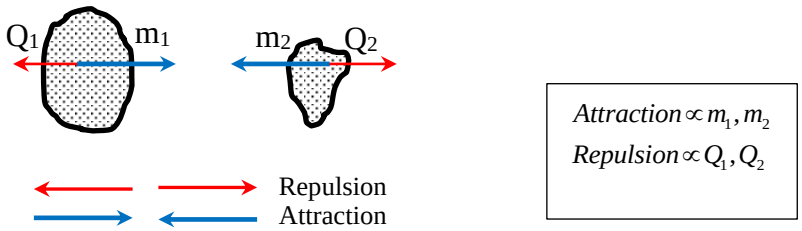
Supplementary data

The Existence of Gravitational Current: A Study of Gravitation and its Interaction with Matter

Description of Supplementary Figure 1

There exist gravitational attraction and repulsion force fields among matter (objects) proportional to mass and energy respectively, for example, between two arbitrary entities with masses m_1, m_2, and thermal energy contents Q_1, Q_2. See Sup. Fig. 1.

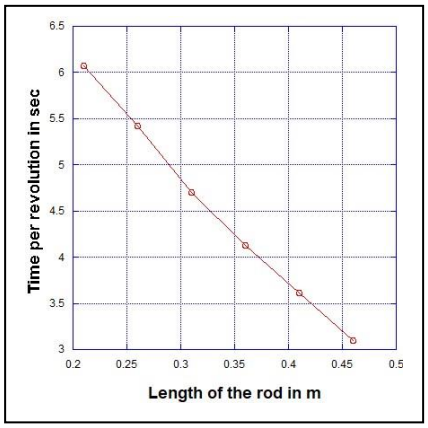


Sup. Fig. 1. *Force fields acting between two arbitrary entities with masses m_1, m_2, and thermal energy contents Q_1, Q_2. There exists attraction (blue arrows) and repulsion (red arrows) forces between them proportional to mass m and thermal energy Q respectively.*

Description of Supplementary Figure 2

Rotational speed of *R*-*W* around shaft *S* with respect to the length *L*

Rotational speed of ***R*** around shaft ***S*** with respect to the length ***L*** are plotted in Sup. **Fig. 2.**

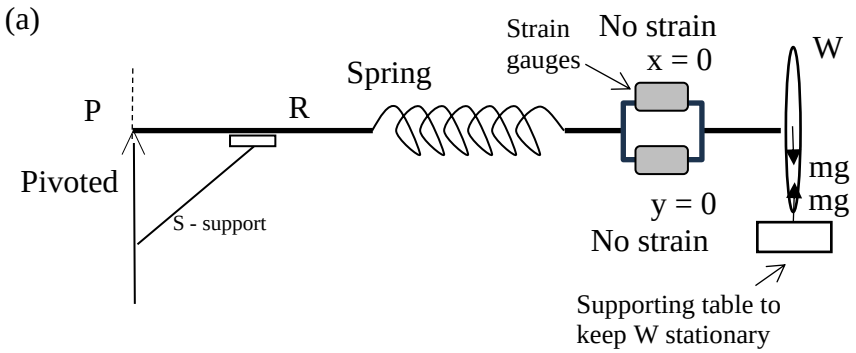


Sup. Fig. 2 *Rotational speed of **R** around the vertical axis **S** in seconds with respect to the length **L** of **R**. Violates conservation of angular momentum; this behavior is discussed in the text*

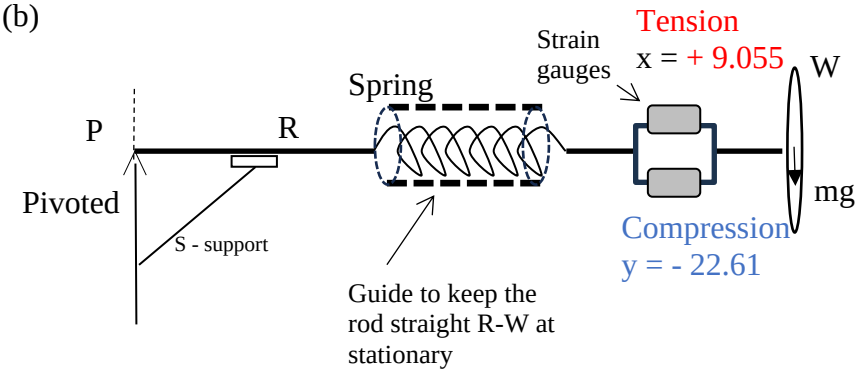
Description of Supplementary Figure 3

A sprig was introduced to the middle of R as shown in the Supplementary Fig.3

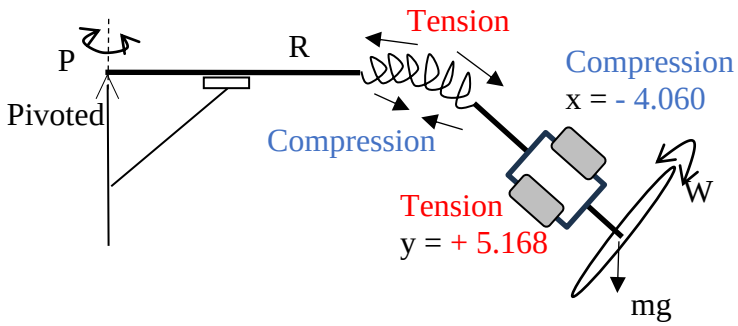
Supplementary Video 8
V8: Strain distribution along the spring-integrated rod within the gyroscope
https://youtu.be/xmQ3Zg88ks4



