



HAL
open science

So-called Big-Bang is a set of "coherent Raman" involving H atoms in 2P states.

Jacques Moret-Bailly

► **To cite this version:**

Jacques Moret-Bailly. So-called Big-Bang is a set of "coherent Raman" involving H atoms in 2P states.. 2020. <hal-02904984>

HAL Id: hal-02904984

<https://hal.science/hal-02904984v1>

Preprint submitted on 22 Jul 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



HAL Authorization

So-called Big-Bang is a set of "coherent Raman" involving H atoms in 2P states.

Jacques Moret-Bailly

July 22, 2020

Abstract

Quasar spectra precisely studied by P. Petitjean, shows superposition of Lyman alpha lines of H atoms with other Lyman lines having larger redshifts, showing that absence of alpha absorption stops redshifts. Thus H excited atoms are involved in so-called "cosmological redshifts". Coherent Raman by 2P hydrogen atoms redshifts light rays frequencies, reducing light intensity only by these shifts. Energy is not scattered into all directions, energy absorbed by an atomic interaction redshifts exactly a ray light quantum. Hubble's law evaluates column densities of H(2P), exaggerating distances of hot stars, so that, smaller, galaxies are stable without dark matter.

Keywords: Coherent optical effects; 030.5620 Radiative transfers

1 Introduction

In 1917, Einstein wrote that interactions of light with a low pressure gas are "spatially coherent", so that [1,2]:

i) In a ray, gas-light interactions do not depend on "selection rules", but may be positive or negative amplifications of modes of incoming ray.

ii) Different rays may interact through a change of properties of matter. In a laser, super-radiance binds dipoles on wave surfaces, so that laser radiated energy which depends on squares of molecular momenta is increased while most other rays are super-absorbed by incoherent super-interactions.

Stars emit winds mainly made of protons and electrons which may cool down enough to combine on Strömgren's spheres, generating superradiant shells of excited gas which may: -Draw bright limbs of Strömgren's spheres -Super-absorb other stars light.

Out of these shells, pressure is low. Following Einstein theory, light-gas interactions are spatially coherent.

2 Atomic hydrogen in 2P states produces redshifts.

2.1 Observation of quasar redshifts.

Burbidge [3] and Karlsson [4,5] studied redshifts (relative frequency shifts) of light emitted by stars. Karlsson's formula shows that frequencies of redshifts are often quantized, with values given by formula $Z(n) = nK$, where n is an integer of serie 3, 4, 6, ... , and Karlsson's constant $K=0.062$. Result for $n=3$ or 4 is verified using Rydberg's formula: $Z_{(\beta,\alpha)} = (\nu_\beta - \nu_\alpha)/\nu_\alpha = [(1 - 1/3^2 - (1 - 1/2^2))/(1 - 1/2^2)] \approx 5/27 \approx 0.1852 \approx 3 * 0.0617$;

$Z_{(\gamma,\alpha)} = (\nu_\gamma - \nu_\alpha)/\nu_\alpha = [(1 - 1/4^2 - (1 - 1/2^2))/(1 - 1/2^2)] = 1/4 = 0,25 = 4 * 0.0625$;

Karlsson's formula works well for $n = 3$ or 4.

2.2 Improvement of Karlsson's rule: Main redshifted lines.

Redshifted Lyman beta and gamma lines are generally not observed because they are exactly shifted on alpha line. Many such coincidences [6] show that *absence of alpha absorption stops redshifts*: Main redshifts require a Lyman alpha absorption generating H atoms in 2P state .

2.3 Quasars main lines.

A first sketch of an absorbed Lyman spectrum of H atom assumes that redshifts add as successive redshifts [7]:

i) We apply a Doppler-like redshift to sketch, such that a first gas absorbed line reaches Lyman alpha frequency.

ii) This stops redshift so that all gas lines are strongly absorbed (sketched).

iii) Assuming a slow remaining redshift, return to i). (This remaining redshift is produced by a Lyman beta absorption if source frequency redshifted to beta frequency was initially emitted by star). Else, there are no more alpha absorption, no more redshifts.

3 Redshift mechanism.

3.1 Spatially coherent interactions of light and molecules.

In a high flying plane, sky is dark while stars are bright: Collisions needed for incoherent emissions become rare. On the contrary, Einstein theory of coherent emissions works, emissions are amplifications of *pre-existing* rays, which are mainly stars rays.

Coherent Raman interactions may be observed in dense media using sources of coherent light (lasers). Thus, in microscopy, biologists use two laser rays [1]: first ray excites molecules, a crossing laser ray observes coherent Raman; For a larger interaction both rays are mixed as modes of a single ray, but there is no geometrical selection.

Usual selection rules work for emissions by colliding molecules, excited, for instance in a standard Raman, not for coherent interactions : lasers use often forbidden lines. In low pressure gas, spontaneous emissions are replaced by

more powerful interactions: resonators of lasers induce superradiant rays, while most other rays are strongly absorbed: For instance, in light pumped lasers (pink ruby, neodyme YAG, dye,...) exciting light is strongly absorbed when laser beam switches on.

3.2 A mechanism of redshifts: "Stimulated Raman Loss" (SRL) [1] also named "spatially Coherent Raman Effect on temporally Incoherent Light" (CREIL) [7]

Atoms in 2P states produce redshifts of spectra. How ?

Set F any frequency in ray spectrum. A quantum at frequency F excites by a Raman coherent interaction a molecular resonance of frequency f. Molecule returns a quantum at frequency F-f. As interaction is spatially coherent, that is it involves in the same way atoms on wave surfaces orthogonal to observed ray, this return must be spatially coherent, corresponding to an amplification of a frequency F-f of ray. This is a general property of optical coherence which may amplify an incident ray, but cannot initiate an arbitrary emission as a collision. As white light emitted by a star is *perfectly temporally incoherent*, its spectrum contains frequency F-f which is amplified by addition of intensities, emission of a quantum amplifying an existing mode of incident light.

