



Fig. 01: Raman in 1930^[01]

Born: 7 November, 1888
Tiruchirappalli, Madras Presidency, British India.

Died: 21 November 1970 (aged 82)
Bangalore, Mysore state, India.

Alma mater: University of Madras.

Awards: 1924: Fellow of the Royal Society
1928: Matteucci Medal
1930: Knight Bachelor
1930: Hughes Medal
1930: **Nobel Prize in Physics**
1954: Bharat Ratna
1957: Lenin Peace Prize

Institutions:
Indian Finance Department
Rajabazar Science College (University of Calcutta)
Indian Association for the Cultivation of Science
Indian Institute of Science
Raman Research Institute.



Fig. 10: Blue of the sea^[12]

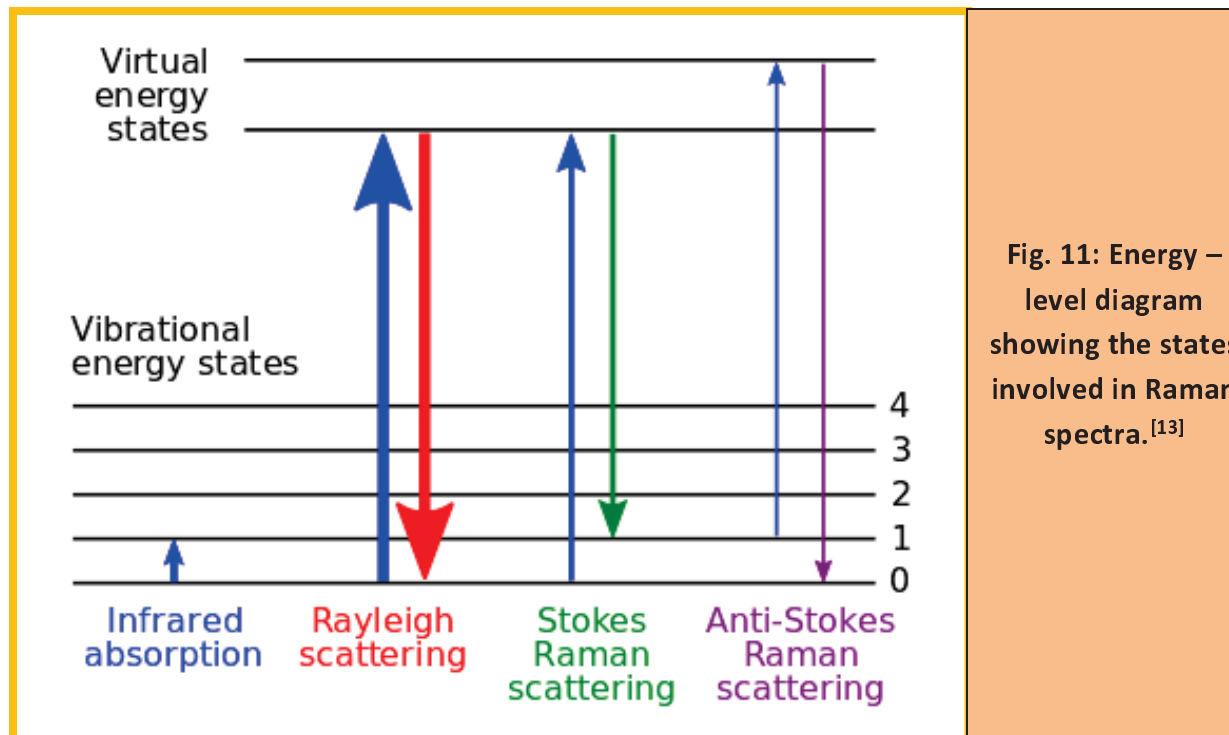


Fig. 11: Energy – level diagram showing the states involved in Raman spectra.^[13]

