Can one distinguish between Doppler shifts due to source-only and detector-only velocities?

Chandrasekhar Roychoudhuri[a,b] and Michael Ambroselli[a]
[a]Physics Department, University of Connecticut, Storrs, CT 06269
[b]Femto Macro Continuum, 7 Fieldstone Drive, Storrs, CT 06268

ABSTRACT

This paper revisits the optical Doppler shift as the classical Doppler shift based upon spectroscopic line broadening of spontaneous emission (moving source) and quantum mechanical conditions for stimulated absorption and emissions (moving detector). We find that excited emitting source-atoms and stimulated detecting-atoms clearly discern their individual absolute velocities with respect to the stationary cosmic vacuum (Complex Tension Field, or CTF). These conclusions can be arrived at when one attempts to visualize the invisible physical processes behind the measurable data from two distinctly different physical phenomena involving Doppler shifts. (i) First, the emergence of ultra-narrow cavity-resonant longitudinal modes, bounded by the homogeneously broadened spectral gain line width, out of a gas laser, which involve Doppler shifts in the spontaneous emission and stimulated emissions due to perpetually moving gas atoms, say, in a He-Ne laser tube. Second, (ii) The white light, generated from the (higher temperature) inside of a star, gets imprinted with a set of absorption line widths due to the "cooler" star-corona-atoms. During the very long cosmic journey, the entire range of frequencies of the white light suffers distant dependent Hubble Red Shift (systematic frequency reduction). However, the absorption line width, generated at the corona, remains same through the cosmic journey. So, the physical process(es) behind the Hubble Red Shift is (are) certainly different from Doppler effects, generated or perceived by, atomic emitters and atomic detectors. These observations imply that the stationary CTF does represent a universal inertial reference frame and the postulate of expanding universe should not be taken for granted. Optical Doppler effects consist of real frequency shift due to source-movement and apparent frequency shift due to detector-movement with respect to the CTF, which facilitate the journey of all EM waves across the entire galaxy. This is not different from classical Doppler effects for sound waves facilitated by the "stationary" pressure tension, held by the air.

Keywords: Cosmological Red Shift; Classical Doppler Shift; Relativistic Doppler Shift; Hubble Red Shift; Space as a physical field, Complex Tension Field; Space as a frequency reducing dissipative field; Spontaneous and Stimulated Emissions; Non-causality of Relativistic Doppler Shift.

1. INTRODUCTION

Our position is that while all physical theories to model physical processes going on in nature have to be based on our incomplete knowledge of the cosmic system; but we must not formalize our lack-of-knowledge as confirmed new-knowledge. In other words, while interim theories must be framed based upon the limited knowledge we have about the cosmic system; we must consciously and openly acknowledge that such theories must be constantly scrutinized as to their foundational hypotheses as our overall knowledge continue to advance. In other words, our scientific culture should be pro-active to nurture the emergence of alternate concepts and models; which should supersede our current theories and knowledge. If we promote the culture that the foundation of the edifice of physics has been firmly established by the theories of special and general relativities (SR, GR) and quantum mechanics (QM); then we are telling our younger generations that, in research, the only option they have is to discover the right shaped stones or construct the right shaped bricks; which will fit into the current edifice of physics. Such a culture has the detrimental effect of suppressing the further evolution of the deeper enquiring minds of our follow-on generations of young students. It would not be very different from various religious dictums that the ultimate truth of the universe has already been given to us through the chosen messiahs. Such a discussion in our scientific community would be healthy, even if I do not succeed in presenting here a better Doppler theory for optics than the prevailing one. The prevailing theory tells us that optical Doppler shift depends solely upon the ***relative velocity*** between the source and the detector [1]:

$$ {}_{\text{det.}}^{\pm}\nu = {}_{src.}\nu(1 \pm \mathrm{v}_{rel.} / c) \quad (1) $$

Let us first summarize the reasons behind this century-old prevailing-belief. The optical Doppler shift is due only to the relative velocity between the source and the detector because we do not know how to measure the absolute velocities of the light-emitting atoms (spontaneous and stimulated) and light-absorbing atoms. This belief got formalized with the firm acceptance of the ***absence of ether*** in the space (i) due to consistent null results of Michelson-Morley (MM) type of experiments and (ii) due to the broad acceptance of Einstein's proposition (through his special theory of relativity) that absolute velocity of any material body cannot be determined due to our inability to define any inertial reference frame.

The velocity of light remains same for all observers irrespective of their different relative velocities.

We accept this postulate as correct; but we need a physical model to support this postulate. Except for gamma rays, design and modeling of all telescopes for radio waves, visible waves and X-ray waves, are very successfully carried out by using the wave-modeling diffraction integral due to Huygens-Fresnel, which is a solution of Maxwell's wave equation. All these waves are also traveling across the entire galaxy. Maxwell's wave equation is identical in structure with that for waves in stationary strings with mechanical tensions. So, we posit that the space is comprised of a physical Complex Tension Field (CTF). EM waves are propagating undulations of this stationary tension field [2-5] This is effectively modified old ether, as a physical field, rather than as a novel substance different from EM waves and particles. This postulate accommodates Michelson-Morley type of experiments without time-dilatation and without the problems of old ether theories. EM waves are propagating undulations of this stationary tension field. Particles are localized, self-looped resonant undulations of the same CTF [2-5]. The velocity of light $c = (1/\varepsilon_0\mu_0)^{-1}$ (in empty space) implies that ε_0 and μ_0 are two of the many intrinsic tension properties of CTF.

