A. Einstein:

(Vierteljahrsschrift für gerichtliche Medizin und
öffentliches Sanitätswesen 44 (1912): 37-40.)

Gibt es eine Gravitationswirkung, die der elektrodynamischen Induktionswirkung analog ist?

https://einsteinpapers.press.princeton.edu/vol4-doc/196

HR: *he essentially derives **frame dragging**, which I do certainly not see as an analogy of gravitation and electromagnetism, see* http://henk-reints.nl/astro/HR-frame-dragging.pdf *.*

See also: https://en.wikipedia.org/wiki/Gravitoelectromagnetism

APOD 2011-05-10: "Gravity Probe B Confirms the Existence of Gravitomagnetism"
https://apod.nasa.gov/apod/ap110510.html

I will call it "gravitism".

https://www.rs20.net/w/2012/08/how-do-magnets-work-magnetism-electrostatics-relativity/
gives a comprehensible derivation of Ampère's law (basic magnetism) via Special Relativity.

Sir Isaac Newton:

PHILOSOPHIÆ NATURALIS PRINCIPIA MATHEMATICA.

LIBER TERTIUS: DE MUNDI SYSTEMATE.

REGULÆ PHILOSOPHANDI.

REGULA II.

Ideoque effectuum naturalium ejuſdem generis eædem aſſignandæ ſunt cauſæ, quatenus fieri poteſt.

Therefore natural effects of the same kind must be assigned the same causes, as far as possible.

HR:

similar things should be treated as similarly as achievable.

If magnetism is due to Lorentz contraction of a chain of electr. charged particles, then why wouldn't the very same apply to gravitation and a mass current?

Noticable difference: as far as we know, negative mass does not exist.

But let's give it a try:

Coulomb's law is ***essentially identical*** to **Newton**'s law of gravitation:	
$\boldsymbol{F_e = k_C \frac{q_1 q_2}{r^2}}$	$\boldsymbol{F_g = G \frac{m_1 m_2}{r^2}}$
Maxwell (using k_C & c^2 instead of ε_0 & μ_0):	Reints (using G & c^2):
$k_C = \frac{1}{4\pi\varepsilon_0} \therefore \frac{1}{\varepsilon_0} = 4\pi k_C$ $c^2 = \frac{1}{\varepsilon_0\mu_0} \therefore \mu_0 = \frac{4\pi k_C}{c^2}$	$\vec{A}$:= gravitational field (<u>**a**</u>cceleration) $\vec{Z}$:= "***gravitism***" (equivalent of $\vec{B}$)
$\nabla \cdot \vec{E} = \frac{\rho_q}{\varepsilon_0} = 4\pi k_C \rho_q$	$\nabla \cdot \vec{A} = 4\pi G \rho_m \geq 0$
$\nabla \cdot \vec{B} = 0$	$\nabla \cdot \vec{Z} = 0$
$\nabla \times \vec{E} = \frac{\partial \vec{B}}{\partial t}$	$\nabla \times \vec{A} = \frac{\partial \vec{Z}}{\partial t}$
$\nabla \times \vec{B} = \mu_0 \left(\varepsilon_0 \frac{\partial \vec{E}}{\partial t} + \vec{J}\right) = \frac{1}{c^2}\left(\frac{\partial \vec{E}}{\partial t} + 4\pi k_C \vec{J}_e\right)$	$\nabla \times \vec{Z} = \frac{1}{c^2}\left(\frac{\partial \vec{A}}{\partial t} + 4\pi G \vec{J}_m\right)$

Might "*gravitism*" have some physical meaning?

Perfectly analogous equations ***would*** *yield gravitational waves, just like EM, wouldn't they?*

dimensions / SI-units:	
$[B] = \frac{\mathrm{N}}{\mathrm{A{\cdot}m}} = \frac{\mathrm{kg}}{\mathrm{A{\cdot}s^2}} = \frac{\mathbf{kg}}{\mathbf{C}} \cdot \frac{1}{\mathrm{s}}$	$[Z] = \frac{1}{\mathrm{s}}$
Electron (lightest charged elementary particle): $W_e \coloneqq m_e/\mathrm{e} = 5.685\,630\,1036 \times 10^{-12}$ **kg/C** $V_e = W_e c^2 = 510\,998.950\,00\ \mathrm{J/C} \approx 511\ \mathrm{kV}$ (not keV!)	*same dimension as Hubble constant*

magnetic force:	"*gravitismic*" force:
$F_B = q\left(\vec{v} \times \vec{B}\right)$	$F_Z = m\left(\vec{v} \times \vec{Z}\right) = \vec{p} \times \vec{Z}$