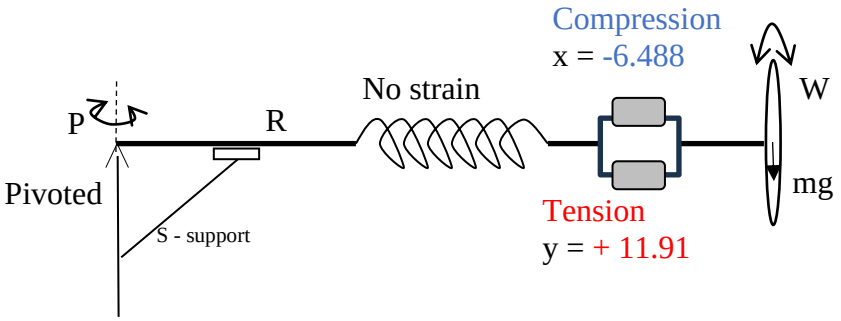
(b)


Tension
x = + 9.055
Strain
gauges
W
Spring
P
R
Pivoted
mg
S - support
Compression
y = - 22.61
Guide to keep the
rod straight R-W at
stationary

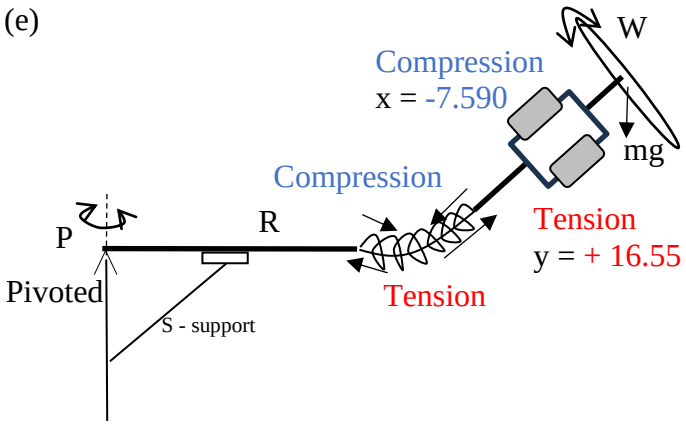
(c)


Tension
P
R
Compression
x = - 4.060
Pivoted
Compression
W
Tension
y = + 5.168
mg

(d)


Compression
x = -6.488
No strain
W
P
R
mg
Pivoted
S - support
Tension
y = + 11.91

(e)


W
Compression
x = -7.590
mg
Compression
P
R
Tension
y = + 16.55
Pivoted
Tension
S - support

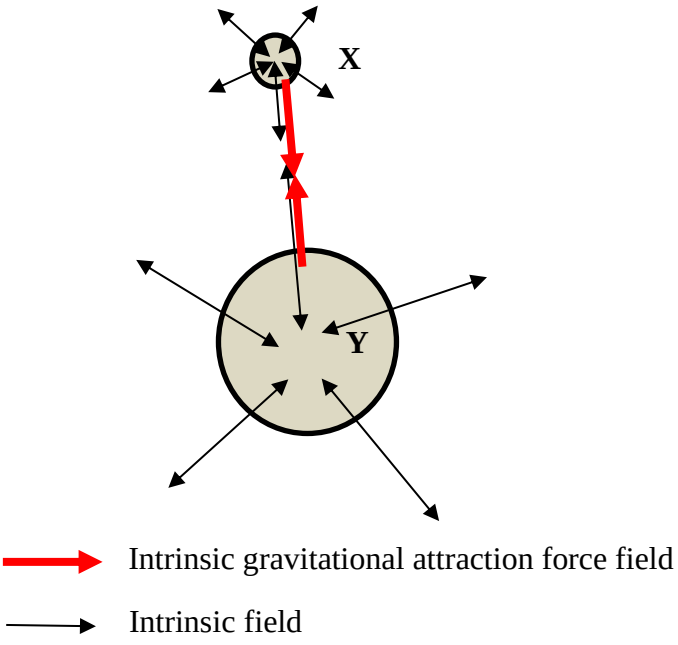
Sup. Fig. 3. A strong spring was introduced to ***L***, in between ***P*** and the strain gauges in the apparatus shown in the Fig. 2. (a) The setup consisting the ***L***, with integrated spring kept horizontally by placing supporting table and reset the reading of the strain gauges to zero (b) A metal tube was inserted to the spring in order to keep the ***R-W*** straight without the supporting table. Readings of the strain gauges were recorded. Then the metal tube was removed from the setup shown in (b). When the ***W*** is set to rotate, the ***R-W*** with integrated spring precesses around ***P***. Then the ***W*** is placed in three different orientations (c) downwards, (d) straight and (e) upwards respectively. Readings of the strain gauges were recorded for each configuration of (c), (d) and (e).