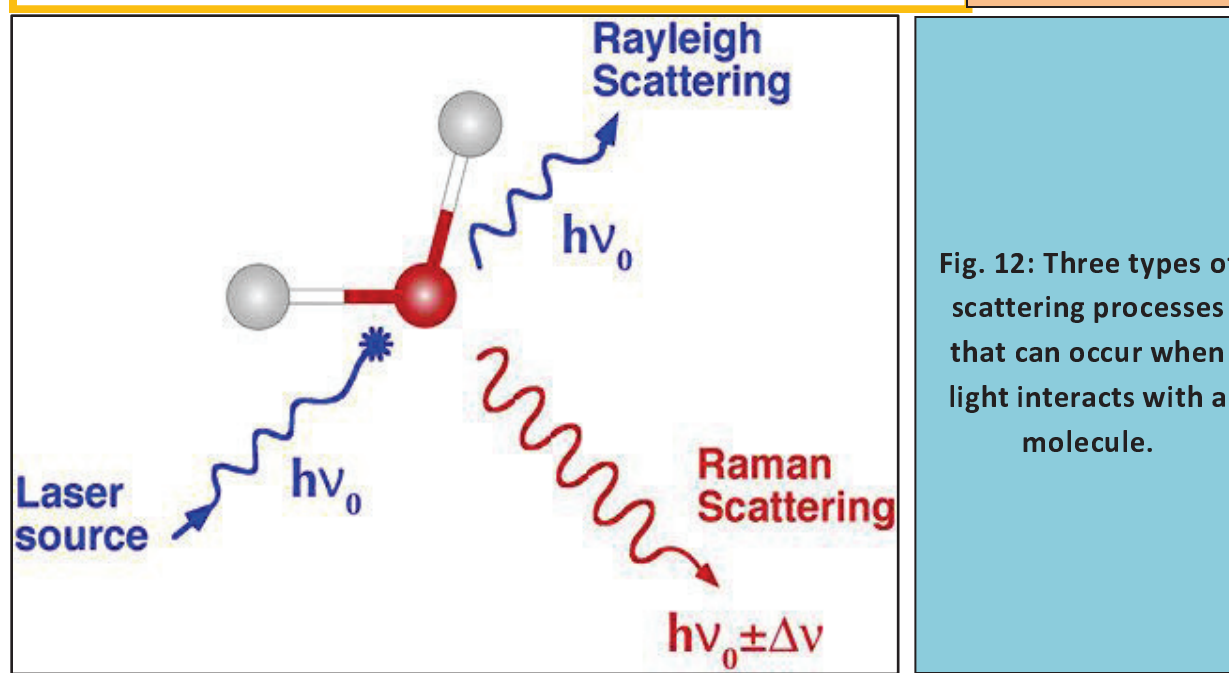


Fig. 12: Three types of scattering processes that can occur when light interacts with a molecule.

Mummy, a bright, glittering book there is, on the table. A lot of shiny colorful words/groups of words there are; like: The great Raman effect, Raman scattering, light and electro magnetic spectrum, reflection and scattering, blue of the sky and blue of the sea, Rayleigh scattering, Stokes and anti-Stokes lines and more.

Mummy, we the group of children, are very much eager to know, their meanings, at least in brief, their inter-relationships and their importance. Mummy, we went to grandma, but she is also waiting for your colorful dictation. Mummy, would you please do the job?

The discovery of the Raman effect has its successful applications to various frontiers, and obviously, this will make you think about the fantastic wideness of the very phenomenon discovered in the year 1928. Let's have a journey, at least, to some of them.

Extensive applications around the globe and across fields:
Help in determining chemical bonding structures; find out crystalline orientation; characterize materials; identify pharmaceutical chemicals; determine temperature; identify pigments in old paintings and historical documents; discover counterfeit drugs; detect explosives using lasers from a distance.

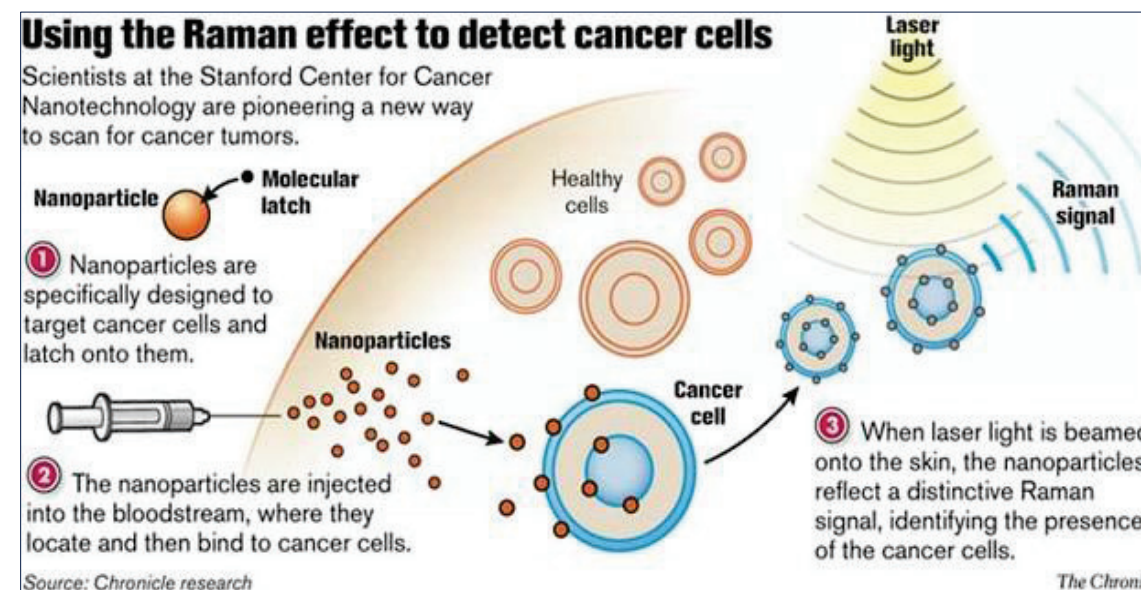


Fig. 13: Using the Raman effect to detect cancer cells. Chronicle Graphic.^[14]

THE BIG BANG AND HYMN OF CREATION:

The Big Bang theory is a cosmological model of the observable universe from the earliest known periods. It describes how the universe expanded from an initial state of high density and temperature. At around 10⁻⁴³ seconds after the big bang, heavily particles began to be pair-produced from radiation, a process which is fairly well understood and replicated in the laboratories. At this stage, there were equal quantities of matter and anti-matter. At this stage the strong, weak, electromagnetic interactions were all unified. After an initial accelerated expansion (inflationary epoch) at around 10⁻³²seconds, and the separation of the four fundamental forces, the universe gradually cooled and continued to expand, allowing the first subatomic particles and simple atoms to form.(2)

Nasadiya sukta, also known as the Hymn of Creation, is the 129th hymn of the 10th mandala of the Rigveda. It is concerned with the origin of the universe.