Ampère's law in vacuum: (B around thin straight wire, I_e = electric current, SI: C/s)	"*gravitismic*" equivalent: (e.g. Z around a jet stream, I_m = mass current, SI: kg/s)
$B(r) = \frac{\mu_0 I_e}{2\pi r} = \frac{2k_C}{rc^2} I_e$	$Z(r) = \frac{2G}{rc^2} I_m$

Do you recognise (something like) the Schwarzschild radius?

Note: J (further above) = current density in {C|kg}/s/m^2, I = current in {C|kg}/s

What if:

we equate: $r = D_{\mathrm{H}}$

and: $Z(r) = H = \dfrac{1}{t_{\mathrm{H}}}$ **?**

Well, it yields: $\dfrac{1}{t_{\mathrm{H}}} = \dfrac{2G}{D_{\mathrm{H}} c^2} I_m \qquad \therefore I_m = \dfrac{D_{\mathrm{H}}}{t_{\mathrm{H}}} \cdot \dfrac{c^2}{2G} = c\,\dfrac{c^2}{2G}$

∴(?) current universal mass current:

$$I_m = \frac{c^3}{2G} \approx 2.01849 \times 10^{35}\ \text{kg/s}$$

Found in http://henk-reints.nl/astro/HR-Geometry-of-universe-slideshow.pdf :

$$G = \frac{c^2 D_{\mathrm{H}}}{2 M_{\mathrm{U}}}$$

yielding: $\boldsymbol{I_m} = \dfrac{c^3}{2} \cdot \dfrac{2M_{\mathrm{U}}}{c^2 D_{\mathrm{H}}} = \dfrac{M_{\mathrm{U}} c}{D_{\mathrm{H}}} = \dfrac{\boldsymbol{M_{\mathrm{U}}}}{\boldsymbol{t_{\mathrm{H}}}}$

which equals the *mean Hubble flow* since the BB

(*all* mass left right *here* that long ago),

but I draw no fundamental conclusions from "what if" calculations.

Nefcio & hypothefes non fingo.

Poynting vector:	Gravitational equivalent:
$\vec{S} = \vec{E} \times \vec{H}$ $\vec{B} = \mu_0 \mu_r \vec{H} = \frac{4\pi k_C}{c^2} \vec{H} \quad (\mu_r = 1)$ $\therefore \vec{H} = \frac{c^2}{4\pi k_C} \vec{B}$	
$\boldsymbol{\vec{S} = \frac{\vec{E} \times \vec{B}}{4\pi k_C} c^2}$	$\boldsymbol{\vec{Y} = \frac{\vec{A} \times \vec{Z}}{4\pi G} c^2}$
$\vec{S}$ is the local energy flux $\lvert\vec{S}\rvert = \dot{E}/A$ (energy flow per area) $\frac{\vec{E} \times \vec{B}}{4\pi k_C}$ = eqv. mass flux, cf. $E = mc^2$	$\kappa = \frac{8\pi G}{c^4} = \frac{2}{c^2} \cdot \frac{4\pi G}{c^2}$ $c^2/2 = V_{r_S}$ = abs. grav. pot. @r_S around *any* BH[1] $\therefore \frac{4\pi G}{c^2} = \kappa \frac{c^2}{2} = \kappa V_{r_S}$
$\frac{\left[\frac{\mathrm{N}}{\mathrm{C}}\right] \times \left[\frac{\mathrm{kg}}{\mathrm{C \cdot s}}\right]}{\left[\frac{\mathrm{N \cdot m^2}}{\mathrm{C^2}}\right]} = \left[\frac{\mathrm{kg}}{\mathrm{s \cdot m^2}}\right]$	$\boldsymbol{\vec{Y} = \frac{1}{\kappa V_{r_S}} \vec{A} \times \vec{Z}}$

