exceed 100% efficiency. It can be surmised that the Hall action in a ferromagnetic conductor like iron, being a sideways force acting on the forward motion of an electron cloud passing through a matrix of atoms whose magnetic dipoles are on average aligned with the field direction at right angles to the motion, the sideways deflection on an individual electron magnetically interacts with the nearby atom’s dipoles to extract energy. In a non-ferromagnetic medium the source of the deflecting magnetic field is too distant from the electron for this interaction to take place. In iron where its internal field is many orders greater than that supplied from the distant source, this local interaction between moving electron and atom is dominant since it is the alignment of those atomic dipoles that supply the local field. It is expected that such interactions will obey conservation of angular momentum (as in the Einstein de Haas Effect and the Barnett Effect), and it is known from many experiments that conservation momentum takes precedence over conservation of energy, most often leading to a loss of energy. In the Strömerzeuger it appears that this leads to energy gain. Put simply, in ferromagnetic material Hall deflection at electron to atom “collision” adds energy (since the electron velocity is slightly increased by the deflection) and that energy is somehow taken from the atom (see section 6).

5) Proposed experiments

The breakthrough in understanding the anomalous effects of the Strömerzeuger comes from the realization that the helical current paths covering the whole cylinder can be treated like a helical coil, and with another actual coil placed there we have a transformer. We have already discussed this second coil being the secondary, but it is also possible to conceive of it being the primary driven by RF. We can place a load resistor that receives only RF voltage and current via a capacitor and isolate the DC source from the RF currents using an inductor, Figure 5. The RF input will induce circular eddy currents around the electrically conductive cylinder that would normally represent a loss due to the finite conductance, but here it also induces RF voltage into the helical current path that then appears across the load resistor where the power there can exceed the eddy current loss. It can also exceed the DC loss of the longitudinal current flow along the cylinder.

The induced RF current is constrained by the skin effect to flow only near the surface of the Fe rod hence the thin-walled cylinder is a good representation. In the Strömerzeuger the arrangement of flat coils adjacent to flat plates play the part of the L and C here. Here we have the basis for some simple experiments to examine this hitherto unexplored effect.

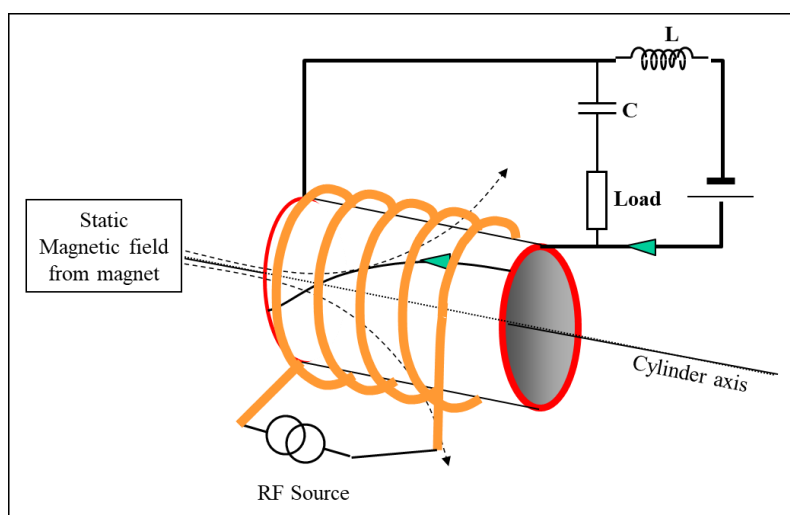


Figure 5. Corbino transformer

Although it is tempting to design an experiment using a thin-walled cylinder as depicted in Figure 5, perhaps having a separate ferrite rod within it, it is more advisable to try to replicate the Strömerzeuger Fe rods as the currents and fields within its entire volume may be necessary to produce the anomalous effects. Coler's 1928 paper that has only recently been revealed shows small diameter magnetized steel wire attached to one end of the rod. Although not done in the Strömerzeuger, the radial field can be doubled by having an identical magnet arrangement at the other end of the rod, polarized as shown in the axisymmetric 3D FEMM simulation Figure 6.