नासदासीन्नो सदासीत्तदानीं नासीद्रजो नो व्योमा परो यत्।

किमावरीव: कुह कस्य यर्मन्मः किमासीद्गहनं गभीरम् ॥ १ ॥

Then even nothingness was not, nor existence, there was no air then, nor the heavens beyond it.

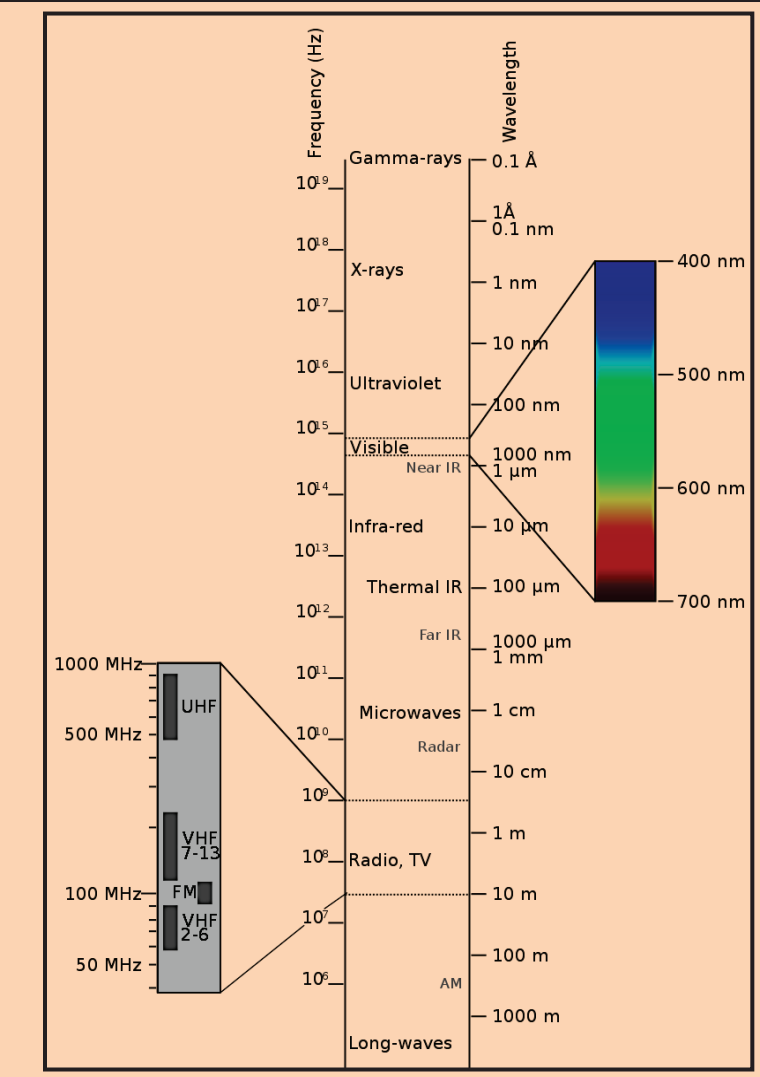
What covered it? Where was it? Who protected it? Was there an unfathomed depth of cosmic water (space plasma)?(3)