Intrinsic characteristics of elementary particles have been captured by the "fine structure constant" $\alpha = (e^2/2h)(\varepsilon_0^{-1}\mu_0)^{-1/2}$. Thus, we only need two other tension-related characteristics, e and h for CTF to support localized resonant oscillations as particles. That particles are resonances, is corroborated by the findings [6] that the internal energies of all particles can be expressed as integral multiples of the energy of an electron.

When light enters into a material medium, its velocity is reduced to $c = (1/\varepsilon\mu)^{-1}$ where ε and μ are the new tension characteristics due to the presence of the assembly material dipoles, which reduce the effective tension values from the oscillating dipole-free CTF. However, when the bulk material moves with a finite velocity with respect to the CTF, the EM waves "suffer" well-established Fresnel drag.

In other words, the optical Doppler shift cannot depend solely upon the relative velocity between a pair of source and detector; as the prevailing assumption is. The implication is that Doppler shifts of light coming from distant galaxies are determined by the ***local*** velocities of the emitting and detecting atoms with respect to the CTF; and the emissions frequencies remain completely independent of the velocities of the various detectors in various other galaxies; because they obey quantum mechanical transition rule $\Delta\nu_{mn} = h\nu_{mn}$. The released energy $h\nu_{mn}$ evolves into a wave packet of frequency ν_{mn} only when the velocity of the source atom is zero w.r.t. CTF. Atom velocity in CTF introduces a real physical frequency shift from ν_{mn} into $\nu_{med.}$. Then a detector would ***perceive*** this $\nu_{med.}$ as $\nu_{\text{det.}}$ due to its own velocity w.r.t CTF. The key assertion of this paper is that, the classical Doppler shift for material based waves and the optical Doppler shift for CTF based EM waves, follow the same and two different physical processes during emission and absorption and hence the representative mathematical formulation should be same as classical Doppler shift formula. Light emitted by an atom in a star in a galaxy at a distance of 10 billion years from the Sun, could not have coordinated its Doppler shift "knowing" its relative velocity with an earth based detector's; because the earth did not exist! The Sun was born barely 4 billion years ago. Calculation of optical Doppler shift based upon current relative velocity between the two galaxies is a non-causal model and hence can lead to erroneous physical conclusions like *Expanding Universe*, which may not be true. It is more likely that the distance dependent Hubble redshift is due to a distant dependent frequency (energy) loss of photon wave packets engendered by very weak dissipative property of the CTF, like the postulate of *Tired Light*, or something else. We support our model by analyzing the origin of multi-longitudinal modes in He-Ne lasers. Light emitting and absorbing atoms in distant galaxies follow the same set of QM rules as those in our laboratory. We can safely assume that the physical properties of the free space between distant galaxies and that between the atoms trapped in a low pressure He-Ne laser tube are one and the same. Then we analyze the spontaneous and stimulated emission characteristics of Ne-atoms in a population inverted laser tube. The spectral line broadening measured in emission and absorption spectrometry is due to Doppler broadening introduced due to the statistical Maxwellian velocity distribution of the atoms; which is determined by the mean temperature of the surrounding of the atoms. Again, our assumption is that this Maxwellian Doppler broadening process is the same in the earth-based discharge tube and in the corona of distant stars. Both classical physics (Doppler & Maxwell) and quantum physics (emission and absorption) are same here as in the distant galaxies. And these two branches of physics are complementary, not discordant with each other.

We now present arguments that atoms, as quantum mechanical light emitters and detectors, behaves as though their absolute velocities remain independent of each other with respect to the quiescent CTF. Analysis of the prevailing spectrometric observations (data) and their Doppler shifts (broadening) validate this assertion.

2. A REVIEW OF CLASSICAL DOPPLER SHIFT

2.1 Source moving; detector stationary

The classical concept and derivation of Doppler shift started as a ***physical process*** based on the relative motions of both the source and the detectors with respect to the ***stationary tension field*** that supports the wave propagation! For a pair of stationary detectors with respect to CTF, a moving source of vectorial velocity $\bar{\mathrm{v}}_{src.}$ with internal resonant emission frequency emitting a frequency ${}_{src.}\nu$ as its internal resonance condition dictates will ***perceive*** them as ${}^{\pm}_{\det.}\nu$ (Fig.1). We are following the old classical model for sound waves that propagate leveraging the pressure tension field held by the air. In our case, the EM waves propagate by leveraging the stationary CTF [7]:

$$ {}^{\pm}_{\det.}\nu = \frac{{}_{src.}\nu}{1 \mp \mathrm{v}_{src.}/c} = {}_{src.}\nu(1 \mp \mathrm{v}_{src.}/c)^{-1} \tag{2} $$

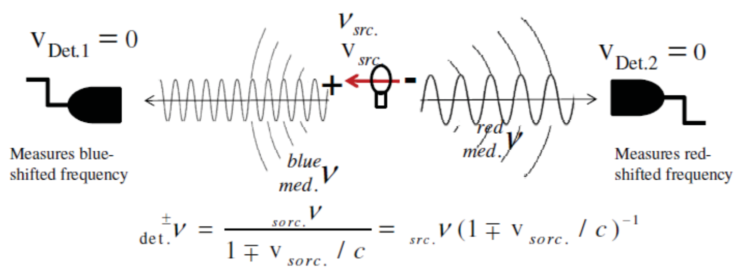


Figure 1. Classical Doppler frequency shifts due to a moving source and stationary detectors.

