A Photon Theory of Light

by F.J. Gheeraert

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CHAPTER 1 Photons

§ 1-1 Masses and their Positions and Velocities in Space.

1 -- Each and Every **Mass** occupies **1 (one) and only 1 position** in space **at the same time**.
No Mass can be at **2(two**), or more, **positions** in space **at the same time.**

2 -- Each Mass **can** Only Move in Space according to **1(one) and only 1 speedvector** (V'),**at the same time,** (the same is true for an eventual "acceleration" vector). However : different " light particles", called **Photons**, can be "emitted" by a lightsource in any direction, **at the same time.**

3 -- If 2 masses (m1 and m2), are present in space at the same time; they occupy 2 different positions at the same time. The distance in space (D) between these masses , is then the **synchronous distance at the time t.**

4 -- The synchronous distance (D) between m1 and m2 determines the orientation of the " directionvectors" : m1→m2; and m2→m1. **The vectors** D, and the velocity vector V', that are present on m1 at the same time, **determine** a **flat surface (X-Y"),** that **contains m1, m2; and the vector V'**. If the **velocity vector (V") of m2** also belongs to the same (X-Y") surface, then both masses m1 and m2 keep moving in that same (X-Y")- surface. (no forces outside this surface in the undisturbed space)

5 -- In the case of two masses (or more) being **present at the same time**, **an additional concept** for **velocities** emerges : the **differential Speed (Vi)**, wich determines the "**pace**" at wich any object traveling in the direction m1→m2 (or m2→m1), comes closer to m2 (or m1).
The **time (t)**, it wil eventually take for the **mass m1, to reach the mass m2** is determined by the **synchonous distance (D)** , and the **differential speed (Vi)** between m1 and m2.
Example : If two photons would **travel towards each other,**at their maximal speed c (as stated by Einstein), their approaching speed would be : (Vi)max =2*c.

§ 1-2 Photon Characteristics

1 -- **Stability**

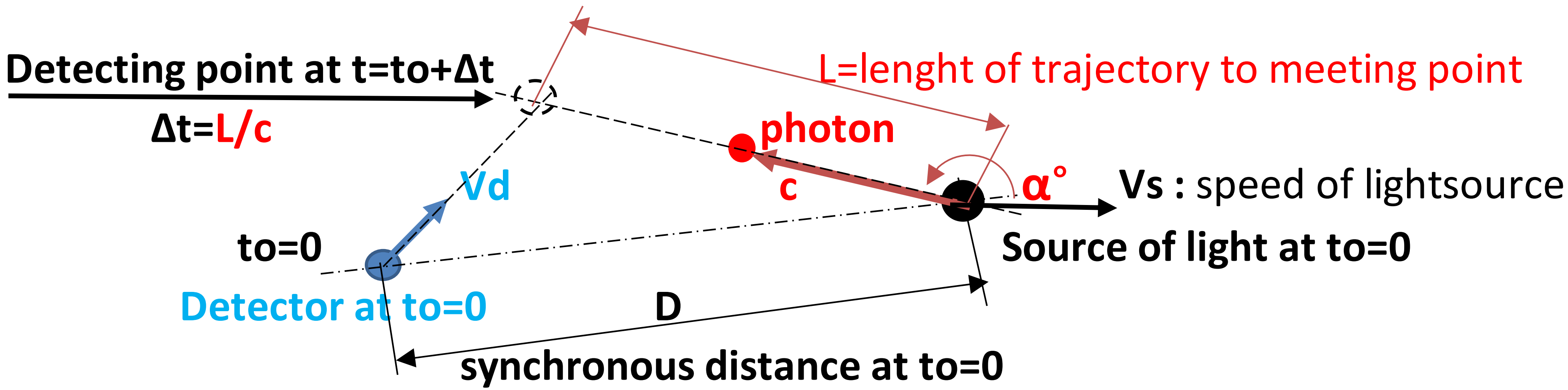
Photons are known to be able to move during billions of years, from one galaxy to another. This remarkable stability is an important quality of photons

2 -- **moving in Straight lines**

Photons move in straight lines in the **undisturbed space**. **Detecting photons** is therefor a problem of "encounter" (both : photon and observer have to be **at the same position at the same time)**. The detector and photon, move in space at velocyties of respectively **Vd** ans **Vf**, the photon was emitted by the light source, itself moving at speed **Vs**. (all velocyties in the same reference system). The vector velocyties **Vd** and **Vf** must be part of the same flat plane (X-Y"), in order to be able to ever meet. The synchonous distance (D) between detector and photon, at time to=0 is also part of the same (X-Y") surface that contains the speed vectors. see fig 1-1

Fig 1-1 **detecting a foton**

Speed vectors, and positions at to=0 in the (X-Y") flat surface



3 -- **Maximal Velocity : Co**

It was concluded from an extensive number of measurements that the speed of light was always the same. This was further confirmed by Einstein as being an absolute constant value : **Co**. According to Plancks law : E=h*f, photons have different energies depending on their frequencies , although they have all the same velocity in space according to Einstein .

4 -- **Electical Charges**

Photons follow their **straight line trajectories** when exposed to electromagnetic fields, so they should have **no net electrical charges**. This does not necessarily mean that they have no electrical charges. In the direct vicinity of a photon, there is a change of the electrical field detectable. The trajectories of photons are known to be influenced by the presence of masses, even to the extend that so called "black holes" can prevent photons from escaping from them. **This sugests that photons have mass.**

5 -- **Photons can have mass**

If photons have "mass", and consequently obey the laws of classical mechanics, then the speed of light (c), emitted from a **light source at speed Vs**, must be determined by the vector addition $\vec{c}=\vec{Vs}+\vec{Co}$. However §1-2-3, limits the value of c to Co, wich is a constant value ! **This is perfectly possible in the following situations :**

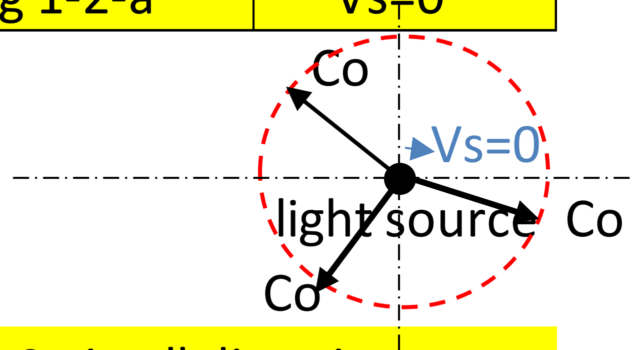
1 -- If Vs=0, then c=Co in all directions see Fig 1-2-a

2 -- If Vs≠0, then $c=Co+Vs*\cos(\alpha)$, with $c \leq Co$, and $(\pi/2) \leq \alpha \leq (3*\pi/2)$. See fig 1-2-b

Backward emission : This can also be written as : **c=Co*(1+i) ; with i=Vs*cos(α)/Co.**