Main postulates regarding gravitational fields

Description of Supplementary Figure 4

P1

There exist two fields, intrinsic field and actual force field (see Sup. Fig. 4). Intrinsic field is isotropic in space and independent from rest of the objects, and the force field would exist between two objects via/through free space or any other medium. The intrinsic field in two objects (in this case; earth and the object) in free space, causes the force fields between same two objects.

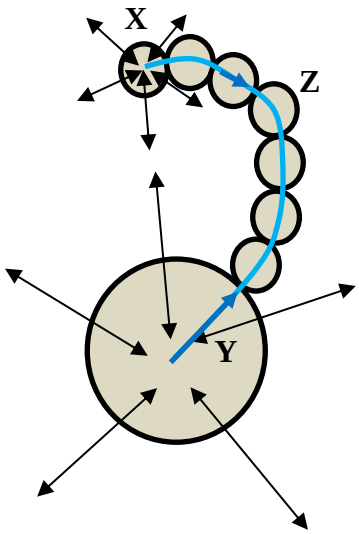


Sup. Fig. 4 *There exist two, intrinsic field (black) and actual force fields. Attraction field is represented in (red). There also exists a gravitational repulsion and in reality, the resultant or combination of these two forces is experienced. However, here only the gravitational attraction field is discussed for convenience.*

Description of Supplementary Figure 5

P2

The intrinsic field is isotropic and uniform throughout space, and force fields can exist between two objects either via free space or through any other medium.



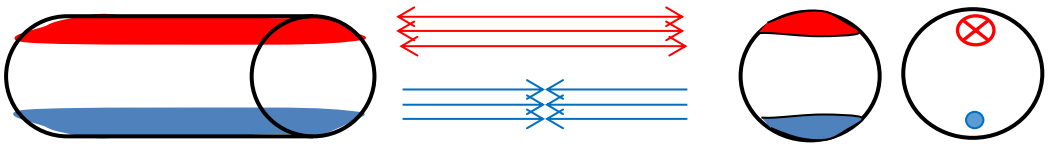
Sup. Fig. 5. *Existence of two fields, intrinsic field (black) and actual force fields. Attraction field (blue) present as shown when a continuous medium is presented in between two objects.*

The intrinsic fields between two objects in free space create a force field that tends to exist through matter rather than through free space.

Description of Supplementary Figure 6

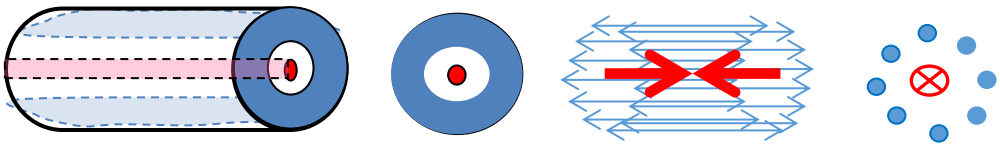
P3

Attraction and repulsive force fields cannot coexist. They maintain the maximum feasible distance from each other within the available medium. Two potential geometries can exist: the fields may be positioned with maximum linear separation within a medium, as illustrated in Sup. Fig. 6(a), or they may be aligned with maximum coaxial separation within a medium, as depicted in Sup. Fig. 6(b). Attractive force field is shown in blue and repulsive field is shown in red.



(a)

a. Linear existence/distribution of gravitational force fields. This distribution of force fields could exist between in relatively stationary objects.



(b)

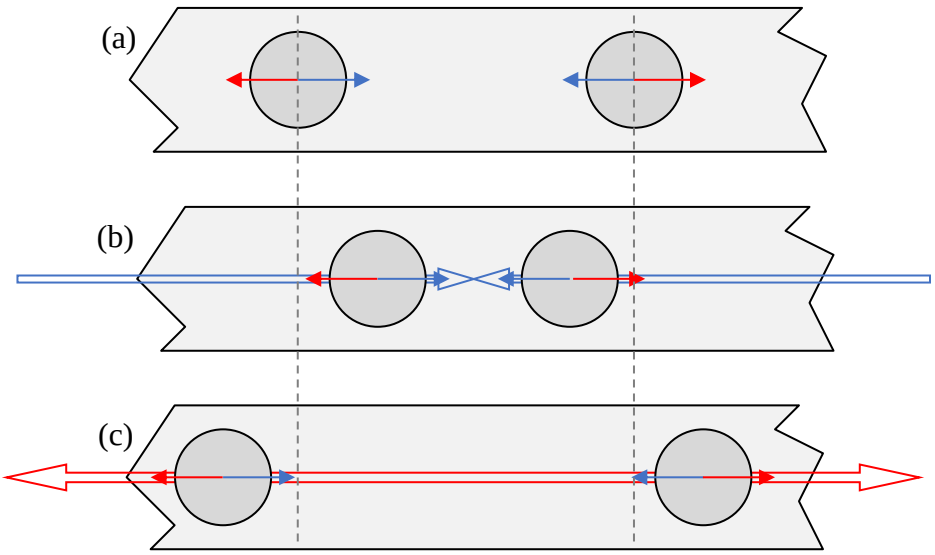
b. Coaxial existence/distribution of gravitational force fields. This distribution of force fields could exist in a rotational object

Sup. Fig. 6. *Possible configurations of force fields, attraction and repulsion forces, distribution within matter (a) linear force field distribution (b) circular (coaxial) force field distribution.*

Description of Supplementary Figure 7

P4

Behavior of distance between particles in matter when external gravitational attraction or repulsive force act on them. When external force fields flow within them, then the forces among them (thereby the distances among them) is rearranged according to these external forces. The attractive force field is shown in blue and repulsive field is shown in red.