2.2 Source stationary; detectors moving

When the source is stationary with respect to CTF (Fig.2), its internal resonance frequency emerges as the frequency of the medium, ${}_{QM}\nu \equiv {}_{src.}\nu = {}_{med.}\nu$. But different detectors with velocities with respect to CTF will perceive this same frequency ${}_{QM}\nu \equiv {}_{src.}\nu = {}_{med.}\nu$ as various different ones ${}^{\pm}_{\det.}\nu$ given by (just as for sound) [7]:

$$ {}^{\pm}_{\det.}\nu = \frac{c \pm \mathrm{v}_{\det.}}{\lambda_{med.}} = {}_{src.}\nu(1 \pm \mathrm{v}_{\det.}/c) \tag{3} $$

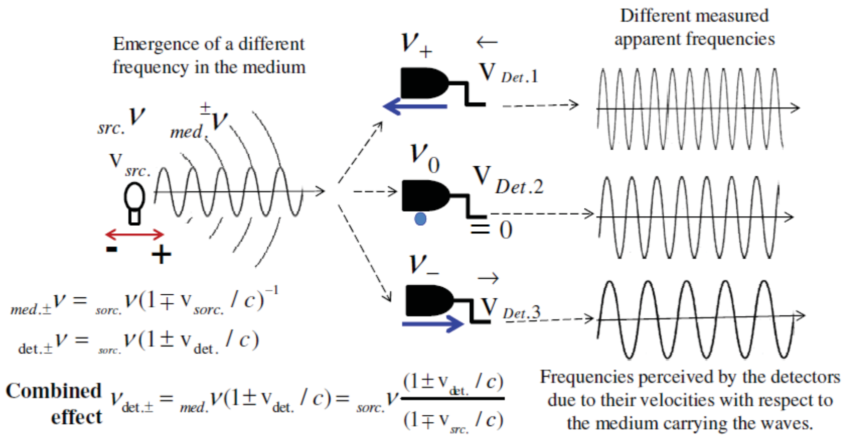


Figure 2. Classical Doppler frequency shifts due to a stationary source and many moving detectors. Note that the same real frequency in the stationary medium is experienced as different wave frequencies by different detectors due to their different velocities with respect to the stationary medium, and relative to each other.

2.3 Source and detectors both are moving with respect to the stationary medium

When both the source and the detectors have relative velocities with respect to CTF (Fig.3), one can obtain the total effective Doppler shift by combining the Eq.2 and Eq.3, just as for sound [7]:

$$\nu_{\det.\pm} = {}_{med.}\nu(1 \pm \mathrm{v}_{\det.}/c) = {}_{sorc.}\nu \frac{(1 \pm \mathrm{v}_{\det.}/c)}{(1 \mp \mathrm{v}_{src.}/c)} \tag{4}$$

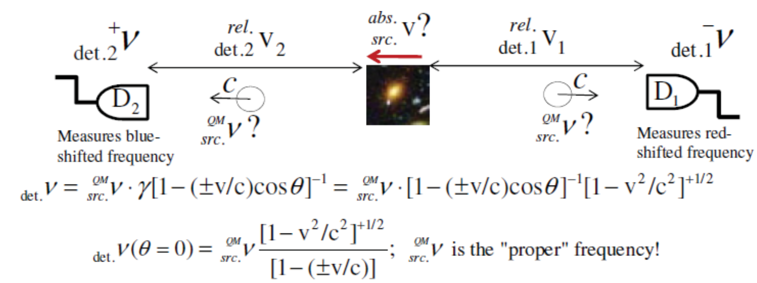


Figure 3. Both the source and the detectors are moving in different directions with respect to the stationary tension field that supports the perpetual propagation of a wave fixed by the tension properties of the tension field.

By accepting $c \gg \mathrm{v}_{\text{src. or det.}}$ one can approximate Eq.2 using binomial expansion and achieve an expression given by Eq.5, which is identical to that of Eq.3:

$${}^{\pm}_{\det.}\nu = {}_{src.}\nu(1 \mp \mathrm{v}_{src.}/c)^{-1} = {}_{src.}\nu(1 \pm \mathrm{v}_{src.}/c) + [\text{neglect 2nd \& higher order terms}] \tag{5}$$

Now one can mathematically argue that the identical structure of Eq.2 and Eq.5 implies that optical Doppler shift depends solely upon the relative velocity between the source and the detector. Then the replacement of $\mathrm{v}_{src.}$ in Eq.2 and $\mathrm{v}_{\det.}$ in Eq.3 by $\mathrm{v}_{rel.}$ yields the so called relativistic optical Doppler shift relation as purely due to relative velocity between the source and the detector, given ion Eq.1. We will abstain from any further discussion on this assumption of "relative velocity" and press on with our approach of modeling nature based upon visualizable physical processes going on in nature.

3. A REVIEW OF SPECTRAL LINE BROADENING EXPLAINED BY CLASSICAL AND QUANTUM PHYSICS

Let us now summarize the origin of line-broadening in spectral emission due to spontaneous emission from gas atoms and line-broadening in spectral absorption by gas atoms. Intrinsic quantum mechanical resonance frequency for downward and upward transitions remains fixed, at least, for kinetic velocities that we measure as thermodynamic average temperature. The gas atoms suffer statistically broad distribution of velocities, which is given by the Maxwell-Boltzmann velocity distribution, where $df(\mathrm{v})$ denotes the number atoms within the velocity band v and v+dv [1]:

$$df(\mathrm{v}) = (M/2\pi kT)\, e^{-M\mathrm{v}^2/2kT} d\mathrm{v} \quad (6)$$

So, a detector in a spectrometer, at rest with respect to the wave-sustaining tension medium, will perceive all the spontaneously emitted wave packets of frequency ${}_{QM}\nu$ as ${}_{med.}^{\pm}\nu = {}_{\det.}^{\pm}\nu$ due to the source (here atom) velocity $\mathrm{v}_{\mathrm{atm.}}$ with respect to the stationary tension field (same as Eq.1, Eq.2 and Eq.5):

$$\begin{aligned} {}_{med.}^{\pm}\nu = {}_{\det.}^{\pm}\nu &= {}_{QM}\nu(1 \mp \mathrm{v}_{atm.}/c)^{-1} \\ &= {}_{QM}\nu(1 \pm \mathrm{v}_{\mathrm{atm.}}/c) + \text{2nd \& higher order terms} \end{aligned} \quad (7)$$