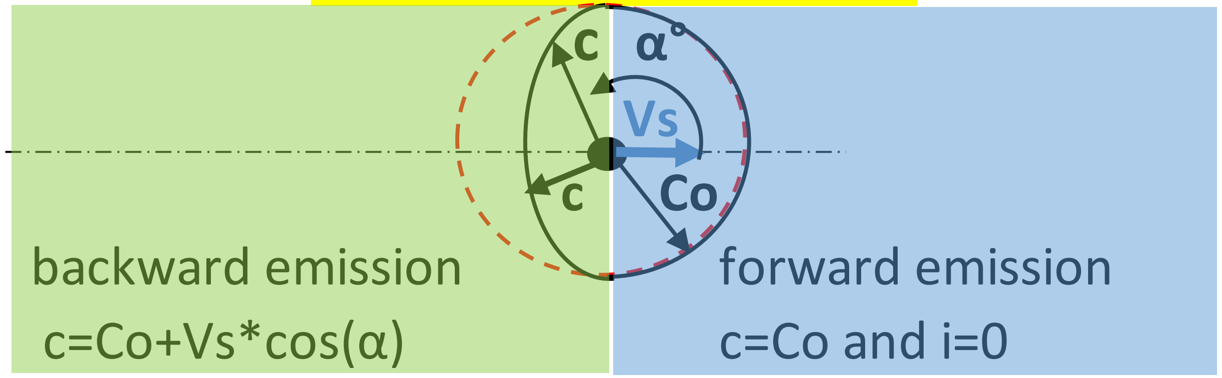
The value of i is completely determined by **Vs** and **α**, at the moment of launching the photon from its source. **i** is a dimensionless quantity limited between a **minimum value of -1**, and a **maximum value of 0. (-1 ≤ i ≤0).**

Fig 1-2-a	Vs=0



c=Co in all directions

Fig 1-2-b Vs≠0



conclusion :	**c=Co*(1+i) and -1 ≤ i ≤ 0**

and also **c+Vs=Co (scalar values at α =π)**

§ 1-3 Possible Nature of Photons

There is one known **Material Structure** that can explain all the above characteristics of the photons, and obeys the laws of classical (Newtonian) mechanics, **together with the energy laws of Einstein and Planck : PHOTONS are ELECTRICAL DIPOLES**

In chapter 2, we analyse photons as **electrical dipoles** composed of two **equal** masses mf/2, being held together by Coulomb attraction, caused by their electrical charges +Q and -Q. The masses m1 and m2 rotate around a common center (Ω), at a distance D=2*R. The total mass of the dipole is **mf=µ*f**, with **µ : the "core" mass**, and **mf=µ*f the "rotational" mass that constitutes the way the dipole can eventualy move in space.** See chapter 2
Thereby : the dipoles are obeying Newtons law of gravity, as well as Planck's energy law, and Einsteins law of energy.

Chapter 2 | Stable Dipoles in the Euclidian Space

Summary of Hypothesis

We propose the following hypothesis : see fig 2 -1

1 -- Photons are electrical dipoles with mass mf, composed of two masses , each mf/2 ,containing opposite electrical charges Q+ and Q-.

2 -- The 2 masses are rotating around a common center Ω at the distance D=2*R from each other. The circumferential speed of the masses is : **V=V1=V2**

3 -- The dipole, can move as an "entity" through space at a velocity **Vtr**.

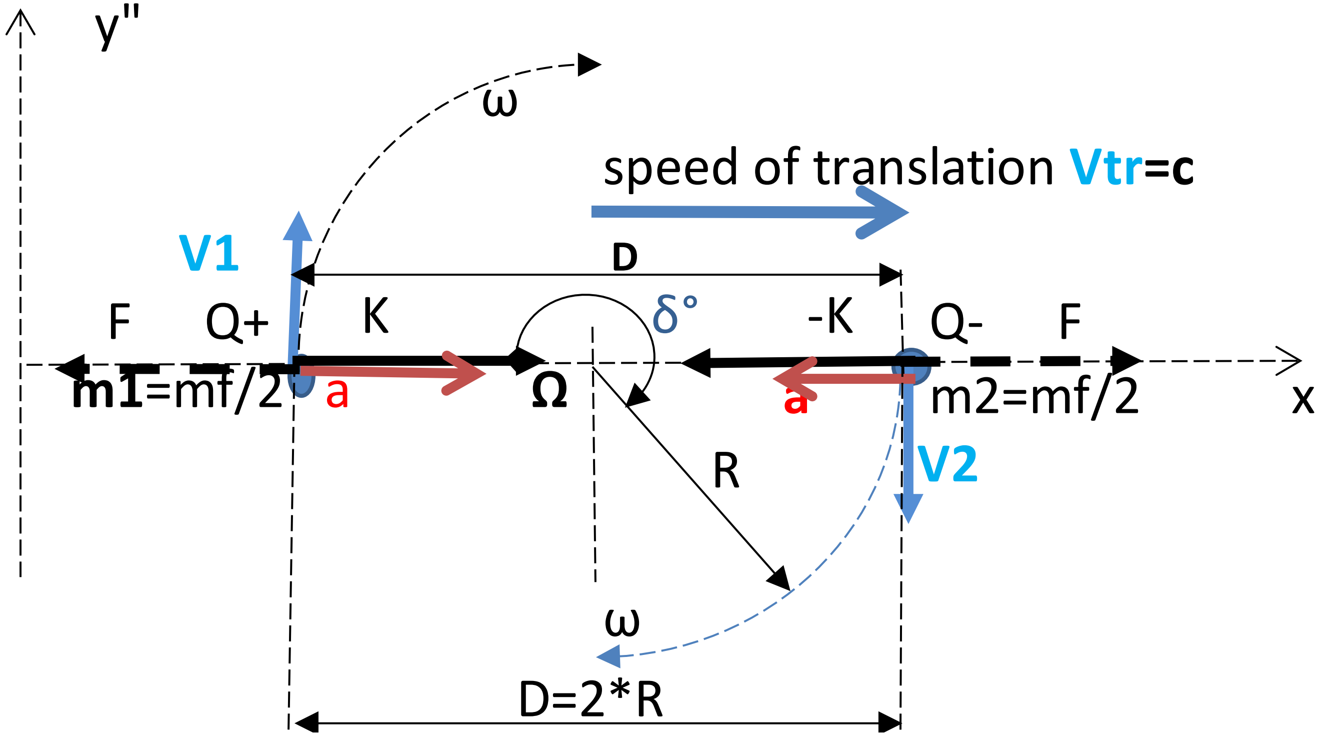
4 -- The electrical charges cause immediately electrical fields around them.*

*Practically meaning that the speed of propagation is at least an order of magnitude greater than c.

Fig 2-1 **ROTATING DIPOLE = PHOTON**

remark : **z=m1/m2=1**

V1=V2=V



§ 2-1 : in the Euclidian Space

1 -- **If** a dipole performs a **stable circular spinning** in the Euclidian space, the following relations should hold : $V=\omega*R$ with : V=the tangential velocity of the masses m1 and m2

ω= the angular rotation speed in radials/sec.

R= the distance between each mass and the spinning center

For a full circle : $\delta=\int\omega*dt=2*\pi$ (integrated from t=0 to t=T, with T =1/f), hence : $\omega=2*\pi*f$ and

$V=2*\pi*f*R$, **or** $(f*R)=V/(2*\pi)$

Attention : **A full circle ($\delta=2*\pi$) is a property of the Euclidian space**, **valid anywhere in space,** hence : Stable dipoles must have an **angular rotation speed (ω), independant from time**, such that the distance (D), between the 2 masses of the dipole **stays the same**, when moving in space. The $\int\omega*dt$, is then equal to : $\delta=\omega*\int dt=\omega*T=2*\pi$, with **T** : the time to perfom 1 complete circle

If we define f=1/T, then **ω**=2*π*f is **the angular speed** needed to perform **1 complete circle,** a **condition** for all stable dipoles moving in the Euclidian space. (ω=2*π*f ; 2*π*R= 1 circle). and with **V**=2*π*f*R; **f is also the number of full circles**, the stable dipole performs in order to advance **V** meters in 1 second.(the total lenght of the circumference of a circle, multiplied by f=n, the number of complete circles per sec. equals the total linear advancement per sec)
V is an **absolute constant value** with respect to space, and a **condition** for all dipoles with z=1 to be **able to move permanently in space**. (**1 complete circle is everywhere the same)**
V is determined by the **possibility to move** in the Euclidian space, but R is exclusively determined by the exact balance between the centrifugal force and the Coulomb attraction.