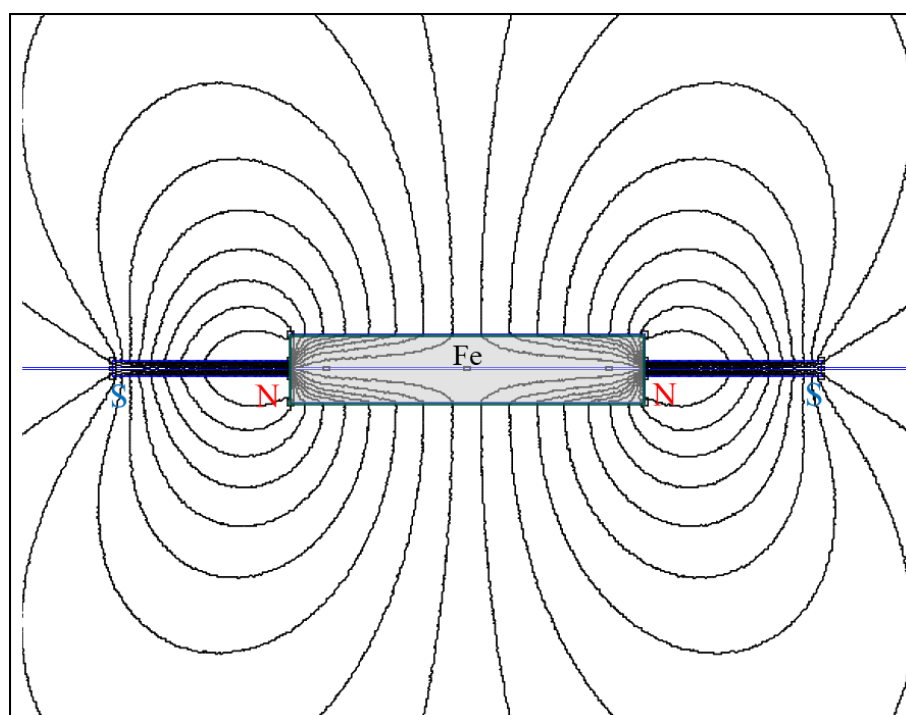


Figure 6. Showing radial flux from Fe rod

The next image shows this double-ended arrangement experiment. In the Strömerzeuger current flows through the steel permanent magnets and this will spin-polarize the electrons

entering the Fe rod which may influence the results. The image shows two different connection regimes to explore performance with and without spin-polarized electrons.

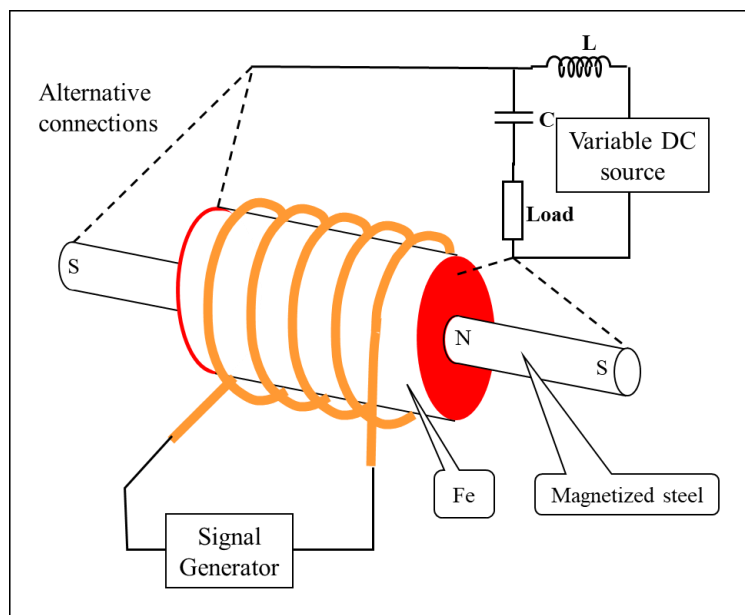


Figure 7. Proposed Experiment

From the 1947 Hudson letter (repaired version reproduced here at Annexe A) Coler was using Armco Fe rods about 10 inches long and 1 inch diameter. The permanent magnets were 16SWG piano wire, and since their magnetization would be somewhat hit and miss it could be advisable to also try steel cored electromagnets there driven by DC.

With modern digital oscilloscopes having a math function, input and output power can be derived from voltage and current probes at these points ensuring that the math is performed over whole cycles.

6) Questions answered

Where does the anomalous energy come from?

Figure 7 shows an electron moving in vacuum entering a magnetic field between two pole faces.