[1] BH = any mass that fits within its own Schwarzschild volume

Impedance of free space:	"*Gravitismic* impedance":
$Z_{0,e} = \sqrt{\mu_0/\varepsilon_0} = \sqrt{\frac{4\pi k_C}{c^2} \cdot 4\pi k_C}$	
$\boldsymbol{Z_{0,e} = 4\pi k_C/c}$ $\approx 376.730\,313\,668\ \Omega$ $[\Omega] = \left[\frac{\text{kg}\cdot\text{m}^2}{\text{A}^2\cdot\text{s}^3}\right] = \left[\frac{\text{kg}\cdot\text{m}^2}{\text{C}^2\cdot\text{s}}\right] = \left[\frac{\textbf{kg}}{\textbf{C}} \cdot \frac{\textbf{m}^2}{\textbf{C}\cdot\textbf{s}}\right]$	$\boldsymbol{Z_{0,g} = 4\pi G/c}$ $\approx 2.79766 \times 10^{-18}\ \frac{\textbf{m}^2}{\textbf{kg}\cdot\textbf{s}}$
$\boldsymbol{\vec{H} = \frac{\vec{B}}{\mu_0} = \frac{c^2\vec{B}}{4\pi k_C}}$	$\boldsymbol{\vec{X} = \frac{c^2\vec{Z}}{4\pi G}}$
$Z_{0,e} = \frac{\lvert\vec{E}\rvert}{\lvert\vec{H}\rvert}$	$Z_{0,g} = \frac{\lvert\vec{A}\rvert}{\lvert\vec{X}\rvert}$
$\boldsymbol{\lvert\vec{E}\rvert = \frac{4\pi k_C}{c}\lvert\vec{H}\rvert}$	$\boldsymbol{\lvert\vec{A}\rvert = \frac{4\pi G}{c}\lvert\vec{X}\rvert}$

Universal mass/charge ratio:

$$k_{\mathrm{C}}/G \approx \frac{8.987\,551\,7923 \times 10^{9}\ \mathrm{N{\cdot}m^2/C^2}}{6.674\,30 \times 10^{-11}\ \mathrm{N{\cdot}m^2/kg^2}} \approx 1.346\,59 \times 10^{20}\ \ \mathrm{kg^2/C^2}$$

$$\boldsymbol{W_{\mathrm{U}} := \sqrt{k_{\mathrm{C}}/G} \approx 1.160\,43 \times 10^{10}\ \ \mathrm{kg/C} \approx 1.859\,21\ \ \mathrm{\mu g/e}}$$

$$\approx 0.068\,1589\ m_{\mathrm{SC}}/\mathrm{e}$$ [2] $$\triangleq 167.097\ \ \mathrm{MJ/e}$$

Fundamental constant of nature, relating mass/energy & electric charge.

$\mathbf{1/W_{\mathrm{U}}}$	$\approx 8.617\,52$	$\times 10^{-11}$	$\mathrm{C/kg}$	$\approx \mathbf{14.6716}$		$\mathbf{e}/\boldsymbol{m_{\mathrm{SC}}}$
	$\approx 9.588\,28$	$\times 10^{-28}$	$\mathrm{C/J}$	$\approx 5.984\,53$	$\times 10^{-9}$	$\mathrm{e/J}$
	≈ 7.560	$\times 10^{42}$	$\mathrm{C}/M_{\mathrm{U}}$	≈ 4.718	$\times 10^{61}$	$\mathrm{e}/M_{\mathrm{U}}$
	≈ 1.462	$\times 10^{-78}$	$\mathrm{C}/\Delta m_{\mathrm{u}}$	≈ 9.124	$\times 10^{-60}$	$\mathrm{e}/\Delta m_{\mathrm{u}}$
				≈ 8.200	$\times 10^{-43}$	$\mathrm{e}/\Delta E_{\mathrm{u}}$ [3]

Intrinsic cosmic electric potential: $V_{e,\mathrm{U}} = W_{\mathrm{U}} c^2 \approx 1.042\,94 \times 10^{27}$ volts.

I have no idea what these values would actually mean.

I refuse to believe the cosmos would be electrically charged or so.

$$W_p = m_p/\mathrm{e} \approx 1.043\,97 \times 10^{-8}\ \ \mathrm{kg/C} \quad \triangleq 1.503\,28 \times 10^{-10}\ \mathrm{J/e}$$

$$W_e = m_e/\mathrm{e} \approx 5.685\,63 \times 10^{-12}\ \mathrm{kg/C} \quad \triangleq 8.187\,11 \times 10^{-14}\ \mathrm{J/e}$$

---

[2] $m_{\mathrm{SC}} =$ mass for which $2r_{\mathrm{S}} = \lambda_{\mathrm{C}}$ ("Compton dipole" inside Schwarzschild sphere) $\approx 27.277\,51\ \mathrm{\mu g}$

[3] See http://henk-reints.nl/astro/HR-Geometry-of-universe-slideshow.pdf

Because I see no reason why $\mathbf{e}$ or $\boldsymbol{m}_{\mathbf{SC}}$
would be (Hubble) time dependent,
I consider both to be very fundamental units.