2 -- **If** a mass m1,(or m2), is subject to a **force K,** it is subject to an **acceleration** **a** in the Euclidian space, with $\vec{a}=\vec{K}/m1$ and **a** the magnitude of the acceleration vector, its direction being the same as $\vec{K}$.

3 -- **If at the same time** the mass m1,(or m2), has a **velocity vector** $\vec{V}$, wich is **perpendicular** to the acceleration vector $\vec{a}$, the mass will **perform a rotation ω** in the **flat surface** wich is determined by the vectors $\vec{V}$ and $\vec{a}$, called (X-Y") surface of the Euclidian Space, **with ω=a/V.** The vector **V** is the **tangential speed** of m on the circular orbit**.** **see chapter 3**

4 -- As a consequence : stable spinning masses m1 and m2, in the **Euclidian Space**, must always obey the following rules : **ω=2*π*f**, **V**=ω*R, or ω=**V**/R, ω=**a**/**V**, hence ω^2=**a**/R , V^2=**a***R, and R=V^2/**a**, f*R=**V**/(2*π), and R=**V**/(2*π*f). Given z=m1/m2=1, V1=-V2 (=**V**), ω is the same for m1 and for m2, with D=2*R. see fig 2-1

5 -- Balance of Forces

The dipole is held together in a dynamic equilibrium by the attracting forces (K and -K), being exactly balanced by the centrifugal forces (F1 and -F2) : **K=F if the dipole is "Stable".**

Hence : **$ke*Q^2/D^2=m1*\omega^2*R$**. With $D=2*R$, and $m1= mf/2$;(z=1), we obtain : **$mf=ke*Q^2/(2*\omega^2*R^3)$**

With $\omega=V/R$: $mf= ke*Q^2/(2*V^2*R)$, and with $f*R=V/(2*\pi)$, or $R=V/(2*\pi*f)$, we obtain :

$mf = f*(\pi*ke*Q^2/V^3)$ **If we call : $\mu=\pi*ke*Q^2/V^3$**, then mf is : **$mf=\mu*f$**

§2-2: Stability conditions for dipoles

The rotating masses m1=mf/2 and m2=mf/2; wich contain the electrical charges Q- and Q+ form together the dipole. The **distance (D)** between the 2 masses must be such as to make sure that the attraction forces on m1 and m2 (K1 and K2), remain always in balance with the centrifugal forces F1 and F2, in order to keep the dipole stable. Hence the rotating speed (ω) must remain **the same for both masses.** The circomferential speed of these masses being V=ω*R, the distance between the 2 masses is D=2*R. If the dipole as a "entity", moves in the (X-Y") flat surface, at the **translation speed Vtr=c**, the **circumferential speed (V) must equal c** in order to **remain stable**. This simply is the consequence of the fact that each mass can not be at 2(two) different positions in space at the same time : c=V

Also : if a photon originated from a source at rest (i=0) : **Co=Vo** See §1-2 and fig1-2-b

With c=Co*(1+i), see §1-2; **Vo=Co, and V** must become V=Vo*(1+i).

Attention : V is the tangential speed in the (X-Y") two dimensional flat surface; c,or Co, is a one dimensional vector in the same surface with Vo **an absolute constant,**

This explains why Co=Vo , and why Co is a maximal value (if i=0) : if the light source was not at rest : c=Co*(1+i), -1 ≤ i ≤ 0; c<Co , but **c+Vs=Vo= Co is an absolute constant, for all stable dipoles**, present in the Euclidian Space (scalar values).

The speed of light c+the speed of the lightsource Vs, is always the tangential velocity Vo

The (X-Y") flat surface is formed by the vectors V and a, containing the masses m1 and m2.

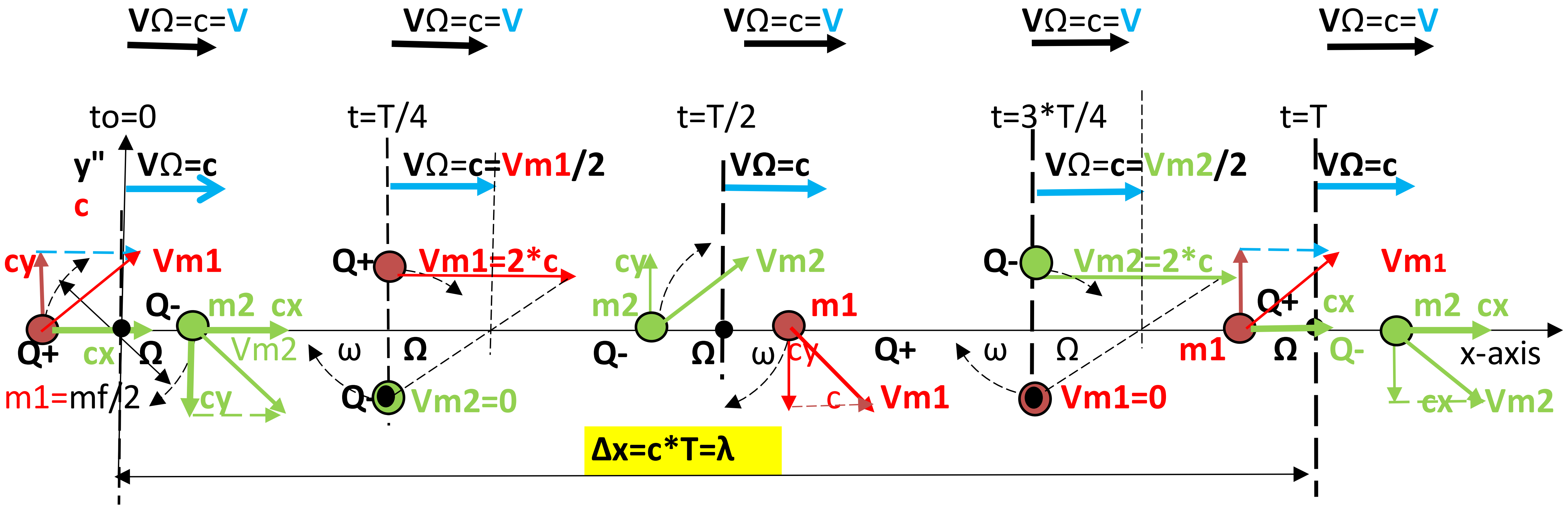
The dipole as a**n "entity"** is spinning in the flat surface (X-Y"); is electrical neutral and moves eventually in the same (X-Y") surface at the translation speed **Vtr=Co (or c, depending on i)**.

If the **translation speed Vtr=0**; this stability condition still applies, although Vtr=0, while the tangential speed of the masses m1 and m2 stays at V.

Fig 2-2 shows the positions and the speedvectors of the masses m1 and m2, and the speedvector (**V**Ω) of the center of gravity (Ω) of the dipole as a "entity", for different moments in time. The (x-y") coördonation system has been chosen such that the x-axis coincides with the direction of the speed vector cx. The relationship for the translation speed of the dipole as a whole, along the x-axis (Vtr)x, holds for all vlues of t : (Vtr)x=VΩ=cx=|**V**|.

Attention : Fig2-2 is only a schematic representation of the relative positions of m1 and m2 with respect to each other, at different times, and **not a representation of the trajetories** of m1, or m2.