The corresponding Doppler broadened spectrum, shown in Fig.4, is due to statistical velocity distribution. The relation is given by [1]:

$${}_{Dop.}S(\nu) = \frac{1}{{}_{D.}\delta\nu}\left(\frac{4\ln 2}{\pi}\right)^{1/2} e^{-4({}_{\det.}\nu - {}_{QM}\nu)(\ln 2/{}_{D.}\delta\nu^2)};\ \text{where}\ {}_{D.}\delta\nu = \left(\frac{2kT}{M}4\ln 2\right)^{1/2}({}_{QM}\nu/c) \quad (8)$$

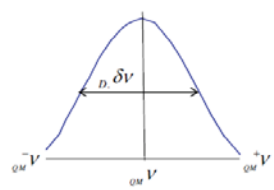


Figure 4. Broadening of the measured spectral line from a gas discharge tube due to statistical distribution of the velocity of the gas atoms, given by Maxwell-Boltzmann formula.

Fig.5 presents a graphic depiction of the spectral line broadening, ${}_{D.}\delta\nu$, due to thermal velocity distribution of the atoms, even though all the spontaneous emission frequency during the quantum transition between the levels $n \to m$ remains fixed to ${}_{QM}^{mn}\nu$, but it evolves into ${}_{med.}^{\pm}\nu$ in the stationary medium due to the source velocity. Mathematical formalisms of classical and quantum mechanics do not help us visualize the detailed physical processes behind this evolution of photon energy $\Delta\nu_{mn} = h\nu_{mn}$ into a photon wave packet with carrier frequency ν_{mn} if the source is stationary in CTF and then further evolve into Doppler shifted wave packet with carrier frequency $\nu_{med.}$.

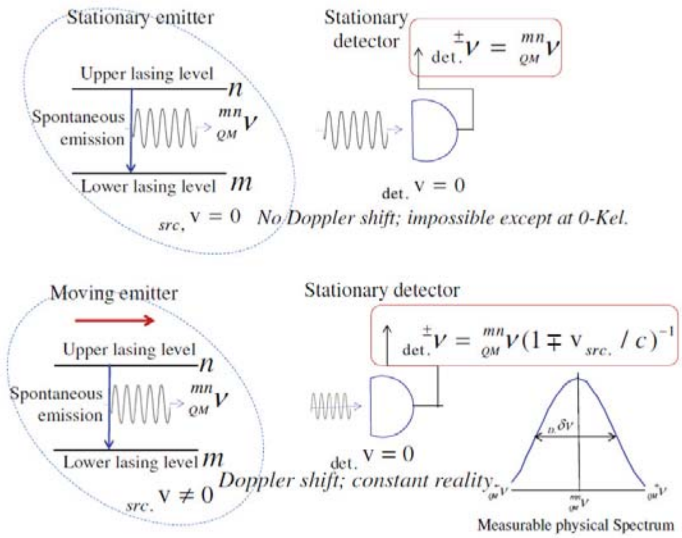


Figure 5. A graphic depiction of the spectral line broadening, $_{D.}\delta\nu$,due to thermal velocity distribution of the atoms, even though all the spontaneous emission frequency during the quantum transition between the levels $n \rightarrow m$ remains fixed to $^{mn}_{QM}\nu$, but it evolves into $^{\pm}_{med.}\nu$ in the stationary medium due to the source velocity.

Considering the broad successes of QM predictions, validated through wide variety of terrestrial and stellar spectrometry, it logically self-consistent for us to assume that the space between the atoms in a low pressure discharge tube in our laboratory and the space between the atoms in the corona of stars must fundamentally be identical, except for the gravitational gradients, whose effect on quantum energy levels are usually weak. We have already suggested that this all-pervading cosmic space as a Complex Tension Field (CTF).

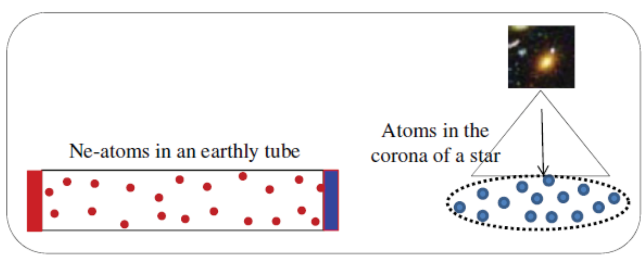


Figure 6. The space between the atoms in a discharge tube on earth and the space between the atoms in the corona of any distant star are same, which we have proposed as CTF. Their quantum level transition properties remain essentially same.

Then we can safely assume that the physical processes behind the generation of emission and absorption spectral lines are identical on earth as they are in the corona of stars. Hence, we should find that the classical statistical physics modeling the velocity distribution for a given temperature and the quantum physics modeling the level transitions in atoms, remain same under careful spectrometric analysis of light, either due to emission, or due to absorption, carried out on earth, or near the corona of a star (in a space vehicle in a stationary orbit around the star). In fact, this is the foundational assumption behind all astrophysics spectrometry. Fig.7 presents a pictorial view of this assumption.