Satabdi Roy, Ex student of Hons in Physics

কোভিড-19; সামাজিক পরিবর্তনের কয়েকটি দিক

পার্থ মন্ডল

সারা বিশ্বব্যাপী কোভিড-19 এর ভয়াবহ পরিস্থিতি আমাদের সকলের মধ্যেই আতঙ্ক সৃষ্টি করেছে। এই পরিস্থিতিতে সকলের অজান্তেই বেশ কিছু সামাজিক পরিবর্তন ঘটে গেছে। মানুষ হয়েছে গৃহবন্দী। বেড়িয়ে শারীরিক দূরত্ব, এমনকি সামাজিক দূরত্বও। অনেক সামাজিক অনুষ্ঠান এখন বন্ধ। তাই মানুষের মধ্যে প্রত্যেক বোধ্যোগ, পারস্পরিক মেলবন্ধন কমে গেছে। অনেক মানুষ হয়েছে কর্মহারা। 'work from home' এর প্রকল্পে অনেকটাই বৃদ্ধি পেয়েছে। এতে বিভিন্ন প্রতিষ্ঠানের বৈদ্যুতিক বিল বা অন্যান্য কিছু খরচ সাশ্রয় হয়েছে টিকই, তবে অনেক মূল্যবান ইলেকট্রনিক্সের যন্ত্রপাতি দীর্ঘদিন ব্যবহার না হওয়ার ফলে নষ্ট হয়ে যাচ্ছে। স্কুল-কলেজের meeting, seminar ইত্যাদি বাড়িতে বসে online এর মাধ্যমে সম্পন্ন হচ্ছে। আগে স্থল কলেজে ছাত্র-ছাত্রীদের মধ্যে মোবাইল ফোন নিষিদ্ধ ছিল, বিশেষ করে পরীক্ষার সময়ে তো কঠোর ভাবে নিষিদ্ধ ছিল। অঞ্চ এখন তাদের জন্য মোবাইল ফোন তো বাধ্যতামূলক হয়ে গেছে। 'Online class' থেকে শুরু করে e-study materials, এমনকি semesterly/ yearly examination গুলোর জন্যও তাদেরকে মোবাইলের সাহায্য নিতে হচ্ছে। এতে ছাত্র ছাত্রীরা প্রমুক্তিগত ভাবে উন্নত হচ্ছে টিকই, তবে তারা মোবাইল ফোনের প্রতি অনেক বেশি আসক্ত হয়ে পড়ছে। ফলে অতি অল্প বয়সি ছেলেমেয়েরা এখন Facebook, WhatsApp ইত্যাদি সোশ্যাল মিডিয়ায় সজে মুক্ত। কোভিড পরিস্থিতিতে খেলার মাঠে ছেলেমেয়েদের খেলাধুলা বন্ধ। তাই এরা Online game এ নিজেদেরকে অনেক বেশি ব্যস্ত রেখেছে। এখন মানুষ সাইকেল, বাইক, personal car এর উপর অনেক বেশি নির্ভরশীল হয়েছে। এতে রাস্তায় যানবাহনের সংখ্যা আগের তুলনায় বেড়েছে। অনেক বেশি সংখ্যক মানুষ এখন online shopping, online billing, online payment এর উপর নির্ভরশীল হয়েছে। তবে কোভিডের মতো ভয়াবহ পরিস্থিতিতে মানুষের মধ্যে স্বাস্থ্য সচেতনতা অনেকটাই বেড়েছে। এখন মাস্ক এবং স্যানিটাইজার মানুষের নিত্য ব্যবহার্য দ্রব্য হয়ে উঠেছে। তাই বাজারে মাস্কের বিক্রি অনেক বেড়ে গেছে। অনেকেই আবার জামা কাপড়ের মতো রংবেরঙের এবং বিভিন্ন কারুকর্ম করা মাস্ক ব্যবহার করছে। বারবার সাবান বা হ্যান্ড ওয়াশ দিয়ে হাত ধোয়ার একটি ভালো অভ্যাস মানুষের জেরি হয়ে গেছে। বাজার থেকে নিয়ে আসা বিভিন্ন দ্রব্য ভালোভাবে পরিশোধন করে ব্যবহার করছে। ভ্রমশপিপাসু মানুষ এখন ঘরের চার দেওয়ালের মধ্যে বন্দী। বিভিন্ন দর্শনীয় স্থানের আশেপাশের হোটেল রেস্তোরাঁ বা অন্যান্য শিল্পের প্রভূত ক্ষতিসাধন হচ্ছে। কিছু কিছু জিনিস পত্রের যথেষ্ট পরিমাণে আমদানি না হওয়ায় সে গুলির দামও বেড়েছে। সর্বোপরি ভালো খারাপের সমন্বয়ে, এই কোভিড পরিস্থিতিতে মানুষের জীবনে বেশ কিছু পরিবর্তন যে ঘটেছে তা অস্বীকার করা যায় না।