Fig 2-2 speed vectors of a dipole, with translation speed equal to the circonferential speed c=V.



period T=1/f **n=f** **wavelenght : Δx=λ c =λ*f** **$cx^2+cy^2=Vm^2$**

Remarks :

1 -- Although the translation speed of the dipole as an "entity" stays the same ($V\Omega$=cx); the total speed ($\vec{V}+\vec{c}$)x of m1 or m2, **with respect to space**, reaches 2*c at certain moments and zero at other moments: e.g. **at t=T/4**, the speed (Vm1)x=2*c and the speed (Vm2)x=0; at the same time **$V\Omega$=(Vm1)x/2=cx**. **This explains why V=Co is an absolute constant maximum**. Fig 2-3
If the dipole stands at rest in space (translation speed=0), the circumferential speed **V** is then always equal c (and **not zero, or 2*c** at some moments). See fig 2-3-a and fig 2-3-b
(with : c→Co if Vs→0).

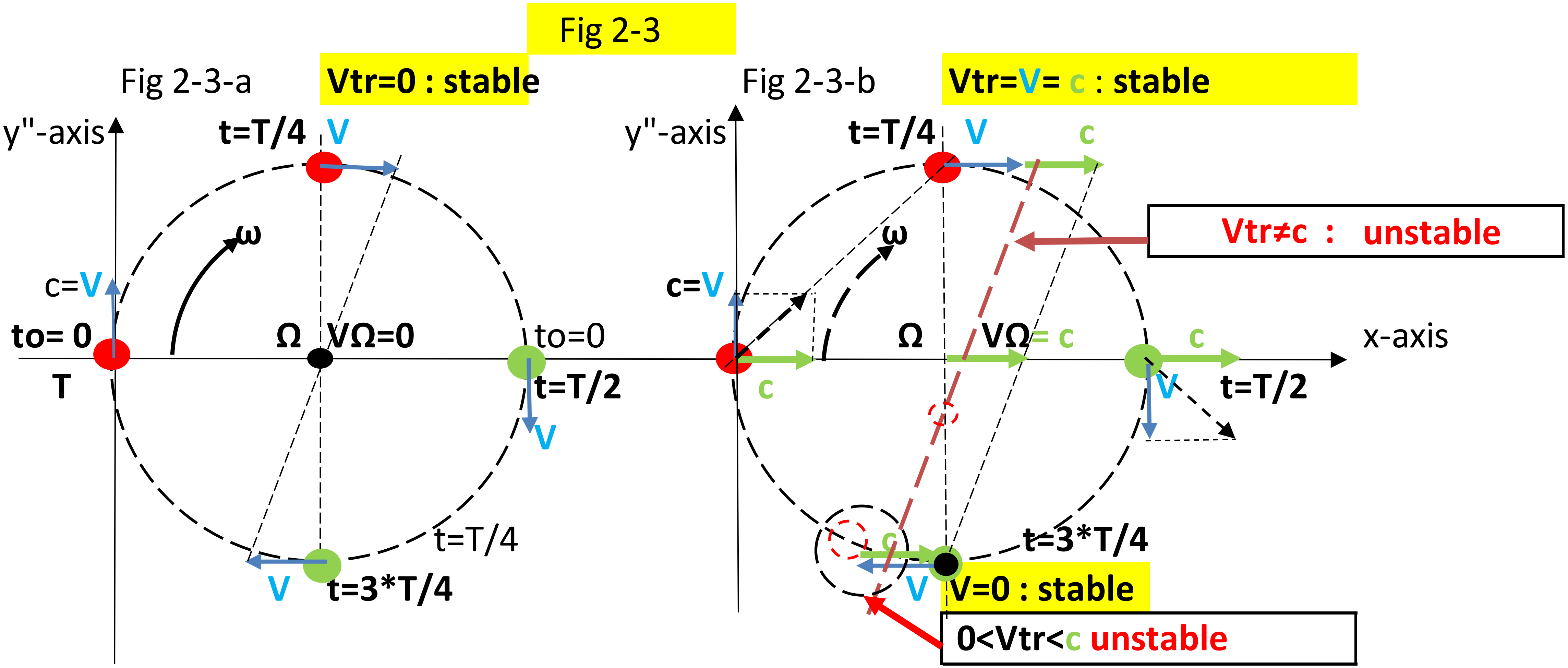


Fig 2-3
Fig 2-3-a
Vtr=0 : stable
y"-axis
t=T/4
V
ω
c=V
to= 0
T
Ω
VΩ=0
to=0
t=T/2
V
t=T/4
V
t=3*T/4
Fig 2-3-b
Vtr=V= c : stable
y"-axis
t=T/4
V
c
Vtr≠c : unstable
ω
c=V
Ω
VΩ= c
c
x-axis
c
V
t=T/2
c
t=3*T/4
V
V=0 : stable
0<Vtr<c unstable

2 -- The dipole as an entity can **not** exist without the two masses m1 and m2 spinning around each other. The rotation (spin) takes place in the flat plane (X-Y"), in wich also an eventual translation occurs. A dipole passing by, creates a temporarily change in the **local** electromagnetic field at a frequency f such that : f *λ =cx

3 -- If cx=0, (a dipole standing at rest in space), λ=0; an observer standing equally at rest, nearby the dipole in the (X-Y")surface, would still notice a periodic change of the polarity of the local electromagnetic field, at a "pace" of **f** times per second. The diameter (D) of the dipole still being the same (for stability reasons).

§2-3 : Frequency range

If an e-m dipole at speed c, passes nearby an observer at rest ; the effect of the rotating electric charges can be noticed. At geater distance this effect vanishes (no net charge).

The stability of the dipoles at frequency (f), is determined by the balance of the forces K=F.

At **higher frequencies**, the distance between the rotating masses must be smaller in order to obtain that eqilibrium, meaning that D must be smaller, the electrial charges coming closer to each other. **The maximal stable frequency** corresponds to the minimal rotating diameter .

Hence the maximum possible frequency is limited by the corresponding minimal rotating diameter wich still allows the electrical charges (Q+ and Q-) to exist **without recombination**.

Although there is theoretically **no lower limit** for the frequency in an "**undisturbed space**", the Coulomb attraction force $K=ke*(Q+)*(Q-)/D^2$, becomes rapidly very small at increasing equilibrium distance D, (low frequencies). This makes the dipole very sensible to influences from"perturbations" such as the presence of other masses or electrical charges.

§2-4 : Mass of Dipoles

If we define "**MASS**" as : "A particular part of Space containig an **stable entity**", that reacts as an **"entity"** to an exterior gravitational field ($\vec{\phi g}$), by undergoing a Force $\vec{K}=\vec{\phi g}$*m .

The **quantity of mass (m)** is given by the **intensity of its reaction** to a given **gravitational field** : m=$\vec{K}/\vec{\phi g}$; and according to §2-1 is equal to : mf=μ*f for stable dipoles.

Remark : This definition has a link to ϕg, wich itself is determined by mass; and therefore is specific for gravitation and the mutual attraction between 2 separate masses: **gravitational mass**.

The dipole has a total gravitational mass mf composed of two parts : mf=m1+m2 with m1=m2=mf/2. The masses (m1 and m2), contain the electrical charges Q+ and Q- and consequently attract each other by the forces Ke and -Ke, according to Coulomb's law.

An eventual external gravitational field ϕg, attracts both masses m1 and m2 with the forces Kg1=Kg2 =ϕg*mf/2, given the very small distance D between m1 and m2. The acceleration of the dipole as a "whole", under the action of the field ϕg is : ag=Kg/mf, with Kg=Kg1+Kg2 , and Kg=ϕg*mf.

§2-5 : Energy content

A rotating dipole moving trough space at a speed c has a tangential velocity **V** , its kinetic rotational energy is : $Er=2*(mf/2)*V^2/2$. Its kinetic energy due to the translation $Etr=mf*c^2/2$. The total kinetic energy of the dipole is then : $Et=Er+Etr=mf*c^2$, with **$V*(1+i)$**$=Co*(1+i)=c$.§2-2 According to Einsteins energy formula $E=m*c^2$; the total energy of a dipole at maximum velocity would be : $Efo=mfo*Co^2$ and; according to Plancks law equal to : $Eo=ho*fo$. (we added the index "o" to indicate that it is the maximum, at Vs=0). **With planck's law in accordance with the energy law of Einstein, we obtain** : $\mu o*fo*Co^2=ho*fo$; and **$\mu o=ho/Co^2$**.