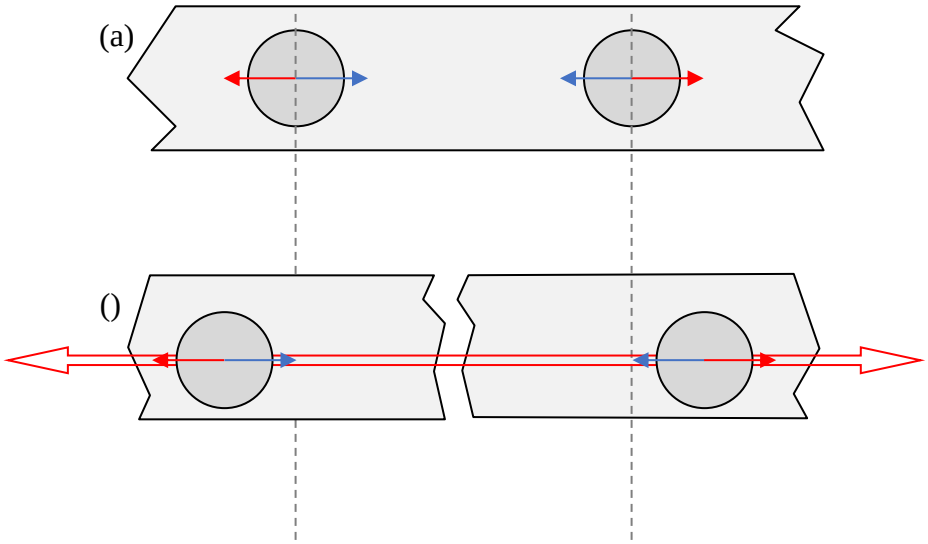


Sup. Fig. 7. *Behavior of Variation of distance between particles in matter when external gravitational attraction or repulsive force act on them. Attractive force field is shown in blue and repulsive field is shown in red. (a) two particles in a rod under their own gravitational attraction and repulsion forces (b) contracted distances of two particles under external gravitational attractive force (c) extended distances of two particles under external gravitational repulsion force.*

Description of Supplementary Figure 8

P5

Each particle can bear/allow/tolerate only finite amount of external fields passing through it, depending on the property of matter/material of the particle such as mass, temperature. Attractive force field is shown in blue and repulsive field is shown in red.