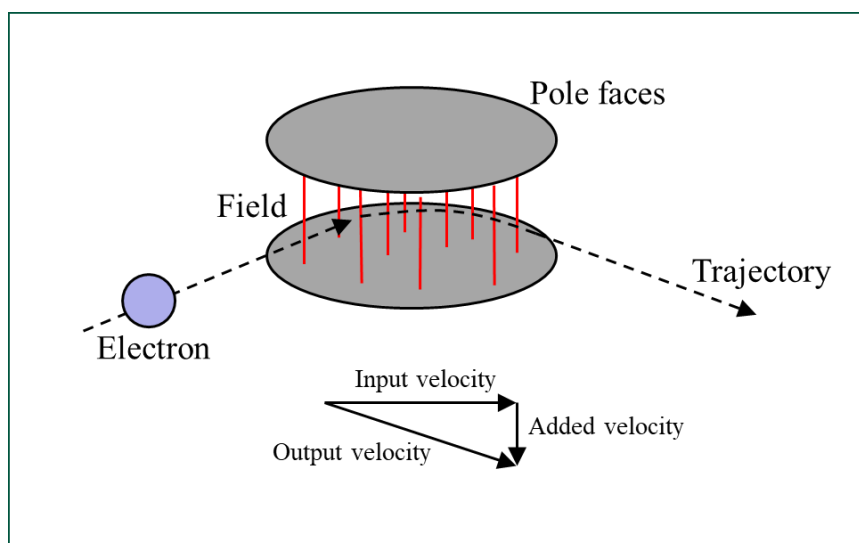


Figure 7. Electron in vacuum

The Hall effect creates a sideways force hence the electron leaves the field with its velocity direction changed. The Hall force adds velocity vectorially hence the output velocity is slightly greater than the input velocity. The increase in kinetic energy is supplied from the source of the magnetic field.

The next Figure 8 shows an electromagnet in vacuum where a sphere having mass and charge has its trajectory modified by the magnetic field from the electromagnet. The sphere leaves with a higher velocity and therefore higher kinetic energy. The energy gain comes from the electromagnet.

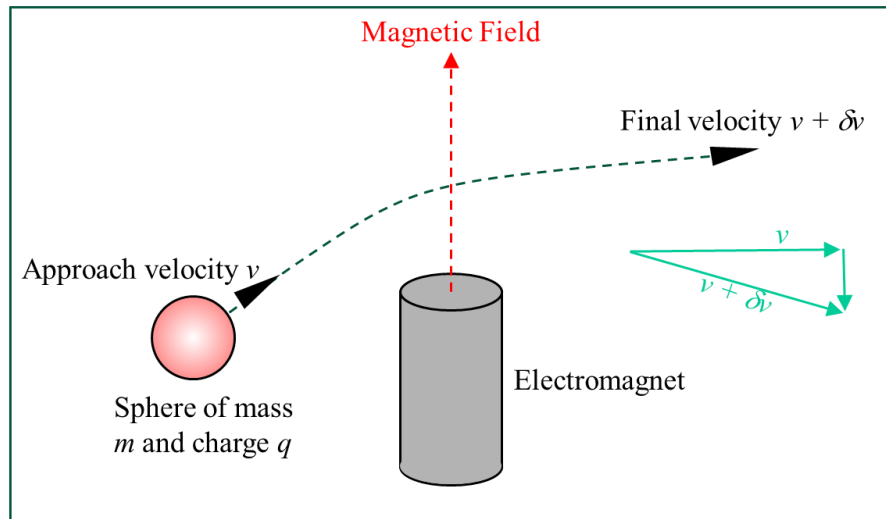


Figure 8. Charged sphere in vacuum

If the electromagnet is simply a multi-turn coil without any core material the magnetic field from the moving charge must induce a voltage pulse into the coil that loads the DC current source, i.e. a unidirectional pulse. This induction comes from the time derivative of the magnetic vector potential of the moving electron; hence its motion deflection must create an E field vortex via this time derivative. The deflection adds velocity, hence there is acceleration along the velocity direction throughout the curved trajectory. The E field from the magnetic vector potential creates a partial E field vortex as shown in Figure 9 that induces voltage into the coil there.

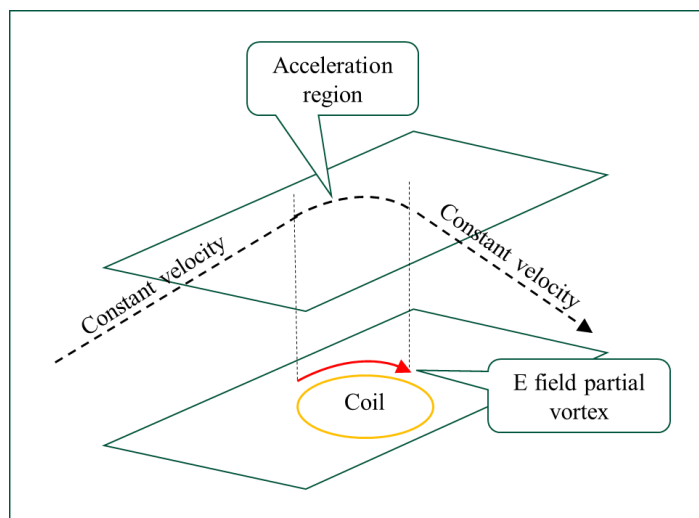


Figure 9. Partial E field vortex

A continual flow of charged spheres would create a continuum of unidirectional pulses that would integrate to a DC voltage. *Such DC induction into a coil is unknown to current EM theory.*