With ho and Co known constants, μo is also a constant : **μo=** 7,3731E-51 kg*sec.

remark : We have found in §2-1 (-5) that stable dipoles can only move in space if $\mu=\pi*ke*Q^2/V^3$, and hence also : $\mu o=\pi*ke*Qo^2/Vo^3$ if i=0. For stable moving dipoles in the euclidian space: V=c, and Vo=Co (§2-2), hence: $\mu=\pi*ke*Q^2/c^3$, and $\mu o=\pi*ke*Qo^2/Co^3= ho/Co^2$; $Co=\pi*ke*Qo^2/ho$
And with $c=Co*(1+i)$; we obtain **$\mu=\mu o$** on condition that **$Q^2=Qo^2*(1+i)^3$**; and **$h=ho*(1+i)^2$**.
$c=\pi*ke*Q^2/h$, is then also : $c=\pi*ke*Qo^2*(1+i)^3/(ho*(1+i)^2)$; and **if i=0, then Co=c.**

Qo^2 : With $Qo^2=Co*ho/(\pi*ke)$ we obtain : Qo^2=7.035...E-36 Coul.^{2} and **Qo=2.65.E-18** Coulomb
The rotation energy (Er) is an "internal kinetic energy", and as such can be considered as "packaged" under the form of "gravitational mass" : $\mu*f$.

§2-6 : Velocity of light : Co

According to §1-2, the velocity of light from a source wich is **not at rest**, is not always Co, but depends on the direction of the emission, with respect to the direction of the motion of the light source : $c=Co*(1+i)$, with $-1 \le i \le 0$. This is the speed of light with respect to the "space referential system", and can change if a photon travels through a gravitational field, provided c stays below, or at maximum equal to Co.

In other words : **Co is the absolute maximal Speed in Space, for any MASS whatever its size.**

Co=Vo : With $\mu=ho/Co^2$ also equal to $\mu=\pi*ke*Qo^2/Vo^3$ (see **§2-1**, and **§2-5)** , we obtain :

$Vo^3=\pi*ke*Qo^2/\mu$: or $Vo^3=\pi*ke*Qo^2*Co^2/ho$ and : $\mathbf{Vo=Co=\pi*ke*Qo^2/ho}$

§2-7 : Energy Quantum

Two different dipoles, at frequenties f, and f+1 have a different kinetic energy content of $\Delta E=\mu*Co^2=ho$, according to the laws of Einstein and Planck. This is also equal to $\Delta(mf)= \mu*Co^2$, consequently ΔE is also a universal constant, and equal to the amount of energy needed to **increase** the rotational energy of the dipole by 1(one) Hz.

Each increase of the frequency by 1 hertz (being 1 additional full tour/sec of the dipole), needs an additional **quantum of energy** : **ΔE=ho**. This is also equal to the increase of **1*μ kg of "rotational" mass**.The notation of "rotational mass", can therefor also be named "**gravitational mass**"as it indicates how a dipole is reacting to a gravitational field.

The eventual **change of 1 Hz of frequency** (being 1 additional full circle per second) is in this case **entirely caused by a gravitational field**, and **does not alter the electric charge** of the dipole. ($\Delta E/Co^2=\mu=ho/Co^2$)

§2-8 : Differential Speed between 2 masses

The differential speed, or "approaching speed" between a photon and an observer, is **as much dependant** on the speed of the observer, as on the speed of the photon.

It folows from §1-2 that the **maximal differential speed equals 2*Co, its minimum being 0.**

The differential speed, together with the the backward speed of light (c=Co*(1+i)), coming from distant galaxies, explains correctly the so called "red shift of light " observed in astronomy. This so called " Doppler effect" is nothing else than the result of the fact that the galaxy (light source), and the observer on Earth, move away from each other.

(see : "The COSMOS": A uniform, sferic expansion model by F.J. Gheeraert)

Chapter 3 Rotational Mechanics

§3-1 : Rotation

In Fig 3-1, the postions of a mass m1 are represented in the flat (X-Y") surface at different times. At to=0, this mass has the position **Po** and a velocity **V**. At the same time (to), it also undergoes an acceleration a, witch is oriented perpendicular to **V**. The 2 vectors **V** and a, acting simultanously together on m1, determine the flat (X-Y") surface, causing the mass to move to the position **P1** after Δt seconds in the same surface.
The acceleration **a** is the result of a force (K) caused by attraction by another mass, either gravitational or electromagnetic, or both : **This analysis is valid for both situations**