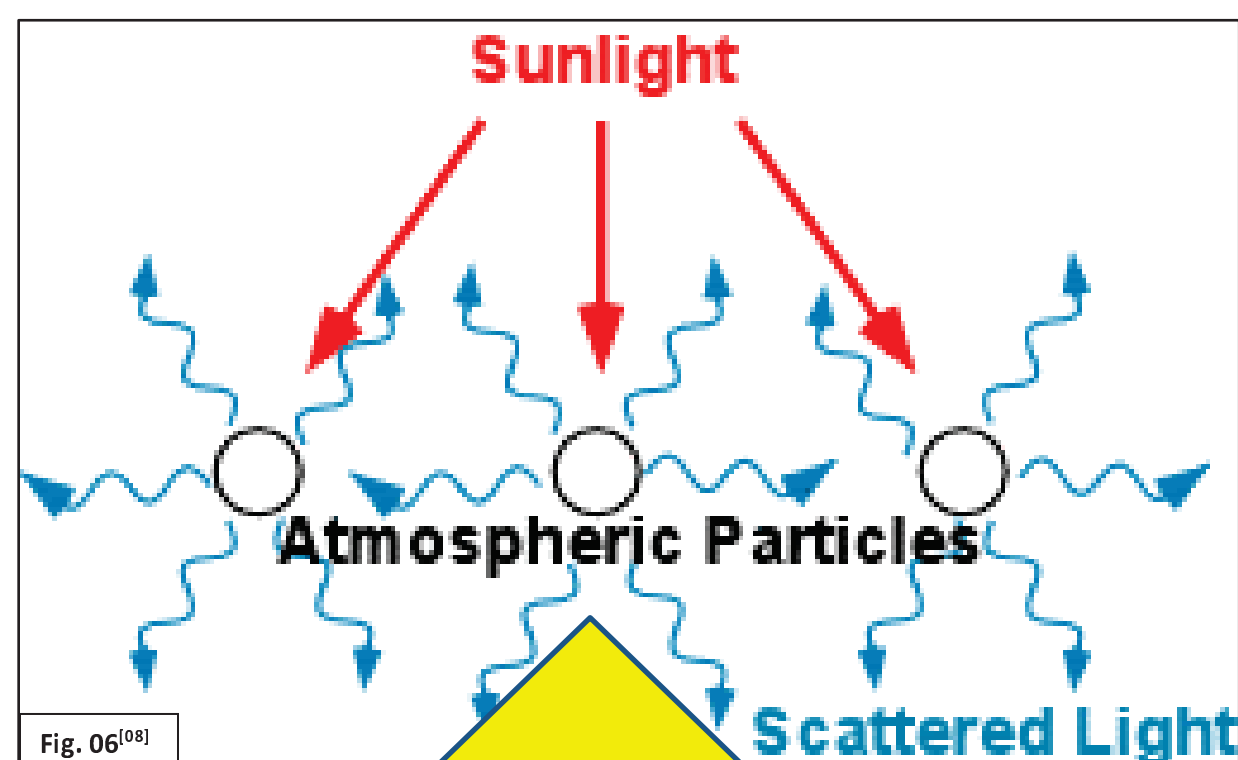
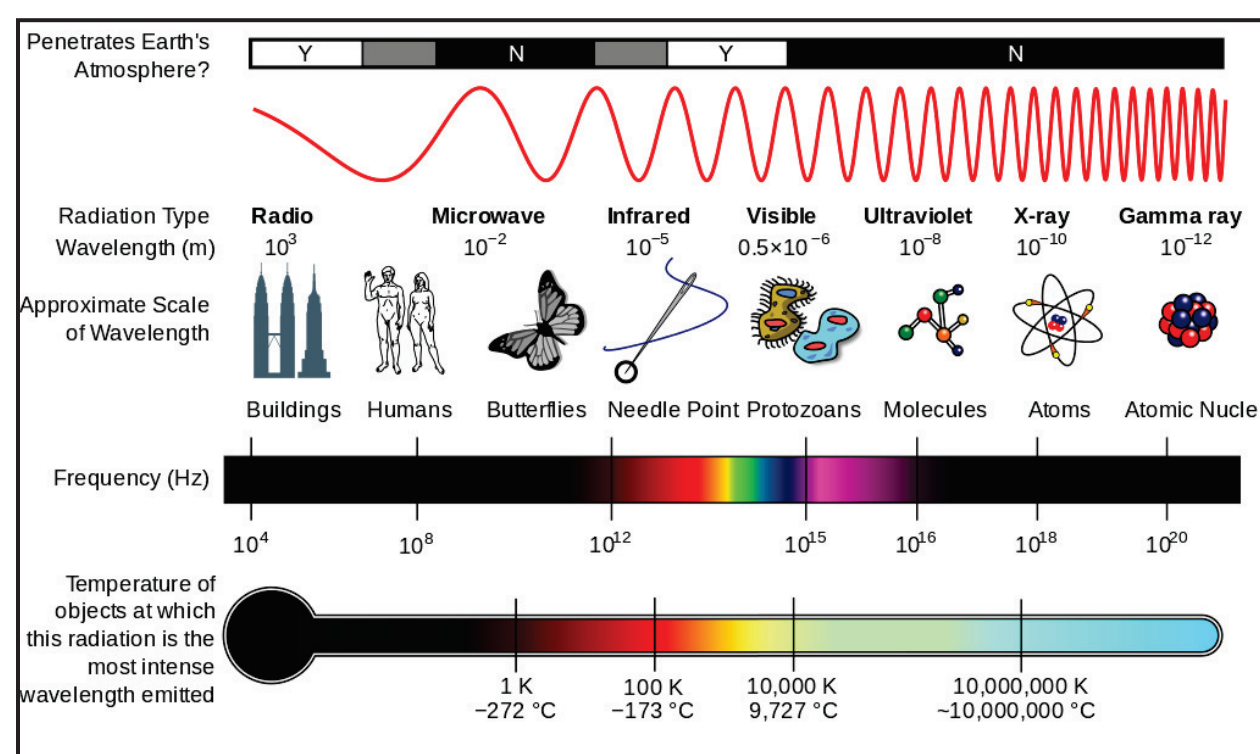
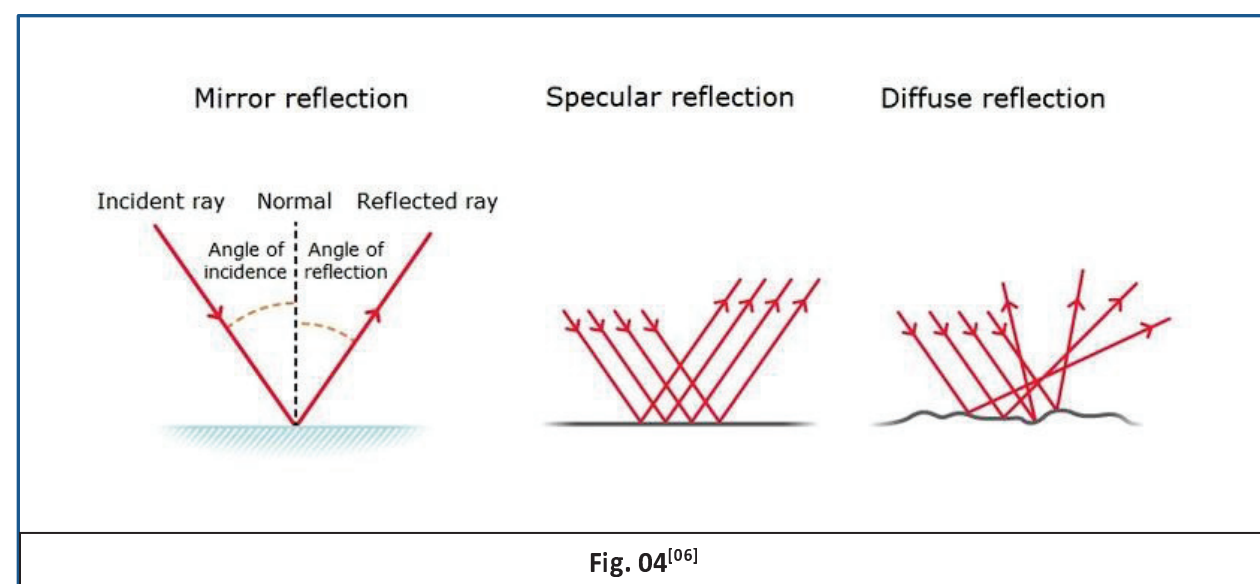