The next Figure 10 shows an electron moving at Fermi velocity within the inter-atomic space of magnetized Fe (or other high permeability electrically conductive ferromagnetic material).

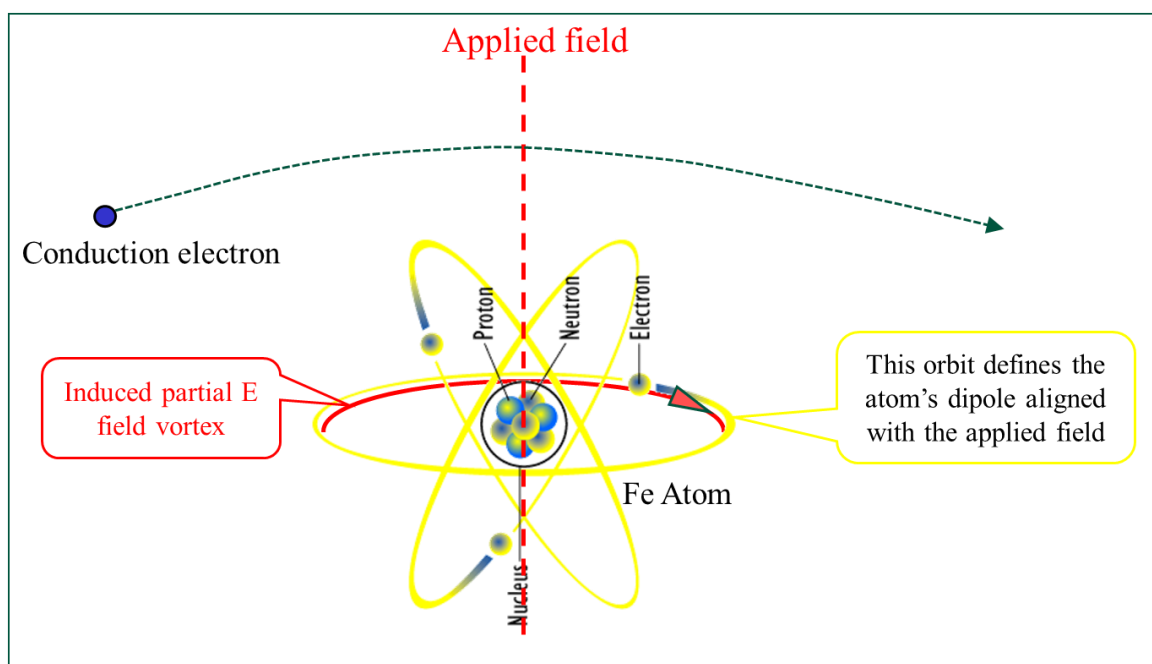


Figure 10. Electrons passing Fe atom

Here the source of the magnetic field is the nearby Fe atom dipole that has been aligned by induction from a distant source. The classical formula $B = \mu_0 H + \mu_0 M$ where $M = \chi H$ and the susceptibility χ is very large tells us the local magnetization M is the dominant source of the field, not the distant source H . We can therefore surmise that the sideways deflection of the moving electron will interact magnetically with the Fe atom that is responsible for the static field there. As in the electromagnet, the magnetic field from the deflected and accelerating electron creates a partial E field vortex within the atom that opposes the orbital motion in such a way that its perpetual motion supplies the anomalous energy.

It can be argued that this increase in Fermi kinetic energy will be dissipated elsewhere within the Fe material because the bulk effect is not electron movement at high Fermi velocity but a slow drift velocity exhibiting the Hall deflection effect. However, the evidence for the Strömerzeuger suggests otherwise.

How does it create RF oscillations when it does not have any active components?

The anomalous effect creates negative resistance that ensures instability in the form of oscillations.

How do those oscillations create DC output when it has no rectifiers?

It can be shown that a combination of DC and AC can yield a power waveform that is very similar to that of unsmoothed half-wave rectification. Coler stated that it needed at least two stages for full operation, the second stage would therefore supply the other half-wave.