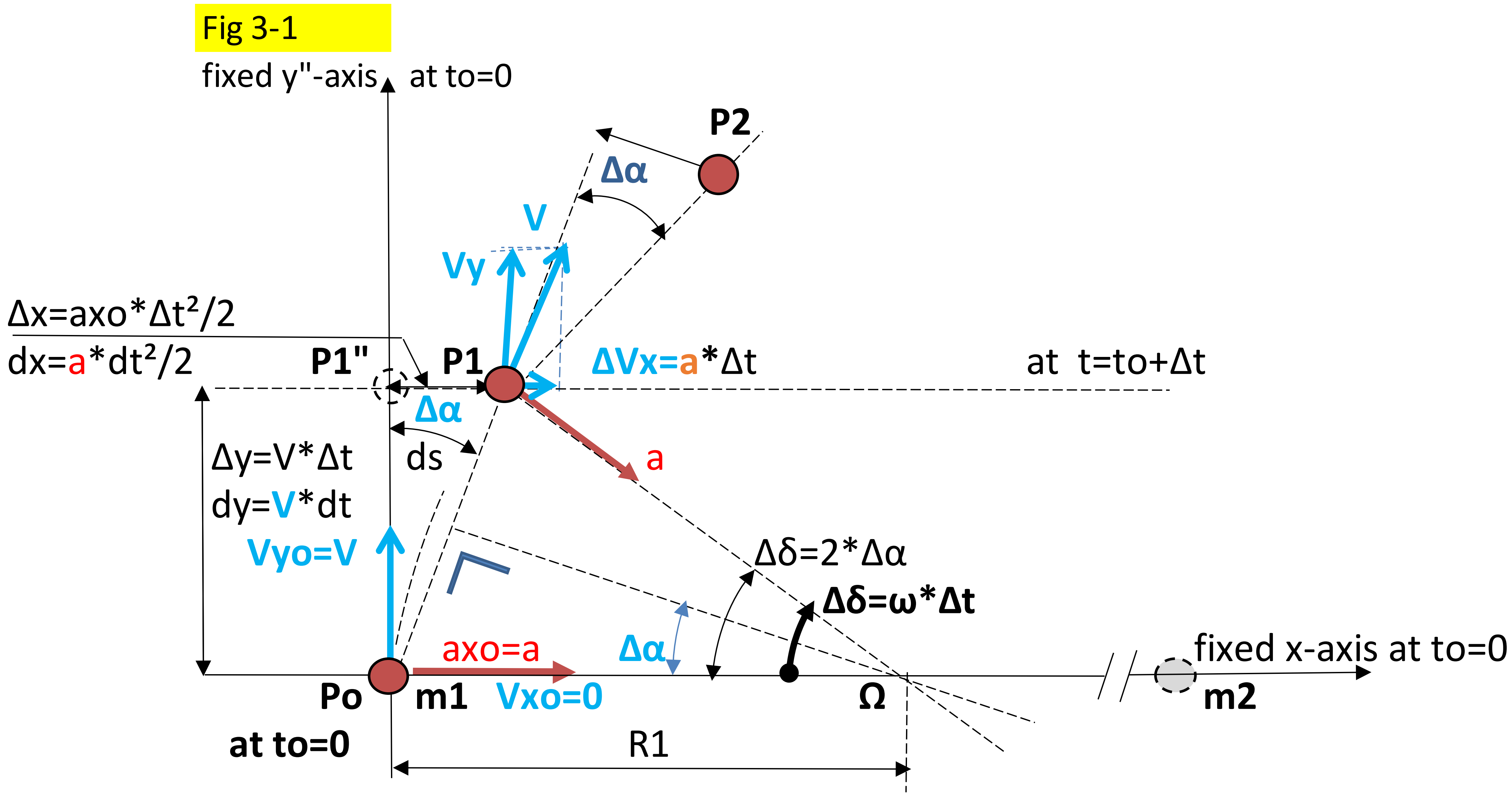


Fig 3-1
fixed y"-axis
at to=0
P2
Δα
V
Vy
Δx=axo*Δt²/2
dx=a*dt²/2
P1"
P1
ΔVx=a*Δt
at t=to+Δt
Δα
ds
a
Δy=V*Δt
dy=V*dt
Vyo=V
Δδ=2*Δα
Δδ=ω*Δt
axo=a
Δα
fixed x-axis at to=0
Po
m1
Vxo=0
Ω
m2
at to=0
R1

limit values : With $\Delta t \rightarrow 0$, we obtain the folowing results :

The position of m1 evolves from **Po** (0;0;) towards **P1**(dx;dy) during dt , see Fig 3-1 with :

$dx=a*dt^2/2$, and--------- $dy=V*dt$, and also : $tg(d\alpha)=(a*dt^2/2)/(V*dt)$; or : $tg(d\alpha)=a*dt/(2*V)$

A Fournier development of $tg(d\alpha)=(d\alpha)+2*(d\alpha)^3/15+$ --- allows to conclude : $d\alpha=a*dt/(2*V)$

with : $d(\delta)=2*d\alpha$, see Fig3-1 , we obtain the angular rotating speed : $\omega=d\delta/dt$ ------ $\omega=a/V$

Important Remarks :

1 -- The definition of $\omega=d\delta/dt$ means that $\delta=\int\omega*dt$. If being integrated from 0 to t=T; **after having revolved 1 complete circle, δ equals : $\delta=2*\pi$**. It wil last T second to complete exactly 1 tour at angular velocity ω. Hence $\omega*T=2*\pi$. The frequency **f,** being the number (n) of tours per sec., is then **$n=f=1/T$**, and hence **$\omega=2*\pi*f$**. The so called "circle acceleration **a** is : ------- $a=\omega*V$.

2 -- In the **Euclidian space**, the tangential speed of the masses of a dipole with **z=1,** must always be : $V=\omega*R$, for geometrical reasons. Consequently : $V=2*\pi*f*R$, or : $f*R=V/2*\pi$. See §2-1

remember : The value of R is exclusively determined by the Coulomb attraction=centrifugal force.

The total lenght of the circumference of a circle with radius R is **s**=2*π*R.

The tangential speed being V, the time needed to complete 1 revolution is : T=2*π*R/V,

with: **V=ω*R : ω*T=2*π.** The center of the rotation (**Ω**) is situated on the line that connects

Radius : the masses m1 and m2, at the distance R1. With ω=**a**/**V** **;** and **V**=ω*R we obtain $R1=V^2/a$

3 -- For photons being dipoles with translation speed c=**V;** and ω=2*π*f; it folows : f*R=c/(2*π)

4 -- In general**, V is the Y"-component of the speedvector V'** of the mass and **perpendicular to the vector** a.The acceleration vector **a** has always the direction of the line that connects both masses. The vectors **a** and V' together form the flat surface (X-Y") in wich the rotation takes place.

§3-2 : Summary of Stability conditions for spinning electromagnetic dipoles

The two masses m1 and m2 can follow stable circular trajectories around a common rotation center (Ω) under stringent conditions : (see also §2-1)

1-- The flat (X-Y") surface, should exist, meaning that the speed vectors V1 and V2 (see Fig2-1), should belong to the same flat surface, and that there are no other masses, or electrical charges , or forces nearby m1 or m2 (no other forces outside this surface).

2 -- The electrical charges Q+ and Q- should not recombine, meaning that the distance between both masses should be greater than the "recombination distance": Dmin.

3 -- The angular rotation speed ω must be the same for both mases m1 and m2, so that the distance between both masses stays the same during the rotation, and hence their mutual attraction forces stay the same.

If Vtr≠0 :

4 -- By an eventual translation speed (Vtr) of the dipole as an "entity", it must obey the basic rule for masses : they can not be at 2 different positons in space at the same time .
1 complete tour of the dipole takes exactly T seconds. With R and ω constant, both masses of the dipole have then moved around a complete circle at constant tangential speed **V,** with λ=V*T=2*π*R (fig2-2). During the **same lapse of time** the dipole "as an entity" has moved over a linear distance λ=Vtr*T, and the dipole is ready to repeat exactly this same movement on condition that **λ=2*π*R**, and hence **Vtr=V**. In the case of a photon, we call Vtr the speed of light c, and c must be equal to **V.**

Summary : Photons being dipoles, in order to stay stable they must satisfy following relations :
λ/R=2*π; c=V=ω*R, wth ω=2*π*f; T=λ/c ; f*λ=c ; n=f ; f*R=c/2*π en f=1/T
After n revolutions, photons have covered a linear trajectory of n*λ, in a total time t=n*T.
Their propagation speed is c=n*f with f=1/T, the total time to cover a certain distance is :
t=Σ(T)=**n*T**; or **t=∫dt.**

remarks :

1 -- When Vtr=0; λ= 0 ; only the conditions 1; 2 and 3 remain. See also fig 2-2 and §2-2.

2 -- Some of the above relations can change if energy is added,or extracted from the dipole, e.g if a photon escapes from the gravitational field of its star, and slows down to another value of c; the values of λ and R decrease to a new dynamic equilibrium for $c=\lambda*f<Co$.
the value of i has decreased $(c=Co*(1+i))$.

CHAPTER 4	Applications of the Stability Rules

§ 4-1 :	Forces

The forces, K and -K, causing the acceleration vectors a and -a in Fig 2-1 are the consquence of the presence of the 2 masses m1=mf/2 and m2=mf/2 at the distance D=2*R from each other (z=m1/m2=1). The 2 speed vectors **V1** and **V2**, as well as the masses m1 and m2 belong to the same (X-Y) flat surface. Each force (K and -K) consists of 2 parts : The gravitation force Kg and the electromagnetic force Ke, with K=Kg+Ke. According to the laws of Newton, and Coulomb : $Kg=kg*m1*m2/(2*R)^2$ and $Ke=ke*(Q+)*Q-)/(2*R)^2$. The electric charge Q being dissociated in (Q-) and (Q+). At "short" distances Ke is much larger than Kg, such that we neglect the effects of Kg at first instance.

Centrifugal Force F :

The force needed to realise the acceleration a of the mass m1 is : K1=a1*m1. With a1=ω1***V1** (see §3-1), and with **V1**=ω1*R1; we obtain : **K1=m1*ω1²*R1,** wich is nothing else than the **centrifugal force F1 and a direct consequence of the action of (Q+)m2 on (Q-)m1,** either by gravitational, or by electromagnetic action (solar systems, or dipoles). A similar analysis allows to write also : F2=m2*ω2²*R2, **due to the action of m1 on m2,** with ω1=ω2, (stable dipoles), R1=R2=R, D=2*R; V1=V2=V and a1=a2=a.