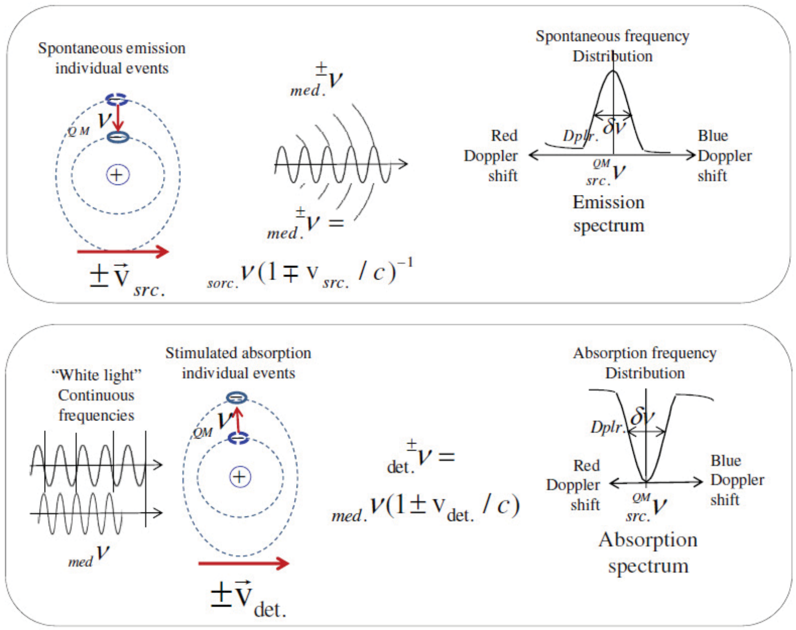


Figure 7. Fundamental spectral characteristics of atoms, either in emission or absorption, remain same, whether the atoms are in a discharge tube on earth, or in the corona of a distant star.

4. A REVIEW OF THE ORIGIN OF GAS LASER MODES: $_{QM}\nu$ REAMINS UNCHANGED DUE TO THERMAL VEL.OCITIES OF ATOMS.

A pair of reasonable high resolution Fabry-Perot spectrometer can be used to simultaneously to display the spectral characteristics of spontaneous and laser light from a He-Ne laser tube. Laser emission along the axial direction will display a unique set of longitudinal modes, which are very narrow and are spaced by the cavity resonance condition set by classical resonance for wave propagation, c/2L, where L is the distance between the cavity mirrors. This is pictorially depicted in Fig.8.

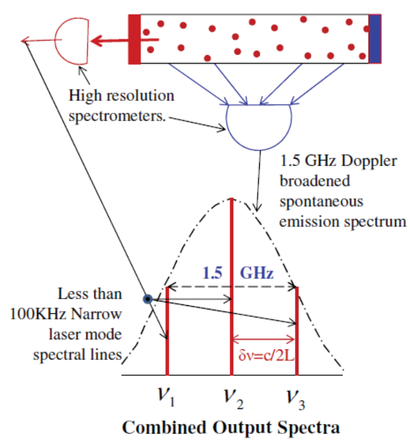


Figure 8. The analysis of the spectral characteristics of light from a He-Ne laser tube is presented. Spontaneous emission from the side of the tube gives a Doppler broadened continuous spectrum. Stimulated emission out of the axial direction displays a set of characteristic longitudinal modes, which are extremely narrow and separated by the mode spacing expression c/2L, L being the cavity length.

In laser terminology, a gas laser is an inhomogeneously gain broadened system because the velocity of the atoms are given by Maxwell's velocity distribution relation, which dictates not only spontaneous emissions process, but also the stimulated emissions process [8]. In fact, as mentioned earlier, for thermal velocities, quantum energy level spacing inside atoms remains unaltered, whether it is downward spontaneous emission, or the downward stimulated emission. We know that it is the stimulated emissions triggered by the axially propagating spontaneously emitted wave packets. But, Maxwell's velocity distribution introduces a spread in the frequency distribution of the spontaneous emissions. So, most of these wave packets are Doppler shifted and do not correspond to ${}^{mn}_{QM}\nu$ necessary for the ***detecting*** atoms to ***perceive*** it as the right stimulating signal ${}^{mn}_{QM}\nu$. However, detectors (atoms) moving with different velocities with respect to the stationary tension field, will perceive the frequencies in the medium ${}^{\pm}_{med.}\nu = {}^{\pm}_{\text{det.}}\nu$ as various different effective frequencies. Then, those excited atoms (in the upper level) that have exactly the same vectorial velocity equal to the original atom that generated the spontaneous wave packet (in magnitude and direction, $\bar{v}_{\text{det.}} = \bar{v}_{\text{src.}}$), would perceive it as the correct quantum mechanical stimulating frequency ${}^{mn}_{QM}\nu$. This can be appreciated from the mathematical expression given in the Fig.9 (see Eq.4). Of course, this also corroborates that when the relative velocity between a pair of atoms is vectorial zero, then the Doppler shifted frequency due to source-atom movement ***appears*** nullified due to the movement of the detector-atom movement. Note that, because of statistical nature of the velocity distribution, a large number of gas atoms can never have vectorial zero velocities at any time. This is the key reason why gas lasers are usually much less efficient than the so-called homogeneously broadened solid-sate lasers [8].

Our key point is that the physical process behind optical Doppler shifts due to excited moving atoms (moving source), and responding moving atom (moving detector) are distinctly different and their separate absolute velocities with respect to the stationary CTF are clearly discernible. Note also that by the time a spontaneous wave packet from a Ne-atom arrives to stimulate another excited Ne-atom, after, say 1ns (30cm far), the original atom most likely is in a totally different quantum state and at a different physical place with a different velocity. So the interacting photon wave packet and the excited atom-to-be-stimulated, cannot have any knowledge (or interacting force) with the original atom that had contributed the stimulating wave packet. Thus the relative velocity between this specific pair of Ne atoms at the moment of stimulated emission by the second Ne-atom has absolutely no physical relevance. Unless, of course, we can declare that atoms can be time-entangled at vast distances between past and the present. This is clearly an un-acceptable proposition to continue to develop causal-effect driven models for nature.