Annexe A

Royal Aircraft Establishment,
Farnborough,
Hants.

18th June 1947.

EL/G.4483/RFS/33

The Secretary,
Ministry of Supply,
Millbank, S.W.1.

For the attention of A.D.R.D. Inst. (EL)

Hans Coler – “Stromerzeuger”

During the past four weeks, we have been supervising at S.R.D.E. Coler's attempts to produce results from the apparatus which had been constructed previously by him with the aid of S.R.D.E workshops.

The apparatus comprises two stacks each of 14 copper plates, about 30" x 8" x 1/8" thick, spaced about 1" apart, and with their long edges parallel. In the spaces between the plates and above the top pair are wound flat coils of about 12 turns of 16 S.W.G. tinned copper wire spaced so that one side of the coil occupies the full width of a plate. The ends of the coils and of the plates are brought out to terminals on boards at the ends. In the space between the plates is a vertical board carrying on each side 18 electromagnets arranged in zig-zag formation. Each electro-magnet has a solid core of "Armco" iron about 10 inches long x 1 inch diameter and three separate windings of which the second is wound in the opposite direction from the first and third. In the upper windings to each wire is fixed, by a device similar to a lathe collet, a small permanent magnet of about 16 S.W.G. piano wire about 3 inches from the terminal at the upper end. One end of one of the windings is connected to the lower end of the permanent magnet. There are three circuits, an "armature" circuit consisting of the copper plates each connected with a permanent magnet and its associated windings on the electromagnet, a "field" circuit comprising the flat coils in series with eight of the permanent magnets and with a coil on each of the remaining 28 magnets and a "third" circuit comprising all the remaining (outside) coils and the electromagnets connected in series. The armature and field circuits come in two groups and are supplied by two batteries of 6 inert type Leclanche. The third circuit is supplied by a battery of 7 or 8 similar cells. Coler has written a note describing his theory of the operation. This is in our hands and is being translated.

According to Coler the normal procedure in setting the apparatus to work is to loosen deliberately a connection in each of the three battery circuits so that the current is variable. There ensues a "formative" period during which some settlement or adjustment of the magnets occurs and the field and armature circuits develop a sympathetic oscillation. When this occurs the voltage on the output terminals falls to zero and then rises rapidly to its final value.

During the four weeks the apparatus was partly or wholly reconnected several times in an endeavour to re-discover the correct connection of the polarity of the magnets relative to the flow of current and of the chirality of the winding to which it was connected, the direction of magnetic field through the flat coils and copper plates and the manner in which these circuits were linked through the coils on the electromagnets, these being the chief variables.

At first the endeavour was to magnetise the permanent magnets as strongly as possible but in the final experiments attempts were to achieve some critical value by first demagnetising with A.C. and then magnetising by small increments with D.C. Finally Coler expressed a desire to demagnetise the magnets completely by heat treatment and start afresh but lack of time prevented this being done.

In the latest trials the output voltage varied to a greater extent than would be expected to be caused by loose connections not subjected to vibration, falling at times to about 0.5 volt from its initial value of about 3 volts. It was noticed that falling output voltage occurred with rising battery voltage so that the variation was not due to battery variations.

Coler states that prior to his breakdown in 1927 he was able to keep a clear mental picture of his operations and did not therefore make drawings. Drawings made subsequently have all been destroyed by bombing. He gives the impression of being honest, anxious to make the apparatus work and confident of ultimate success. He does appear to be a nervous individual and the fact that he has been working to a time limit may have preyed on his mind and prejudiced his chance of success.

It is unfortunate that the decision was made to construct an unnecessarily large and elaborate model in the first instance. The principle, if genuine, would have been demonstrated with very much simpler apparatus, with a very much reduced chance of error and with very much less labour.

While it must be admitted that the genuineness of the device is, on the face of it extremely improbable, we have the evidence of Capt. Sandberg and Modersohn, who, though not technicians, claim to have seen it in operation, and the documents reproduced in B.I.O.S. Report 1043, Item No. 31, all of which support the case that it has worked. Assuming that Coler's mental powers have been affected by his experiences it may be that, given the opportunity of working quietly, and not limited to a definite time frame, he would be able to reproduce the required conditions. If he fails the cost will not have been very great and if he succeeds it will have been well worth while. We propose therefore that he be given a further opportunity of working at the R.A.E. for a period of about 6 months, preferably on the simplest possible form of his device.

(Sgd.) C.S. Hudson

for Director
Royal Aircraft Establishment.