Hence : With mf=m1+m2; and z=1 (m1=m2=mf/2), **The balance of forces K=F is always obtained at the equilibrium distance D=2*R.**

§ 4-2 : Stability :

The centrifugal forces F1 and F2, are the consequence of the spinning of the masses m1 and m2, and are at any moment equal, but opposite, to the attraction forces K and -K that cause the stability of the spinning dipole : $(mf/2)*\omega^2*R=ke*(Q)^2/(2*R)^2$; or : $mf=ke*Q^2/(2*\omega^2*R^3)$. With $mf=\mu*f$ (§ 2-5); and $\omega=2*\pi*f$, we obtain : $\mu=ke*Q^2/(8*\pi^2*f^3*R^3)$, and from $f*R=c/(2*\pi)$ it follows : $\mu=\pi*ke*Q^2/c^3$. At maximum photon velocity, when the lightsource was at rest, the translation speed of the photons is called Co; the electrical charge needed for stability is then called Qo,and $\mu=\pi*ke*Qo^2/Co^3$. In §2-5 we obtained $\mu=ho/Co^2$, hence $Co=\pi*ke*Qo^2/ho$ and : $Qo^2=ho*Co/(\pi*ke)$. Hence : Qo and Qo^2 are universal constants : Qo^2= 7,0353E-36 . Qo=2,6524E-18 Coulomb See §2-5

Conclusion : With $Co=\pi*ke*Qo^2/ho$; Co=V (§2-2) ; $V=\omega o*Ro$; and $\omega o=2*\pi*fo$: $ke*Qo^2/(2*ho)=fo*Ro$

And also : $Co/\pi=ke*Qo^2/ho$.

If $c<Co$: In § 1-2 we found that if the lightsource is not "at rest" ($Vs \neq 0$), the translation speed of a **backwards emitted photon is $c=Co*(1+i)$, with $c \leq Co$ and $-1 \leq i \leq 0$. with : $\mu=\pi*ke*Q^2/c^3$** for **stability reasons**, hence : **$Q^2=Qo^2*(1+i)^3$** and **$h=ho*(1+i)^2$**, such that **$\mu=h/c^2=ho/Co^2$.**

Only stable dipoles can travel through space . **μ is an absolute invariable constant.**

remark : Planck's constant : ho is the result of the analysis of the radiation of so called "black bodies". this measurements were performed on Earth, and are therefore valid for a lightsource at rest (This can be shown for measurements of the speed of light, since the speed of the Earth is to small to influence the results), and hence ho is measured. If it would be possible to perform the same analysis for light coming from far away galaxies, we should obtain $h=ho*(1+i)^2$.

§4-3 :	The basic "Entity" µ

The **dipole model** for **photons**, based on the accordance between the **energy laws of Einstein and Planck,** results in the conclusion that the total "**rotational mass**" of a photon is equal to : mf=µ*f, with µ being an absolute invariable constant : **µ**= 7,3725E-51 kg*sec

The dimension of µ (mass*period T), and f=1/T, with **f** : the number of completely performed circles/sec., means that there exists a basic and invariable **quantum of mass (µ)** for **f*µ kg of gravitational mass.**

The tangential speed of the dipole (**V**) must be equal to the translation speed c of the dipole for all stable frequencies; wich leads to fig 2-2 and Fig 2-3 of chapter 2.

The **change of position of the mass mf** (dipole), under the action of the gravitational field (ϕg)x is a change **(Δx**) of the **position** of the dipole in the direction of the x-axis, **every tour**.

With Δx=λ (see fig 2-2) **in m/tour**. cx=λ*n, with n=f : the number of tours per second.

cx is the translation velocity in the direction of the x-axis of the dipole as an "entity", and hence : **cx=c=Δx*f, and also : c=λ*f. (if cx=0; λ=0,** a spinning dipole **"at rest"**in space).

The **translation speed of the stable dipole per second is allways : c= Δx*f**

§4-4 :	Frequency and Radius of Spinning

Based on : **Vs** the speed of the emitting light source

Co : Maximal value for the velocity of light; and $c=Co*(1+i)$ with $i=Vs*\cos(\alpha)/Co$ **$-1\leq i \leq 0$**

We obtain : **Vo=Co** : the maximal circumferential speed of the dipole needed to move through space.

Vo =c+Vs :Vo an **absolute constant in the Euclidian Space**, and $c=Co*(1+i)$

V=c : The tangential speed of a dipole at speed c, and $V=Vo*(1+i)$

c=ω*R for photons in the Euclidian space **: f*R=c/2*π see fig4-1**

ho=Planck's constant ; dependant on i : $h=ho*(1+i)^2$

ke : Coulomb's constant

$\mu=ho/Co^2$ ($=\pi*ke*Q^2/c^3$) An absolute constant : μ is invariant : independant of i en f

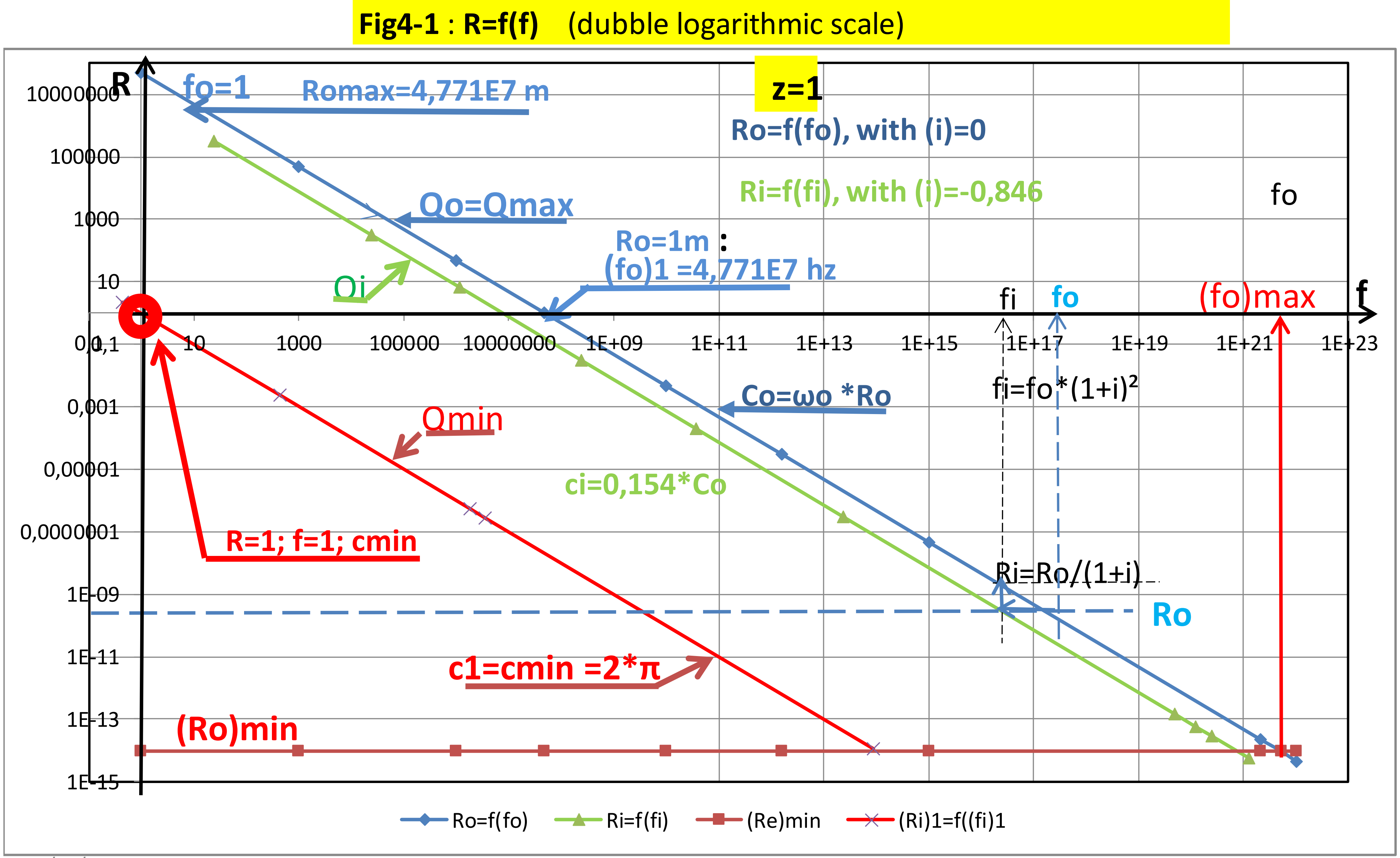
Qo : electrical charge of a dipole with z=1 (+Qo en -Qo); **with Qo a constant value**