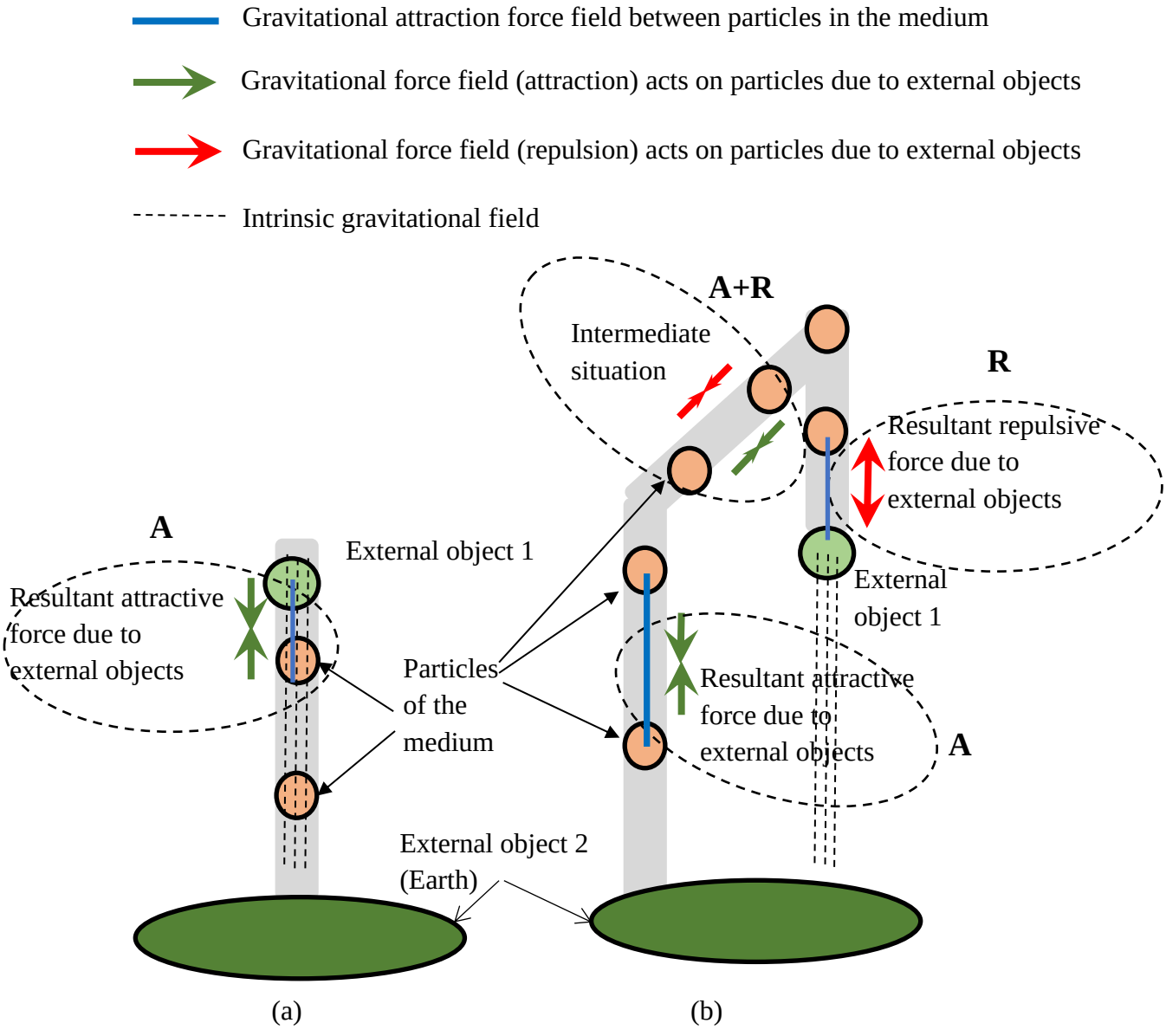


Sup. Fig. 8. *Behavior of two particles in matter when extremely large external gravitational repulsive force acts on them. (a) two particles in a rod under their own gravitational attraction and repulsion forces (b) splitting of two particles under extremely large external gravitational repulsion force. Each particle can bear/allow/tolerate only finite amount of external fields passing through it*

Description of Supplementary Figure 9

P6

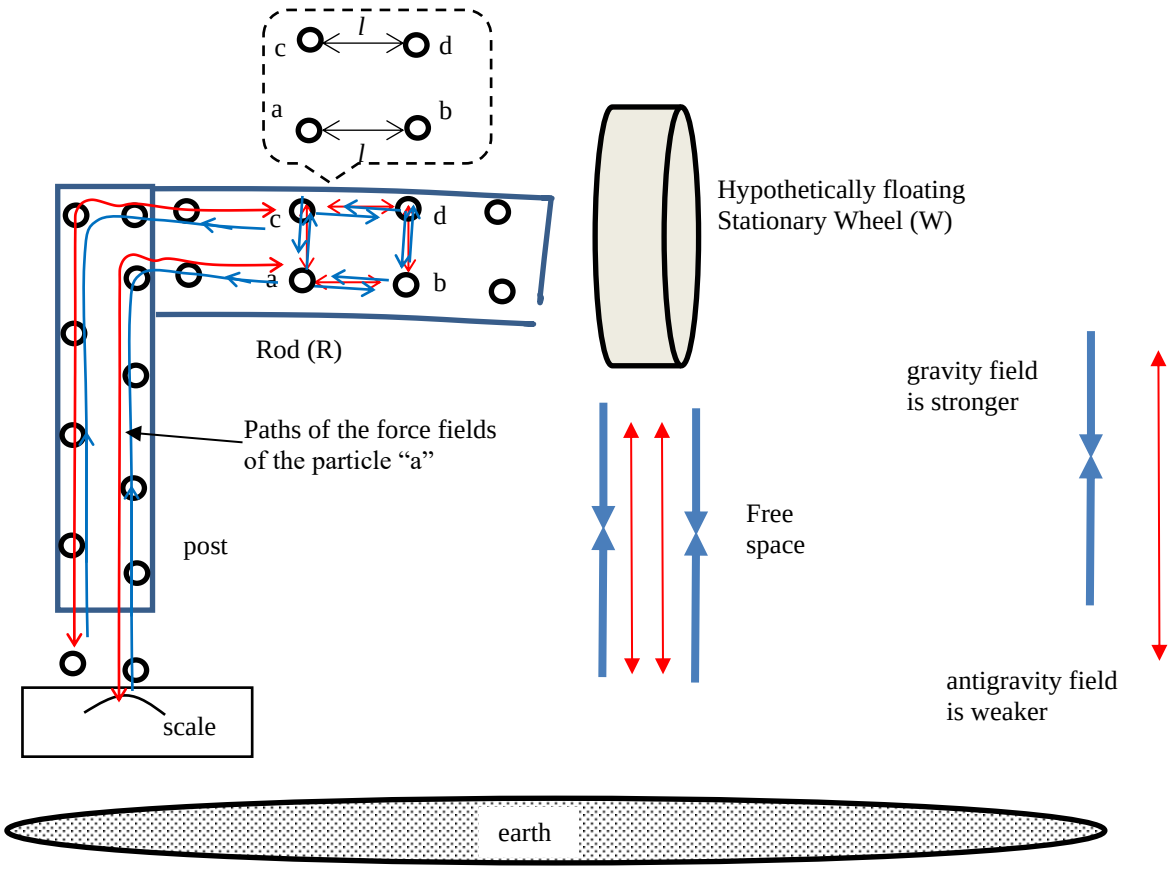
Attraction or repulsion force induced in a particle in continuum medium are **relative to** directions of intrinsic field and natural force field caused by the external object.