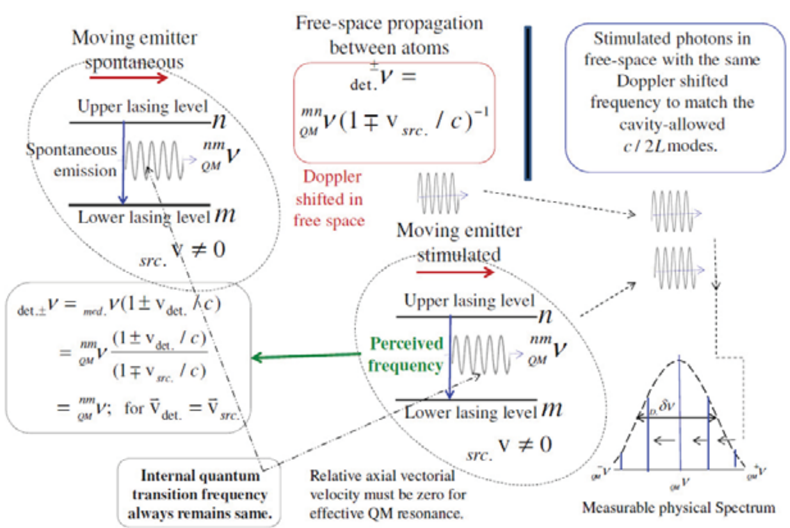


Figure 9. Emergence of frequency-sharp set of longitudinal modes from inhomogeneously gain-broadened gas lasers, following the conditions for classical cavity-wave resonance and quantum mechanical energy level transitions for spontaneous and stimulated emissions clearly imply that the behavior of the Ne atoms are dictated by their respective relative velocities with respect to the stationary discharge tube, and hence the stationary vacuum (CTF) encased by the laser tube.

5. DISCERNING THE COSMOLOGICAL RED-ONLY SHIFT FROM THE RED-&-BLUE DOPPLER SHIFTS IN STELLAR SPECTRA.

We have established that light emitting and light detecting Ne-atoms, many centimeters apart, cannot recognize their past-and-present relative velocities. Let us now extend the same logic to light emitting (absorbing) atoms and detecting atoms in different galaxies.

5.1 Atomic absorption spectra generated by atoms should show identical physical characteristics on earth and in the corona of a star

Fig.10 is a pictorial presentation of our prevailing assumption that the characteristics of absorption spectra of gas atoms on earth and in the corona of a distant star follow the same QM rules. But Hubble established that the absorption spectra generated in the corona of a distant star in a distant galaxy, when measured on earth, the absorption line center shifts towards lower and lower frequency (red shift) depending on the inter-galactic distances.

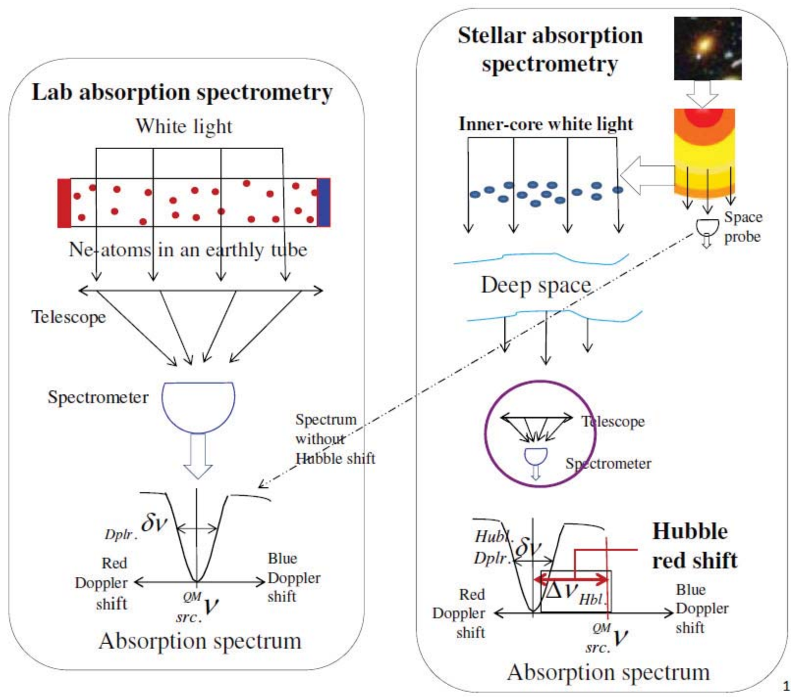
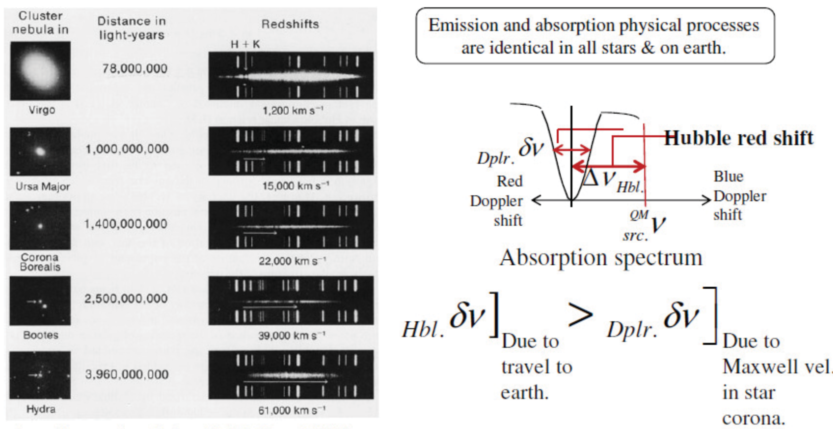


Figure 10. The physical process behind the emergence of spectral broadening of the absorption spectra, whether taking place on earth or in the corona of a star, is identical. However, when we measure such spectra from different distant galaxies, the recognizable characteristic line-centers are systematically red-shifted depending upon the distance. Interestingly, the absorption line width is still dictated by the mean temperature of the corona of the star that emits the light.

