Optical coherence in interstellar space simplifies universe model

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Abstract

Expansion of stellar winds made essentially of protons and electrons, cools them in a spherical shell around Strömgren's sphere, into excited H atoms by which superradiance and associated super-absorption transform energy received from star into emissions by sphere limb. In interstellar space, stimulated Raman losses redshift stellar light by fine structure excitations of H in 2P states.

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1 Introduction

Each specialty has its rules, but it is often difficult to compare rules of neighboring disciplines: for instance, what an astrophysicist calls a "1420 MHz laser emission" is, for a spectroscopist, a “superradiant emission" because, in spectroscopy, lasers need optical resonators. Except close to stars, gas pressure is lower than in a gas laser, so that gas interactions with light are spatially coherent (s-coherent): there is no spontaneous light emission, no selection rules. All interactions in a mode are s-coherent, they can only be an increase or decrease of radiance in existing ray (possibly a weak zero point ray). Needed frequency always exists in temporally-incoherent (t-incoherent) exciting light, so that Raman interactions transfer quantized energy between modes of ray.

2 Light-gas interactions close to a hot star.

Hot stars emit a “stellar wind” made mainly of protons and electrons. By an adiabatic expansion this gas cools until protons and electrons combine on a Strömgren's sphere. This sphere is surrounded by excited gas in a Strömgren's shell. Superradiance in the shell works in directions for which light amplification is maximal, as in a laser (taking into account laser virtual size due to mirrors.). Thus we observe the bright limb of sphere while super-absorption generated by super-emission absorbs nearly all star light. The result of this very complex system involving minority atoms, is a transfer of star energy to limbs emission. Around small stars, Strömgren's shell is only detected by amplification of light emitted by background stars.

Strömgren's sphere of SNR1987A was initially strangled by planetary absorption of energy in an equatorial plane.

3 H atoms in 2P states produce redshifts observed in astronomy.

Periodicities noted in spectra of stars, particularly of quasars leads to Karlsson's rule: many redshifts are nK, where K is Karlsson constant 0.062 and n an integer of serie: 3, 4, 6, ... Calculate by Rydberg formula the redshifts Z which bring the frequencies of Lyman beta and gamma lines of atom H to frequency alpha:

$Z(\beta,\alpha) = (\nu_\beta - \nu_\alpha)/\nu_\alpha = [(1-1/3^2)-(1-1/2^2)]/(1-1/2^2)] \approx 5/27 \approx 0.1852 \approx 3*0.0617$;

$Z(\gamma,\alpha) = (\nu_\gamma - \nu_\alpha)/\nu_\alpha = [(1-1/4^2-(1-1/2^2)]/(1-1/2^2)] = 1/4 = \beta = 0,25 = 4*0.0625$.

Empirical Karlsson law is explained by admitting that these redshifts are produced by atom H in its level 2P: As long as these atoms can be created by a Lyman alpha absorption, the spectrum is redshifted, which prevents visible inscriptions of absorption lines. But when an absorbed line reaches Lyman alpha frequency, redshift disappears, and all lines of local gas are absorbed.

Redshift resumes slowly if there remains in redshifted star spectrum enough energy for a Lyman beta absorption to create atoms able to redshift the spectrum enough for the frequency absorbed spectrum line, to emerge from Lyman alpha frequency.

A computation of such construction of a spectrum of quasar is fruitful, but, at low frequencies it needs addition of a chromatic dispersion of redshifts observed in stars multiplets: It is useless to vary fine structure constant.

4 Redshift of a stellar light ray by Raman energy loss.

The s-Coherent Raman Effect on t-Incoherent Light (CREIL), also named Stimulated Raman Loss (SRL) , studied for half a century mainly for its applications in microscopy and in optical fibers [1,2], does not interest astrophysicists, whereas we have pointed out the importance of coherent Raman in study of propagation of stellar light outside Strömgren systems, where Einstein's theory of optical coherence applies [3].

A far star light generates planar wave surfaces in a non-collisional gas. A s-coherent Raman interaction absorbs **any** quantum of a corresponding ray and feeds by a resonance frequency of an H atom, a quantum of lower frequency, as required by coherent emissions. This frequency propagated in ray because star spectra are perfectly t-incoherent. This need of amplification replaces usual selection rules for colliding molecules.

Atom excited by this Raman interaction loses received energy by interaction with low frequencies of background.

What are the involved resonances of H atom ?

The Lamb shift frequency (1,058 GHz) is probably too close to the hash frequency of incoherent natural light. Fine structure frequency, at 10.9 GHz is suitable.

Note that the probability of an interaction depends slightly on the frequency of modified quantum, so that the redshift has a chromatic dispersion, unlike a Doppler redshifts: it is not useful to vary the fine structure constant.

5 Applications.

5.1 The forests of quasars spectra.

Let us condense in a few lines the principle of a spectroscopy of quasars much simpler than previous theories. A quasar is assumed to be surrounded by a large region containing mainly non-excited hydrogen atoms under low pressure, so that s-coherence applies.

i) H atoms are pumped from 1S to 2P by a Lyman alpha absorption, which produces a quasi permanent redshift. The coefficient of amplification at frequency Lyman alpha increases.

ii) An accidental ray initiates a coherent emission, a "flare" observed as in an aurora borealis. During this superradiant emission, the gas becomes super-absorbent, it strongly absorbs the observed light, drawing a black line in spectrum. Absorption is repeated, etc. until the arrival of an absorbed line at alpha frequency generate a spectrum absorption, as described in previous section.

Coherence is useful until inside dense regions of stars where pressure makes pseudo-crystals of H atoms.

5.2 Hubble Law

. The redshifts of stars does not evaluate their distance, but the column density of excited atomic hydrogen. These atoms are obviously particularly abundant in the vicinity of hot stars: There, distances are over-valued. Thus, spiral galaxies were distant, swollen, unstable. Bubbles were inflated in maps of galaxies, and so on.

6 Conclusion.

A day will come when astrophysicists will agree to learn and apply contemporary spectroscopy.

References

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