Sup. Fig. 9. *Attraction and repulsion forces induced in the particles of the continuum medium are relative to intrinsic field (a) direction of the force field due to external object is similar, to the directions of intrinsic field of external object (b) direction of force field due to external object is opposite to the directions of intrinsic field of external object*

Action of the gyroscope explained

Description of Supplementary Figure 10

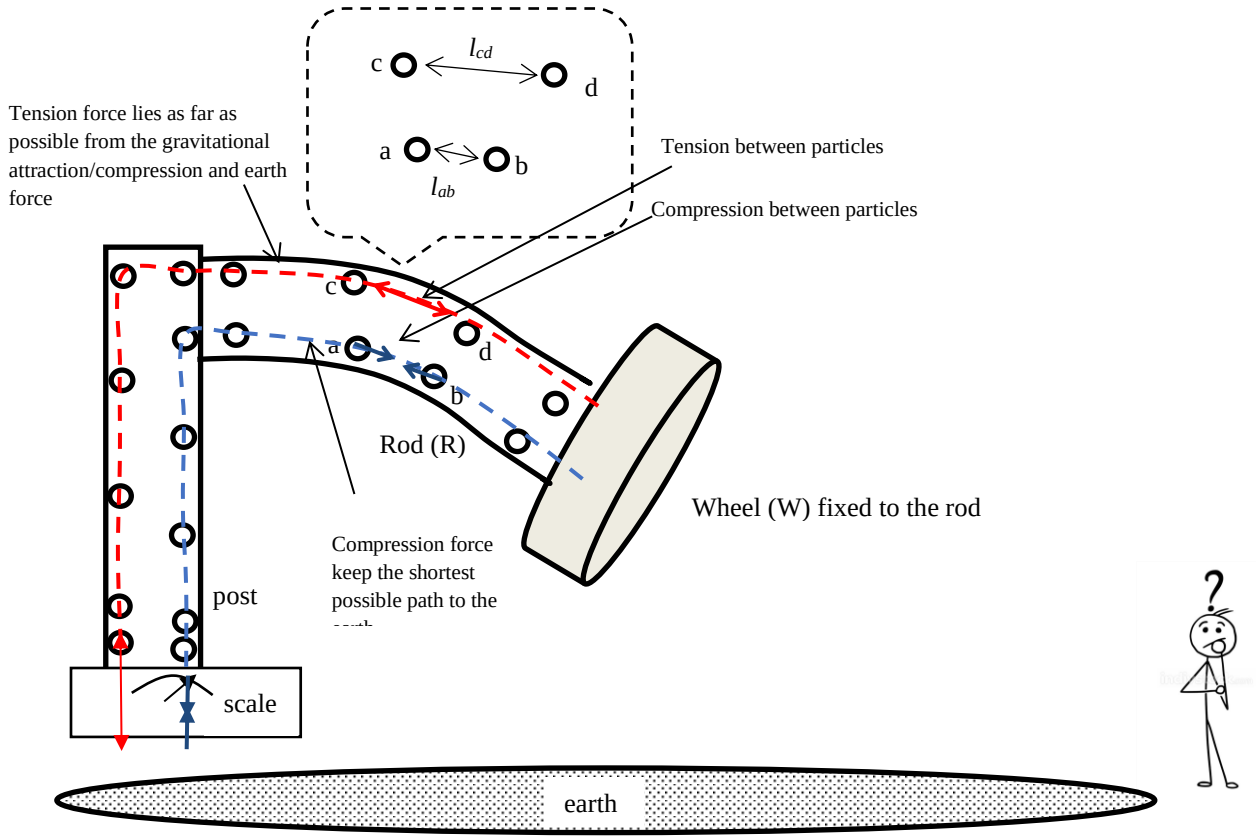


Sup. Fig. 10. ***Ideal condition (hypothetical)****: Floating object/wheel is at rest in free space and the post has been placed aside for clarity. For the convenience of understanding the proposed model, the wheel is considered as a single particle. Gravitational attraction and repulsion exist among each and every element of this apparatus as mentioned in* ***(P1)****. The gravitational force on stationary wheel is larger than the gravitational repulsion force. Let's assume that the post consists of discrete particles in 2-D array and for the discussion, only particles a, b, c and d are*

considered. Each of these particles gravitationally is interact, both attractively and repulsively, with earth, with intrinsic and force fields. The intrinsic fields exist within each object as described in P1(not shown), and the force field exists through the medium (of the post) as shown.