WHAT ABOUT THE VISIBLE REGION OF THE ELECTROMAGNETIC SPECTRUM

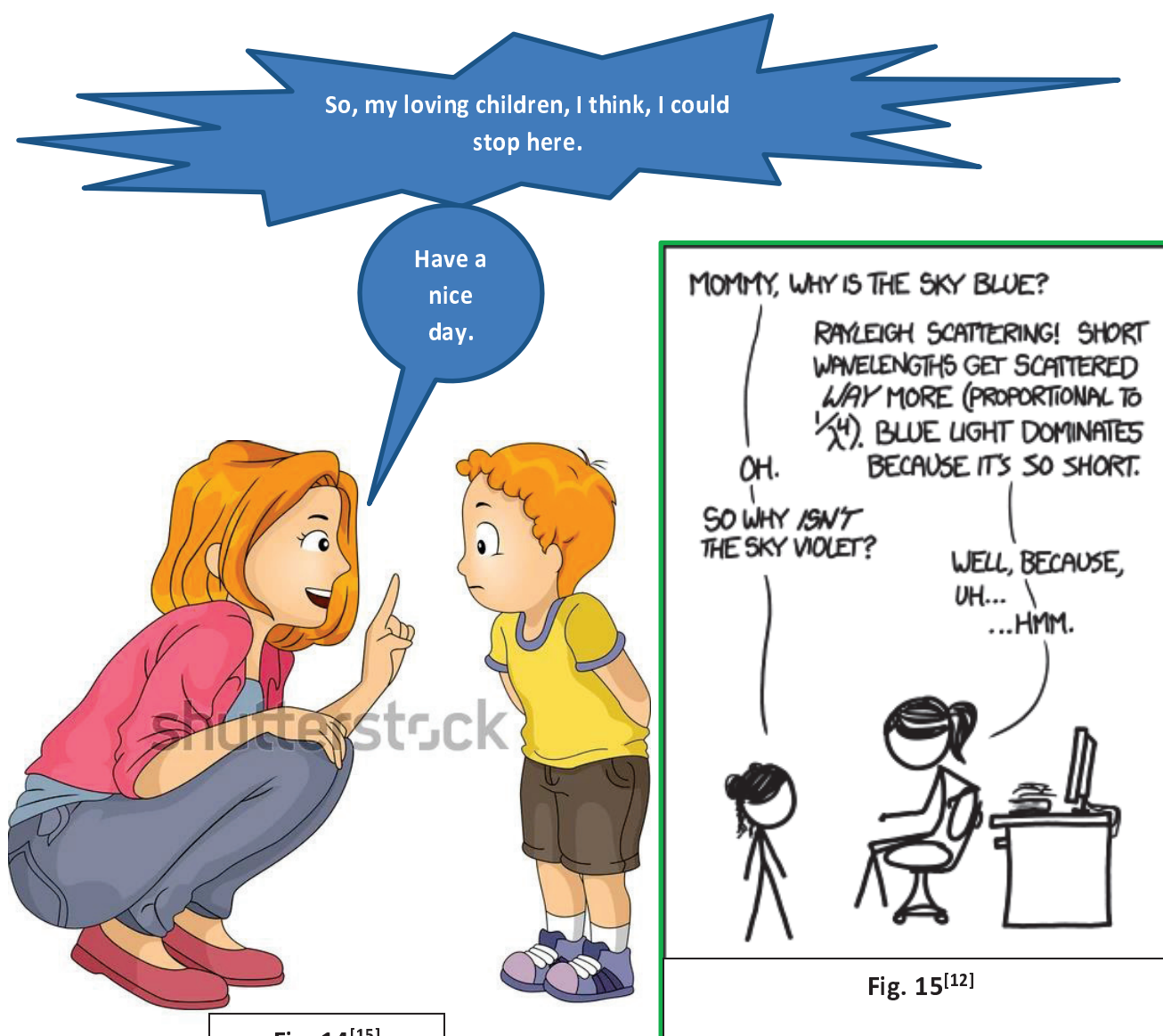


Fig. 03^[04,05]

Light → the visible part of the electromagnetic spectrum. Other parts also do a lot for the mankind. We see, experience, and enjoy the reflection and scattering. Also, with the light → a lot more!