Therefore I consider: $\mathbf{1}/\boldsymbol{W}_{\mathbf{U}} \approx \mathbf{14.6716\ e}/\boldsymbol{m}_{\mathbf{SC}}$
just as fundamental a quantity as well
(accuracy restricted to min. of k_C and G, which is 6 digits)

Just some trial caculations:

$$\mathbf{14.6716} \cdot \boldsymbol{\alpha} \approx \mathbf{0.107\,064}$$

$$\mathbf{14.6716}/\boldsymbol{\alpha} \approx \mathbf{2010.54}$$

Both seem nothing special to me.

Radiation by electric dipole:

https://phys.libretexts.org/Bookshelves/Electricity_and_Magnetism/Essential_Graduate_Physics_-_Classical_Electrodynamics_(Likharev)/08%3A_Radiation_Scattering_Interference_and_Diffraction/8.02%3A_Electric_Dipole_Radiation :

$$\text{Far-field wave} \qquad \mathbf{B}(\mathbf{r},t) = \frac{\mu}{4\pi r}\nabla\times\dot{\mathbf{p}}\left(t-\frac{r}{\nu}\right) = -\frac{\mu}{4\pi r\nu}\mathbf{n}\times\ddot{\mathbf{p}}\left(t-\frac{r}{\nu}\right). \qquad (8.24)$$

This expression means that the magnetic field, at the observation point, is perpendicular to the vectors **n** and (the retarded value of) $\ddot{\mathbf{p}}$, and its magnitude is

$$B = \frac{\mu}{4\pi r\nu}\ddot{p}\left(t-\frac{r}{\nu}\right)\sin\Theta, \quad \text{i.e. } H = \frac{1}{4\pi r\nu}\ddot{p}\left(t-\frac{r}{\nu}\right)\sin\Theta, \qquad (8.25)$$

where Θ is the angle between those two vectors – see Fig. 2.[7]

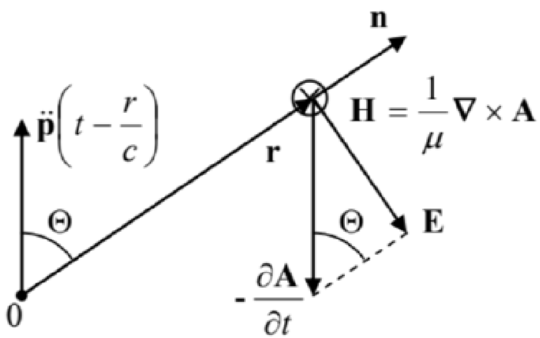


Fig. 8.2. Far-fields of a localized source, contributing to its electric dipole radiation.

The most important feature of this result is that the time-dependent field decreases very slowly (only as $1/r$) with the distance from the source, so that the radial component of the corresponding Poynting vector (7.9b),[8]

$$S_r = ZH^2 = \frac{Z}{(4\pi\nu r)^2}\left[\ddot{p}\left(t-\frac{r}{\nu}\right)\right]^2\sin^2\Theta, \qquad \text{Instant power density} \qquad (8.26)$$

Assuming: dipole moment $= p = qd \sin \omega t \therefore \ddot{p} = -qd\omega^2 \sin \omega t$

we find: $H_{\theta=90°} = \frac{\ddot{p}(t-r/c)}{4\pi rc} = \frac{-qd\omega^2}{4\pi rc} \sin \omega(t-r/c)$

and: amplitude of $(\vec{E} \triangleq Z_{0,e}\vec{H})$: $\frac{k_C qd\omega^2}{rc^2}$

as well as: $S_r = Z_{0,e}H^2 = \frac{4\pi k_C}{c}\left(\frac{-qd\omega^2}{4\pi rc} \sin \omega(t-r/c)\right)^2$

$$= \frac{k_C q^2 d^2 \omega^4}{4\pi r^2 c^3} \sin^2 \omega(t-r/c)$$

Mean radial energy flux in equatorial plane of dipole: $\overline{S_r} = \frac{k_C q^2 d^2 \omega^4}{8\pi r^2 c^3}$