Then, any quantum of energy hf transferred from observed ray to atom may be absorbed by a coherent or incoherent interaction with cold background light. Entropy increases.

Assuming that F is much larger than f, Raman does not depend much on F: redshift has a small chromatic dispersion.

A lot of convenient low energy interactions is available in 2P states of H atom:

* Fine structure: Energy in state $2P_{3/2}$ is larger than in $2P_{1/2}$ by $45 \mu\text{eV}$ (corresponding to frequency $f=10,9 \text{ GHz}$, wavelength $\lambda = 2,8 \text{ cm}$). * Lamb shift : Energy in state $2S_{3/2}$ is larger than in $2P_{1/2}$ by $4,372 \mu\text{eV}$ ($f= 1.0576 \text{ GHz}$, $\lambda = 28,37 \text{ cm}$).

* Hyperfine energy by coupling of nuclear and electronic spins: $5,9 \mu\text{eV}$ ($f= 1,42 \text{ GHz}$, $\lambda = 21\text{cm}$).

4 Applications of spatially coherent spectroscopy in astrophysics.

4.1 New Hubble law.

Redshift by H atoms may be added to cosmological one, or replace it. It shows that Hubble law exaggerates distances where density of excited H atoms is large, in particular close to hot stars. Thus:

- Spiral galaxies are closer to us. Smaller, their stability does not require dark matter.
- Bubbles inflate maps of galaxies.
- Being interactions with matter, redshifts by H atoms have a chromatic dispersion: there is no need to modify fine structure constant to explain the multiplet spectra of far stars.

4.2 Observation of Strömgen's spheres.

Protons and electrons making stellar winds cool down by expansion, combine on Strömgen's spheres, generating outside Strömgen's shells of ionized, excited gas (mainly hydrogen). This laser medium generates superradiant light rays in directions for which amplification is maximal (as in a laser), that is tangentially to sphere, showing its limb.

Depending on intensity, the limb of sphere may show: only an amplification of light of far stars seen through, or a bright ring possibly punctuated. For SNR1987A, the sphere was initially strangled into an hourglass probably by light absorption of planets turning in an equatorial plane: Three circular limbs appeared by superradiance, just when direct star light was super-absorbed.

What a beautiful "black hole" !

4.3 Anomalous accelerations.

Outside Strömgen sphere of the Sun, protons and electrons of solar wind are cool enough to combine into excited hydrogen atoms. These atoms are able to transfer, by Raman coherent interactions, energy from sunlight to microwaves used to evaluate distance and speed of Pioneer probes. Thus probes seem have an anomalous acceleration.

5 Propagation of Quasar light in relatively far hydrogen atoms.

This is an example of simplification of space spectroscopy. In a region where radiated UV has broken H₂ molecules, excited atoms generate a Lyman alpha increasing amplification coefficient. As in a polar region of Earth, out of stratosphere, without collisions, excited atoms cannot emit Lyman alpha light. However, an improbable collision may start a bursting superradiant emission, so strong that astronomers see "flares", a lot of coherent emissions. This system works as a light pumped laser, that is it absorbs strongly rays which are not superradiant, in particular quasar ray. During pumping, star spectrum is redshifted, absorption is not very large. During flares, observed ray is strongly absorbed as pumping rays of a flashing laser: spectrum shows very dark lines, almost equidistant.

6 Conclusion.

The rejection of the application to astrophysics of Einstein's work (1917) by Menzel (illustrious astrophysicist) in 1931 led astrophysics to absurd theories that, unfortunately, some people insist on defending.

Low pressure of interstellar gas makes light-matter interactions mainly coherent, thus similar to interactions in a gas laser.

Hubble's law does not evaluate distances, but column densities of H(2P) atoms. Depending on abundance of excited H atoms, distances evaluated from Hubble's law must be modified: Closer, smaller, spiral galaxies may be stable without dark matter. Very bright stars inflate bubbles in maps of galaxies... And so on

Bibliography :

- [1] Ji-Xin Cheng, Xiaoling Sunney Xie, editors, Coherent Raman Scattering Microscopy, CRC Press, (Taylor and Francis.), Chap. 1.3.4. Spontaneous versus Stimulated Raman Loss (SRL). ISBN. 978-1-4398-6765-5, CRC Press (2012)
- [2] Higgins K. D. B, 2014, S. C. Benjamin, T. M. Stace, et al. Superabsorption of light via quantum engineering., Nature Communications, 5, Article number: 4705 (2014). DOI : 10.1038/ncomms5705.
- [3] Burbidge, G. The Distribution of Redshifts in Quasi-Stellar Objects, N-Systems and Some Radio and Compact Galaxies. ApJ. 154, L41-L48 (1968).
- [4] Karlsson K. G. Possible Discretization of Quasar Redshifts, Astron. and Astrophys., 13, 333, (1971).
- [5] Karlsson, K. G. Quasar redshifts and nearby galaxies. Astron. Astrophys. 239, 50-56 (1990).
- [6] Petitjean P. Le contenu baryonique de lunivers rvl par les raies dabsorption dans le spectre des quasars. Annales de Physique , 24, 1 (1999).
- [7] Moret-Bailly J. Propagation of light in low pressure ionised and atomic hydrogen. Application to astrophysics, IEEE Transactions on plasma science, vol. 31, No. 6, p.1215-1222, 2003.