You throw, you direct multi colored (chromatic) rays of light towards a medium (may be air) or media. Eyes far away from you (in the medium) can see, can experience some partiality - some favoritism or preferences in the distribution of the colors of the scattered light in their receiving end. One can observe the blue of the sky, one can observe the reddish nature while Sun rises or sets. Yes, the great scientist Rayleigh is here; Rayleigh scattering there is. Blue color of the sky is caused by the scattering of sunlight off the molecules of the atmosphere. Frequency of the interacting light keeps itself unchanged.



PROSE & VERSE

Online Class

Arpita Chatterjee
Semester-I, Roll No.: BS109

Online Classes get begin in every school; With full of regulation and rule.

Online classes conduct through mobile phone From morning, till noon.

Some students attending online class, Only for their time pass.

They are waiting for reopening of school Didn't taking online classes as study tool.

Sometime online classes face network problem, Some students leave classes and then come.

Online classes make students physically weak; Students can't reach their peak.

At least some months we have to study online. Nobody knows when the situation gets fine.

Ocean and Sand

Surabhi Singh

Oh Ocean! Oh Ocean! How bright you are?
Glittering like a diamond in the night of stars.
Three-fourth of water you hold is blue,
Submerged most of the historic clues within you.
Providing shelter to lots of aquatic lives,
Changing your form from liquid, vapor to ice.

Oh sand! Oh Sand! How bright you are?
Holding the Ocean, Spreadout so far.
Jumping on you, feels like a cushion,
Can't be believed that you hold the Ocean.

All these qualities means a lot,
Despite so much you both being so soft.

NavIC – The Indian version of GPS

Surabhi Singh

Navigation in Indian Constellation (NavIC) is an Indian regional Navigation Satellite System (IRNSS) developed by Indian Space Research Organisation (ISRO), aim to provide navigation, timing and reliable positioning services in and around India. It consists of 8 satellites in the space, out of which only 7 are active. 3 out of 7 are in geostationary orbit, and remaining 4 are in geo geosynchronous orbit. It is certified by 3GPP (3rd Generation Partnership Project), responsible for coordinating mobile telephony standards globally.

As per experts, NavIC has the potential to replace US owned Global Positioning System (GPS) in the Indian Ocean extending up to approximately 1500 km from Indian Ocean. It provides higher accuracy compared to US based GPS and independent of using any delay – causing frequency error due to its use of Dual-Band frequencies. This makes it better than GPS but it's area coverage is limited only to India and its neighbouring countries. Thus, in a nutshell NavIC is the Indian version of GPS.

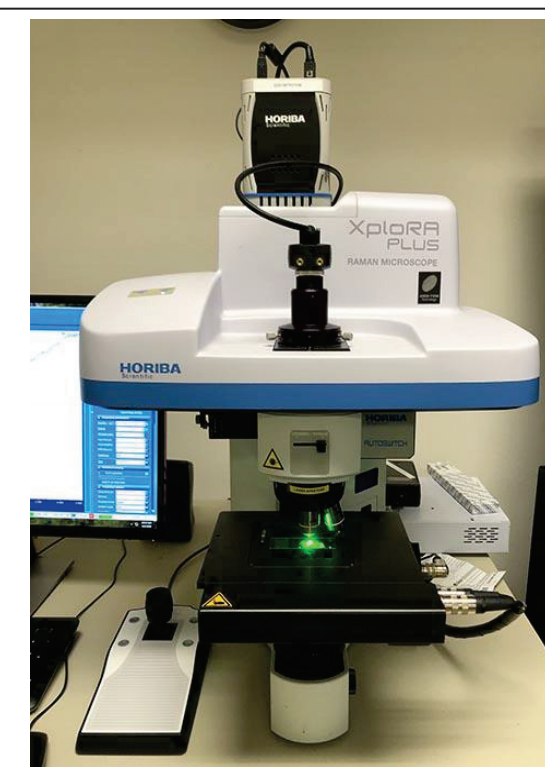
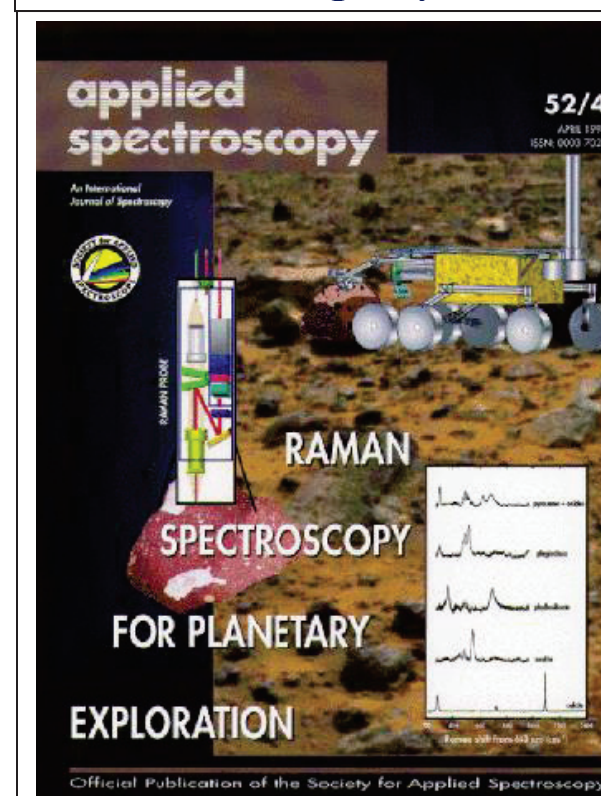