Gravitismic equivalent:

Amplitude of $\vec{A}$: $\frac{Gmd\omega^2}{rc^2}$

Mean equatorial radial energy flux: $\overline{Y_r} = \frac{Gm^2 d^2 \omega^4}{8\pi r^2 c^3}$

https://andrealommen.github.io/PHY309/lectures/dipole :

Total radiated power, integrated over entire sphere around dipole antenna:

$$P = \frac{\boldsymbol{\mu_0} p_0^2 \omega^4}{12\pi^2 c} = \frac{\boldsymbol{4\pi k_C} \cdot p_0^2 \omega^4}{\boldsymbol{c^2} \cdot 12\pi^2 c} = \frac{k_C q^2 d^2 \omega^4}{3\pi c^3}$$

Gravitismic equivalent: $$P = \frac{G m^2 d^2 \omega^4}{3\pi c^3}$$

And now, something completely different:

https://astronomy.swin.edu.au/cosmos/g/gravitational+waves :

The power emitted by a binary system of masses m_1 and m_2 in a circular orbit at a distance d from each other in gravitational waves is:

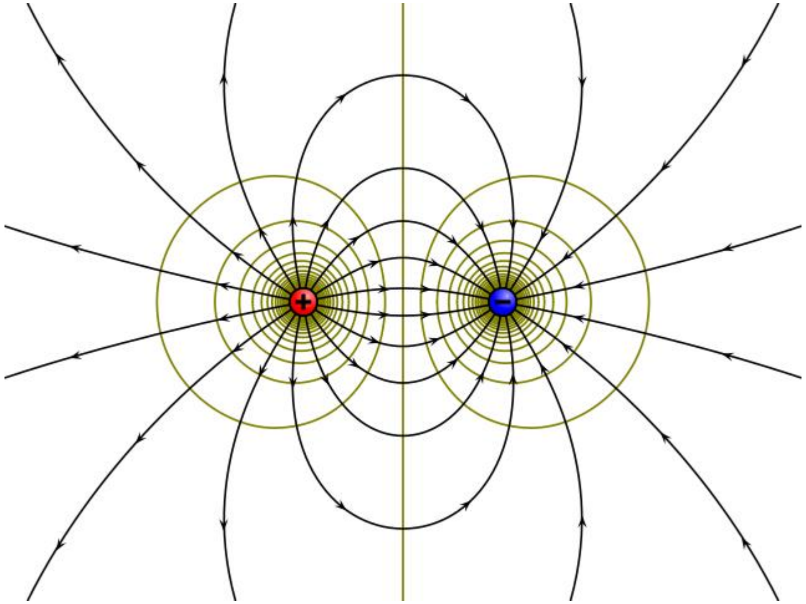
$$P = \frac{32G^4}{5c^5d^5}(m_1m_2)^2(m_1+m_2)$$

$$m_1 = m_2 = m \Rightarrow \boldsymbol{P} = \frac{32G^4}{5c^5d^5} \cdot 2m^5 = \boldsymbol{\frac{64G^4}{5}\left(\frac{m}{cd}\right)^5}$$ 🤔

Ergo: the e-dipole equivalent is a miserable failure.

Note: energy manifests as mass, not as charge, & charge can be $\pm$.

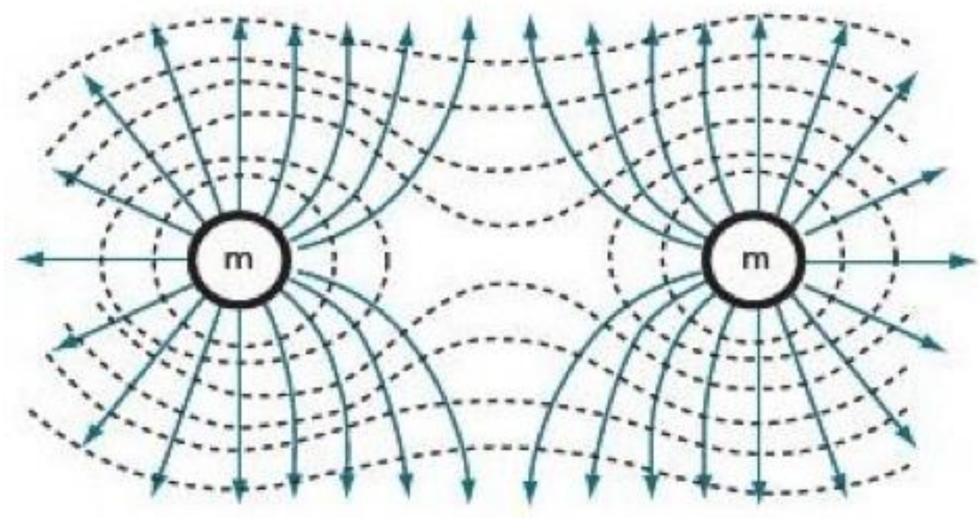
Electric dipole field
& equipotentials:



https://commons.wikimedia.org/wiki/File:Electric-dipole-field-lines-and-equipotential-lines.svg

Same sign: repulsive.

Gravitational dipole field
& equipotentials:



https://sites.google.com/site/ibdpphysics101/course-units/10-fields/10-1-describing-fields

Same sign: attractive.

Magnetic dipole:

circular electric current I_e around surface $A = \pi r_e^2$

magnetic moment: $\mathfrak{m} = I_e A = \pi I_e r_e^2$

magnetic flux for $r_e \to 0$ preserving $\mathfrak{m}$:

$$\vec{B}(r) = \frac{\mu_0}{4\pi}\left[\frac{3\vec{r}(\vec{\mathfrak{m}}\cdot\vec{r})}{r^5} - \frac{\vec{\mathfrak{m}}}{r^3}\right] = \frac{k_C}{c^2}\frac{3\hat{r}(\vec{\mathfrak{m}}\cdot\hat{r}) - \vec{\mathfrak{m}}}{r^3}$$

in the (equatorial) plane of: I_e , with $r \gg r_e$:

$\vec{\mathfrak{m}} \perp \hat{r} \Rightarrow \vec{\mathfrak{m}} \cdot \hat{r} = 0,\ B = \left|\vec{B}\right| = \frac{-k_C \mathfrak{m}}{c^2 r^3}$ (sign indicates direction opposite to $\vec{\mathfrak{m}}$)

Gravitismic equivalent:

two equal masses m , orbiting each other at r_{orb}:

$$\text{Kepler III: } T_{\text{orb}} = \sqrt{\frac{4\pi^2 r_{\text{orb}}^3}{G m_{\text{tot}}}} = \sqrt{\frac{2\pi^2 r_{\text{orb}}^3}{Gm}} \therefore I_m = \frac{2m}{T_{\text{orb}}} = \frac{m}{\pi}\sqrt{\frac{2Gm}{r_{\text{orb}}^3}}$$

gravitismic moment: $\mathfrak{g} = \pi I_m r_{\text{orb}}^2 = \pi \frac{m}{\pi}\sqrt{\frac{2Gm}{r_{\text{orb}}^3}}\, r_{\text{orb}}^2 = \sqrt{2G r_{\text{orb}} m^3}$

equatorial gravitismic flux: $Z(r \gg r_{\text{orb}}) = \frac{-G\mathfrak{g}}{c^2 r^3} = \frac{-\sqrt{2 r_{\text{orb}} (Gm)^3}}{c^2 r^3}$

$$Gm = \frac{r_S c^2}{2} \therefore \boldsymbol{Z(r)} = \frac{-\sqrt{2 r_{\text{orb}} r_S^3 c^6 / 8c^4}}{r^3} = \frac{-\sqrt{r_{\text{orb}} r_S^3 c^2 / 4}}{r^3} = \frac{-\boldsymbol{c}}{\boldsymbol{2}} \cdot \frac{\sqrt{\boldsymbol{r_{\text{orb}} r_S^3}}}{\boldsymbol{r^3}}$$

Recapitulation:

Electromagnetism:		Gravitism:
$k_C\ ,\ \vec{E}\ ,\ \vec{B}\ ,\ \vec{H}\ ,\ \vec{S}$	$\triangleq$	$G\ ,\ \vec{A}\ ,\ \vec{Z}\ ,\ \vec{X}\ ,\ \vec{Y}$
$\varepsilon_0 = \frac{1}{4\pi k_C}, \quad \mu_0 = \frac{4\pi k_C}{c^2}$		
$\vec{H} = \frac{\vec{B}}{\mu_0} = \frac{c^2 \vec{B}}{4\pi k_C}$		$\vec{X} = \frac{c^2 \vec{Z}}{4\pi G}$
$Z_{0,e} = \sqrt{\frac{\mu_0}{\varepsilon_0}} = \mu_0 c = \frac{4\pi k_C}{c}$		$Z_{0,g} = \frac{4\pi G}{c}$
$\lvert\vec{E}\rvert = \frac{4\pi k_C}{c}\lvert\vec{H}\rvert$		$\lvert\vec{A}\rvert = \frac{4\pi G}{c}\lvert\vec{X}\rvert$
$\vec{S} = \vec{E} \times \vec{H} = \frac{c^2}{4\pi k_C}\left(\vec{E} \times \vec{B}\right)$ $S_r = Z_{0,e} H^2 = \frac{4\pi k_C}{c}\left(\frac{c^2 B}{4\pi k_C}\right)^2 = \frac{c^3 B^2}{4\pi k_C}$		$\vec{Y} = \vec{A} \times \vec{X} = \frac{c^2}{4\pi G}\left(\vec{A} \times \vec{Z}\right)$ $Y_r = Z_{0,g} X^2 = \frac{4\pi G}{c}\left(\frac{c^2 Z}{4\pi G}\right)^2 = \frac{c^3 Z^2}{4\pi G}$
$F_B = q\left(\vec{v} \times \vec{B}\right)$		$F_Z = m\left(\vec{v} \times \vec{Z}\right) = \vec{p} \times \vec{Z}$
$B(r) = \frac{\mu_0 I_e}{2\pi r} = \frac{2k_C}{rc^2} I_e$		$Z(r) = \frac{2G}{rc^2} I_m$

Now I unfoundedly presume the non-oscillating dipole yields an EM-like grav. wave...

Suppose: $r_{\text{orb}} = r_{\text{ISCO}} = 3r_{\text{S}}$ then: $Z(r) = \frac{-c}{2} \cdot \frac{\sqrt{3r_{\text{S}} r_{\text{S}}^3}}{r^3} = \frac{-c r_{\text{S}}^2 \sqrt{3}}{2r^3}$

($Z(r)$ was derived using Newtonian gravitation, so this is an itsy bitsy tricky...)

suppose as well: 2 instances of Sgr A* orbiting each other in the galactic plane,

each has: $M \approx 8.26 \times 10^{36}$ kg

Sgr A* distance: $r \approx 26670$ ly $\approx 2.523 \times 10^{20}$ m

gravitismic flux: $Z \approx -2.433 \times 10^{-33}\ \text{s}^{-1}$

cf. Hubble constant: $H \approx 2.3 \times 10^{-18}\ \text{s}^{-1} \approx 71$ km/s/Mpc

gravitational field of wave: $|\vec{A}| = \frac{4\pi G}{c} |\vec{Z}| \approx -6.8 \times 10^{-51}\ \text{m}^2\text{kg}^{-1}\text{s}^{-2}$

momentum of sun in its galactic orbit (i.e. around those 2 Sgr A*):

$$\vec{p} \approx M_\odot \vec{v}_\odot \approx 4.375 \times 10^{35}\ \text{kg m/s}$$

gravitismic force: $\vec{F}_Z = \vec{p} \times Z \approx -1065$ N

Equatorial energy flux: $Y_r = \frac{c^3 Z^2}{4\pi G} = \frac{3c^5 r_{\text{S}}^4}{16\pi G r^6} = \frac{3c^5 \cdot 16 G^4 M^4}{16\pi G r^6 c^8} = \frac{3G^3 M^4}{\pi c^3 r^6}$ $\approx \mathbf{1.9 \times 10^{-31}\ W/m^2}$

Einstein's GR: $\boldsymbol{P}_{\textbf{tot}} = \frac{\mathbf{64G^4}}{\mathbf{5}} \left(\frac{\boldsymbol{M}}{\boldsymbol{cd}}\right)^{\mathbf{5}}$, $d = 3\frac{2GM}{c^2} \therefore \frac{M}{cd} = \frac{c}{6G}$ $\therefore \boldsymbol{P}_{\textbf{tot}} = \frac{\mathbf{2c^5}}{\mathbf{1215G}} \approx 5.97 \times 10^{49}$ W

(homogeneous) mean flux: EARTHQUAKE ALARM: $j_{\text{grav}} = \frac{P_{\text{tot}}}{4\pi r^2} \approx 75 \times 10^{+6}\ \text{W/m}^2$

🤔 ⁂ 🤔 ※ 🤔 🎼🎶🎻 🤔 ※ 🤔 ⁂ 🤔