The particles in the post have attraction and repulsion forces among them, as well as with the earth (which flows through particles in the post) ***(P3)****.*

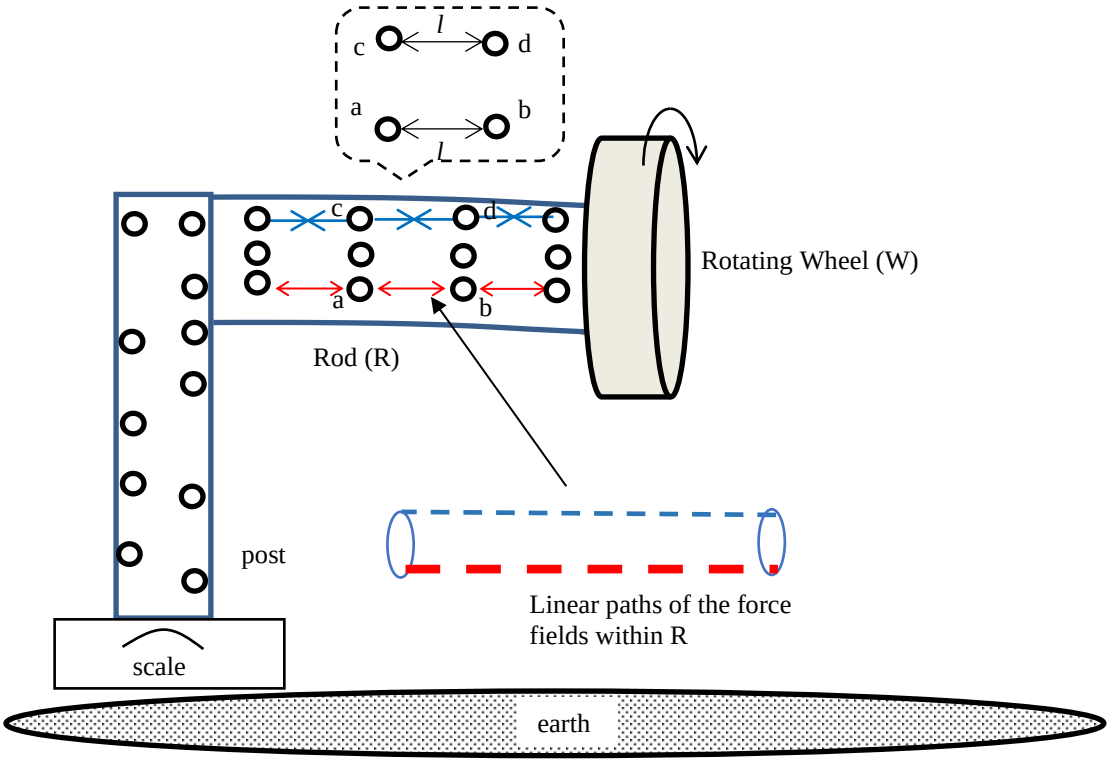
Description of Supplementary Figure 11



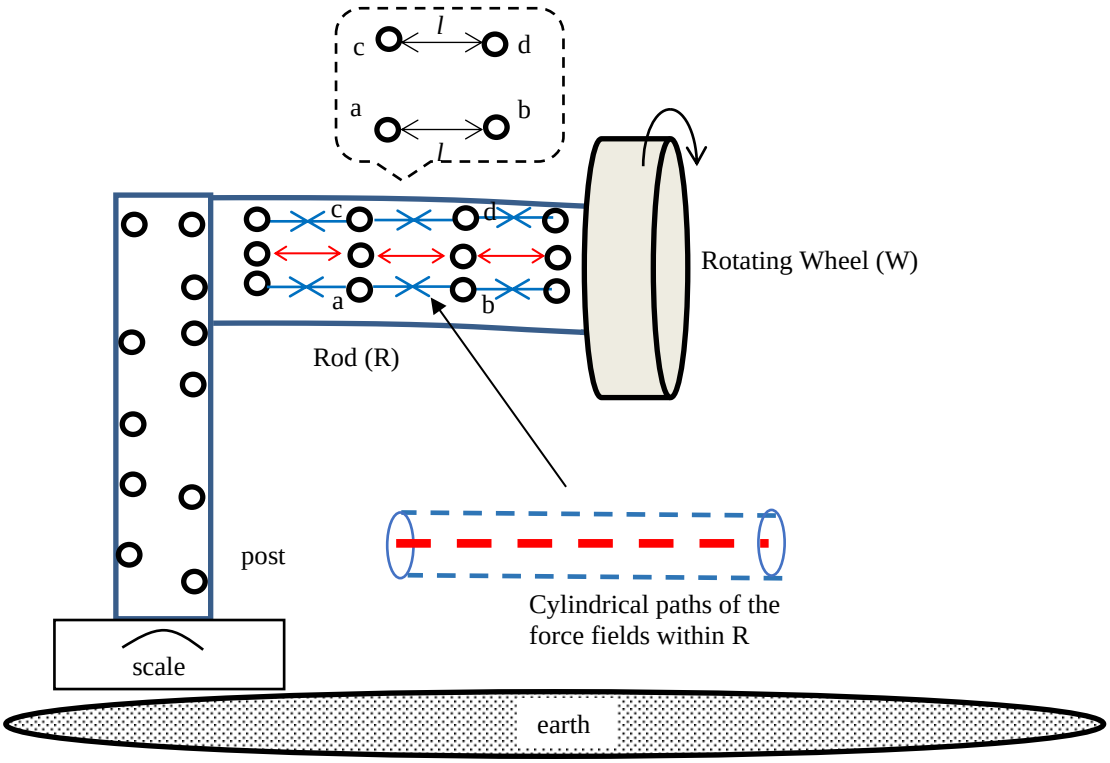
Sup. Fig. 11. *shows the gravitational forces act on objects, the post and the wheel. Post is rigidly fixed to the earth via scale and the wheel is rigidly fix to the end of the arm. The intrinsic fields exist among each object/particle as described in P1(not shown), and the force fields of the wheel exist through the continuous medium (of the post in this case) as shown by the dotted lines, blue and red representing attraction force and repulsion force respectively. These two forces exist along the rod with a maximum separation as described in P3 (see Sup. Fig. 6(a)). The*