5.2 Identifying the different physical processes behind absorption line-width and the line-center shift

The physical characteristics of the absorption line spectra are set by the Doppler velocity distribution of the atoms in the outer corona of a star. The width follow the Maxwell's velocity distribution rule set by the mean temperature at the corona. The absorption line spectra are represented by the absence of optical frequencies over a narrow band out of the emerging "white light" from further inside the star. So, the real physical signals consist of this "white light" with absence of narrow bands of signals at characteristic atomic and molecular emission frequencies. Absorption lines are ***non-signals***, or absence of physical signals. *Non-signals (or "nothing") cannot undergo physical changes like Doppler frequency shifts.* But the entire "white light" shows cosmological (or Hubble) red shift when we measure on earth. The measured width of the absorption lines remains congruent with the corona temperature induced absorption broadening.

This can be seen in the spectra given in Fig.11. Note that the cosmological red shift of the line centers ${}_{Hbl.}\Delta\nu$ consistently becomes larger and larger for galaxies farther and farther away from us. But the Doppler induced absorption line width ${}_{Dplr.}\delta\nu$ remains determinable essentially by the corona temperature. Accordingly, we have proposed [xx] that the physical process(es) behind the distance dependent cosmological redshift is distinctly different from the optical spectral Doppler shifts generated due to velocity distribution of atoms. It is possible that the CTF itself possesses the capability to very slowly assimilate some of the energy deposited externally by some de-excited dipoles back into its tension field energy. This could be a mechanism for the CTF to be a self-re-generating system for particle and waves. Alternately, it could be due to some weak nonlinear property induced in the CTF by the densely present wide variety of cosmic entities, giving rise to this distant dependent frequency degradation:



http://astro.wku.edu/astr106/H_K_redshift.jpg

Figure 11. The frequency shift of the entire span of "white light" consistently increases with the distance of the galaxies, thus shifting the line-center of absorption line-center further and further to lower frequencies. But, the absorption line width, determined by the corona of stars, remains related to the mean temperature of the coronas.

5.3 Proposal to measure absorption spectra by a space vehicle with controllable velocity.

The apparent Doppler shift in a wave packet propagating through CTF as perceived by a detector (spectrometer) is given by Eq.3. This perceived frequency shift is immaterial whether the carrier frequency of the wave packet under measurement, has been introduced by the source velocity, or by the subtle dissipative property of the CTF, as mentioned in the previous section. Although, the state of our technology and the affordability of the necessary cost may not yet be encouraging, we would like to propose a potential of space probe that can occupy a stationary orbit in a star carrying a high resolution spectrometer. Then it can send the absorption spectra that would not suffer from cosmological distance dependent red-shift. It will only show temperature dependent Doppler broadening (see Fig.12).

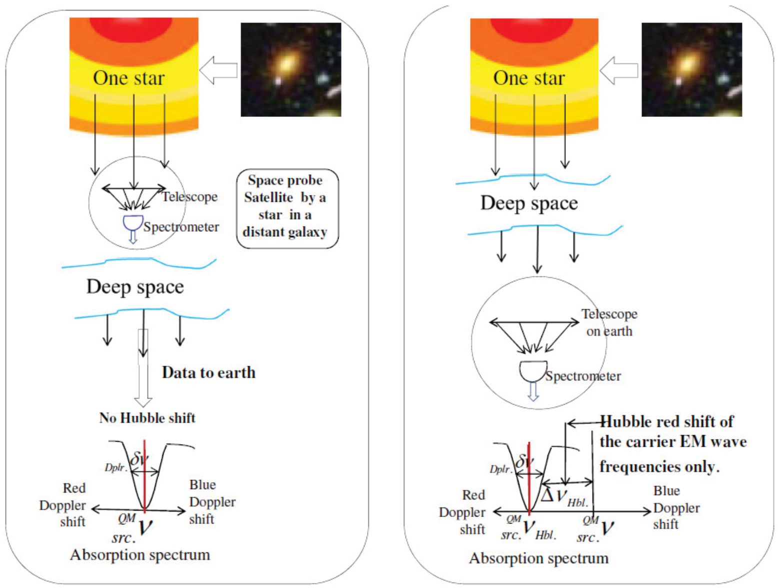
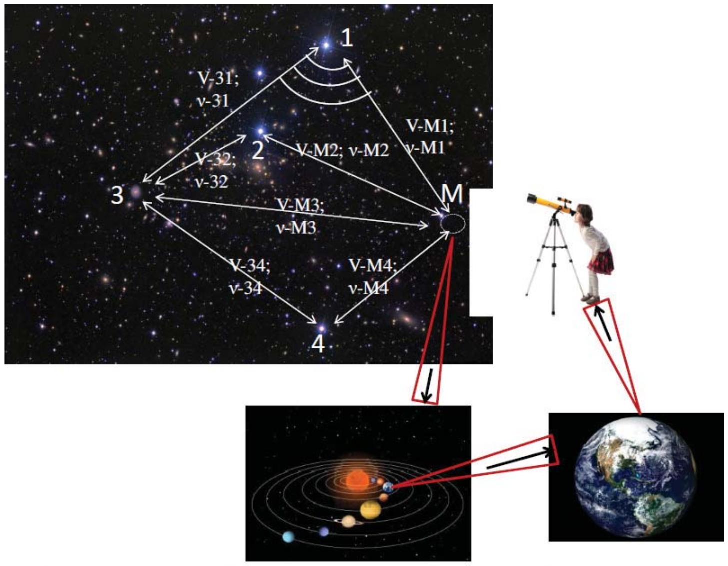


Figure 12. A space probe in a stationary orbit in a distant star would be able to send us the data for the absorption line center and width that does not suffer from frequency down shift due to propagation through space (CTF)...