$Q^2=Qo^2*(1+i)^3$; en **$c^3=\pi*ke*Q^2/\mu$** according to the balance of forces.

Co : The value of Co is entirely determined by Qo and equal to $Co=\pi*ke*Qo^2/ho$

fequency : If the lightsource is moving away at a speed **i*Co** from an observer at rest , the observer will measure the speed of the incoming photons at c=Co*(1+i); and a wavelength λ , with c=λ*f .
Hence c=Co*(1+i)=λ*f, and λ=λo/(1+i), wih λo the wavelenght of the same dipole if i=0.
Since λ=2*π*R, and λo=2*π*Ro: R is also : R=Ro/(1+i).
In **§3-1** we obtained f*R=c/(2*π),and fo*Ro=Co/(2*π), hence : --- $f=fo*(1+i)^2$; and also : $\omega=\omega o*(1+i)^2$ see fig4-1

Fig4-1 represents the spinning radius R as a function of **f, for (Qo)max, Qi with i=-0.15 and Qmin.**



§4-5 : trajectories of m1, and m2 in the (X-Y")flat surface

The evolution of the positions of m1, and m2, in the (X-Y)surface, as a function of time, can be obtained from their speedcomponents :Vm1 and Vm2 with: see Fig4-2

for Vm1 : $(Vm1)x=Vo*\cos(\omega*t)+Co$; $(Vm1)y''=Vo*\sin(\omega*t)$

for m2: $(Vm2)x=-V*\cos(\omega*t)+Co$; $(Vm2)y''=-Vo*\sin(\omega*t)$

After integration, with ω independant from t, and Vo=Co :

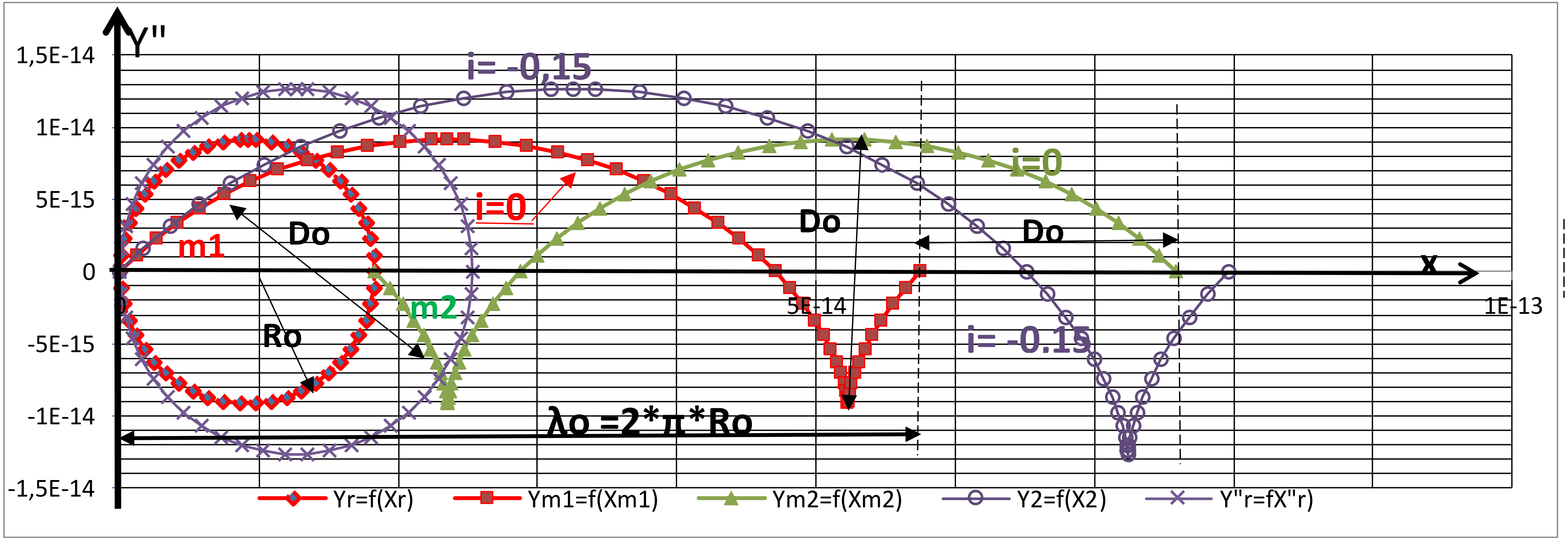
$Xm1=Co*t+Vo*\sin(\omega*t)$; $Xm2=D+Co*t-Vo*\sin(\omega*t)$

$Y''m1=Vo*(1-\cos(\omega*t))$; $Y''m2=Vo*(\cos(\omega*t)-1)$

For a given value of f (example), With $\omega=2*\pi*f$, $R*f=Co/(2*\pi)$, and $D=2*R$

Fig4-2 Trajectories of m1 and m2 as a function of time

Remark The circles in Fig4-2 are the trajectories if the translation=0



Chapter 5 | General Conclusions

1 -- Admitting that photons are spinning dipoles, satisfies all known experimental results, including the "red shift"of light, and is based uppon the laws of Newton, Coulomb, Einstein, and Planck. It is also in accordance with the usual models for the atoms.

2 -- The model provides a explanation for Einstein's statement that **Co** is an **absolute constant and maximal** value for masses : The maximal tangential speed **Vo** is **limited** because the Coulomb attraction must equal the centrifugal force, hence : $\omega=2*\pi*f$ is limited; and the maximal translation speed of dipoles must always be equal to tangential speed : **Co=Vo**

3 -- It explains why light at different frequency, has still the same translation velocity, and why "light beams" follow straightline trajectories through the "undisturbed" space.

4 -- The concept of **μ**, as an ***invariant*** **amount of (mass* T), and T : duration of 1 complete circle** and a fundamental corner piece of dipoles, explains their **gravitational mass** : **mf=μ*f.**

5 -- It explains why the energy formules of Einstein and Planck provide the same result **$m*c^2=h*f$** with **$\mu=ho/Co^2$, and $\mu=7.372E-51$ kgsec.**

6 -- All photons originating from lightsources at rest, contain the same electrical charge : Qo This is also their maximal load : **Qo= 2.652E-18** Coulomb. The tangential speed of this dipoles is the same for them all : $Vo=\pi*ke*Qo^2/\mu$ (=Co)

7 -- The frequency of a dipole together with its tangential speed determine its energy : $Et=\mu*f*c^2$

8 -- Uncertainty relation : the 2 masses of the dipole, circling around, define the position of the dipole at any time. If this position is exactly known for the time t=to, we can however **NOT** know the angular position (δ) of the masses m1 and m2 at the same time .

F.J. Gheeraert
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