excess/additional forces go through the particles a, b, c and d. The path of the external attraction field exists inside the medium ***as short as possible*** *(as it is attractive/attract each other) making the shrinking the distance between molecules (a and b) in that path as shown in the blue arrows. Similarly, the external repulsion force takes the longest path (making the expanded distance between molecules (c and d) as shown in the red arrows. The forces between (a and d), and (b and c) are not altered/affected.*

Description of Supplementary Figure 12



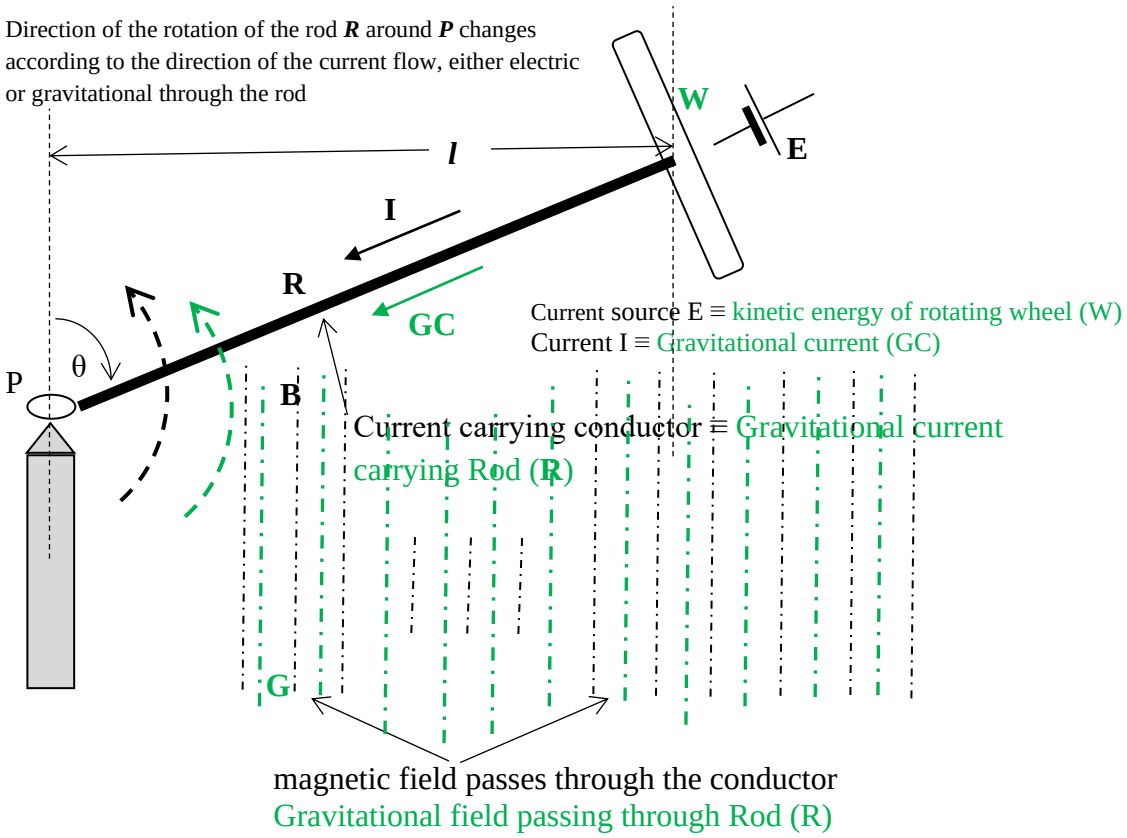
(a)



(b)

Sup. Fig. 12. According to the observations, the gravitational force distribution may take cylindrical configuration as shown in Sup. Fig. 6(b), even though strain gauge shows reversed tension/compression value

Description of Supplementary Figure 13



Sup. Fig. 13. Analogy between working principle of electric and gravitational motors. Description for gravitational field is given in **green** text. When a current carrying conductor is placed in a magnetic field ***B***, a force is created perpendicular to both the magnetic field and the direction of the flow of current ***I***. This force moves/rotate the conductor around ***P*** as shown in the picture. Similarly, when gravitational current ***GC*** flows in the rod ***R*** in a gravitational field ***G,*** a force created perpendicular to both gravitational field and the direction of flow of gravitational current. This force moves/rotates ***R*** similar to the motion of current carrying conductor in a magnetic field.