5.4 Logical incongruence in the assumption that only relative velocity between a pair of distant galaxies determine the Doppler redshift

We have marked out five galaxies in the diagram below, 1, 2, 3, 4 and M (our Milky Way). According to prevailing cosmology, the relative velocity between any pair of galaxies is fixed by the measured Hubble shift. Consider only one particular absorption line center ν_{QM} out of all the absorption lines that are generated by all stars. But this same ν_{QM} emitted from the galaxy "1" would be measured as different Doppler shifted line-centers by different galaxies. On earth, we measure it as ν-M1 due to our ***relative velocity*** V-M1. Intelligent creatures in different stars of the galaxy "3" would measure this particular line Doppler shifted to ν-31 due to their ***relative galactic velocity*** V-31. If the cosmic space does not have any influence on the consistent cosmological frequency down shift; then, according to our understanding of the laser mode generation (section 4), the total frequency down shifts (ν_{QM}-ν_{M1}) and (ν_{QM}-ν_{31}) should be exclusively due to the velocities V-M1 of galaxy M and V-31 of galaxy 3 with respect to the stationary CTF. Some of these frequency shifts are so large that absolute velocities of the detector-galaxies would exceed the velocity of light, which is not accepted by current physics models. Alternatively, if these frequency shifts are really due to the separate relative velocities between the respective galaxy pairs, then we have the causal violation in the assessment of our time-interval. If the galaxy "1" is 10-light years far from us; the light we are analyzing today on earth was emitted well before the Sun was even born! The Sun cannot coordinate its relative velocity with that of a galaxy many billions of light years before it was born.



http://www.astronet.ru/db/xware/msg/1244892/comacluster_rowe_big.jpg.html

Figure 13. Logical inconsistencies in explaining cosmological red shift as exclusively due to Doppler shift of EM waves due to relative velocity between all possible pairs of galaxies (see text for explanations).

Even stronger argument is that all absorption line centers ν_{QM}'s and their absorption line broadening get set by the temperature of the corona of the stars due to the local temperature dependent Maxwell's velocity distribution and the effective absolute velocity of the star with respect to the stationary CTF. We have already mentioned that the absorption lines correspond to the absence of any physical signal. A "nothing" signal cannot undergo physical changes! That is why the width of absorption lines does not change due to propagation through vast cosmic space. However, the real signals contained in the "white light" (entire range of EM waves) undergo the frequency down-shift over the entire frequency span. So the set of locations of the absence of frequency bands simply shifts with the shift of the "white light" without undergoing any further frequency down shift. Clearly, this shift is introduced by the space (CTF).

5.5 Summary

Based upon the facts (i) that propagating waves do not interact in the linear domain [9] in the absence of interacting medium (NIW-property); and (ii) that the velocity of light remains constant in the free space as $c = (1/\varepsilon_0 \mu_0)^{-1}$ and validated by Maxwell's wave equation; we have proposed that cosmic space is a stationary Complex Tension Field (CTF) that supports the perpetual propagation of EM waves. The propagating EM waves represent liner perturbations of this CTF induced by various dipole undulations. Particles are localized self-looped resonate undulations of this same CTF [2-5] generated by some non-linear perturbations. Doppler shifts of EM waves have two components. Source movement facilitate the generation of physically frequency shifted undulation, from ν_{QM} to $\nu_{med.}$, in the CTF, which continue to propagate with this ***physically shifted new frequency***. Different moving detectors with different relative velocities with respect to CTF will ***perceive*** this same $\nu_{med.}$ as different frequencies as $\nu_{det.1,}$ $\nu_{det.n}$ etc. This view is depicted again in Fig.14.

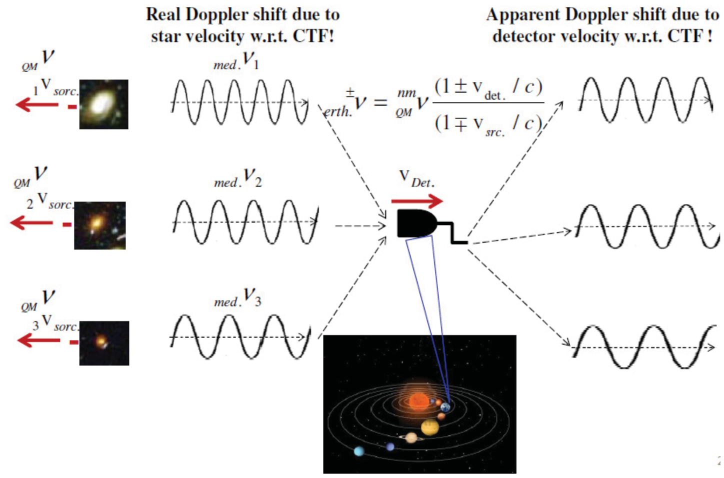


Figure 14. Doppler shifts of EM waves sustained by CTF, just as sound waves sustained by pressure tension field, suffer two types of Doppler shifts. Real shift due to source movement and apparent shift due to detector movement.

To preserve causality in physics (effects determined by some real physical interaction process), it is then logical for us to conclude that the cosmological frequency down shift (redshift) originate in the CTF as a very weak distant dependent energy loss of the EM wave packets as they propagate through vast distances between the galaxies [5].

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