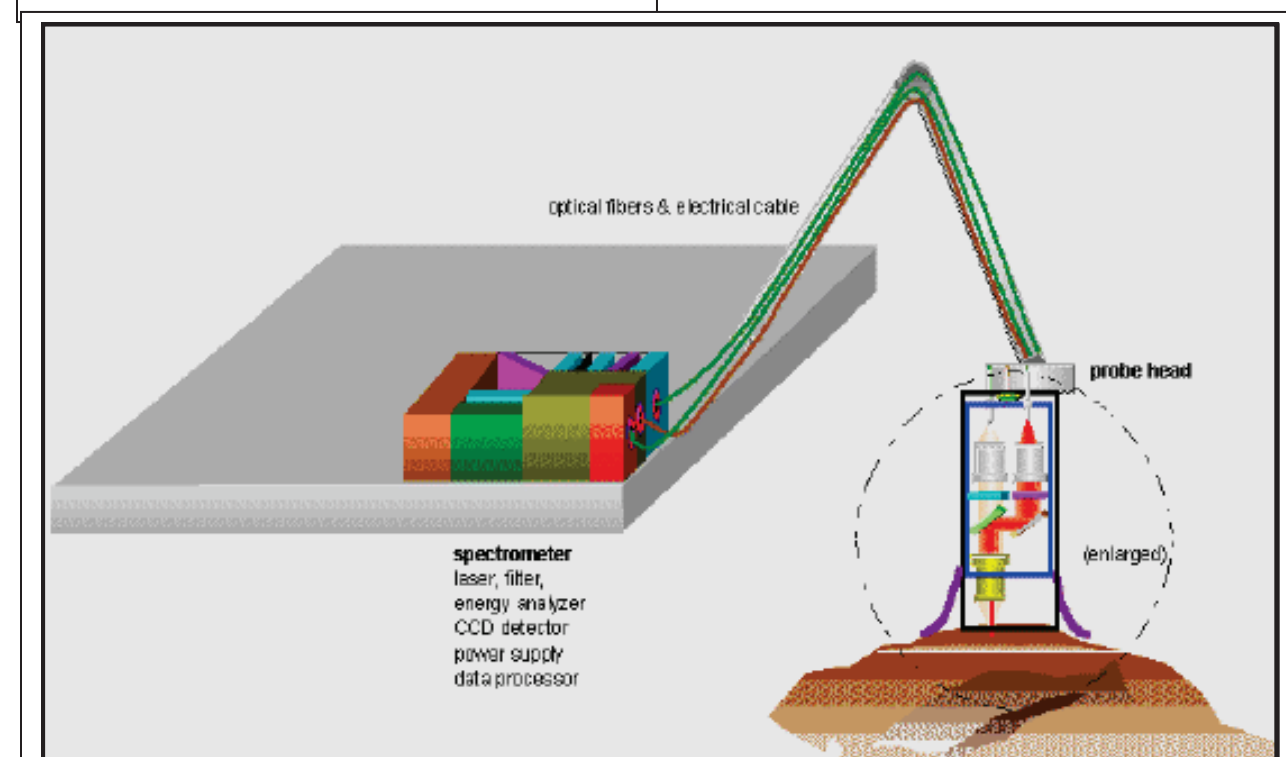
Fig. 17: Raman Spectrometer.^[17]

FT-IR is the most traditional technique for identification of unknown organic materials. Raman spectroscopy also provides information on molecular bonds; however, it yields the best information where IR is least useful. The two techniques are complementary and, in combination, allow the best determinations of unknown^[17].

Development of the Mars Microbeam Raman Spectrometer (MMRS), a flight system for planetary missions.^[18]



Mars has consistently been the object of humankind's questioning nature for eons. From the ancients to modern day, Mars has held a place in our intellectual and cultural interests.^[19]



Proposed design for Mars Microbeam Raman Spectrometer (MMRS).

A lightweight, easily deployable probe attached to the arm of the rover or lander, and an energy analyzer mounted on the rover or lander body along with the electrical power supply and the data processor. The two parts are connected by an electrical cable for power and an optical fiber for signal transfer.

The unit diagrammed above is a proposed design for a future Martian mission. In addition to the basic functioning components of all Raman Spectrometers, a small drill will be added to the sampling probe in order to analyze the soil just below the highly oxidizing surface of Mars. For those units using SERS technology, a metal platform will be added to promote sample analysis.^[19]

Sir Chandrasekhara Venkata Raman, Nobel-laureate (Physics-1930), assisted by K S Krishnan at IACS, Calcutta, India, discovered on 28 February 1928, that when a beam of coloured light entered a liquid, a fraction of the light scattered was of a different colour, dependent on material property. This radiation effect of molecular scattering of light bears his name as 'Raman Effect', from which many applications in photonic communications and spectroscopy evolved.^[21]



Fig. 07. Sky Turn Red at Sunrise and Sunset^[09]

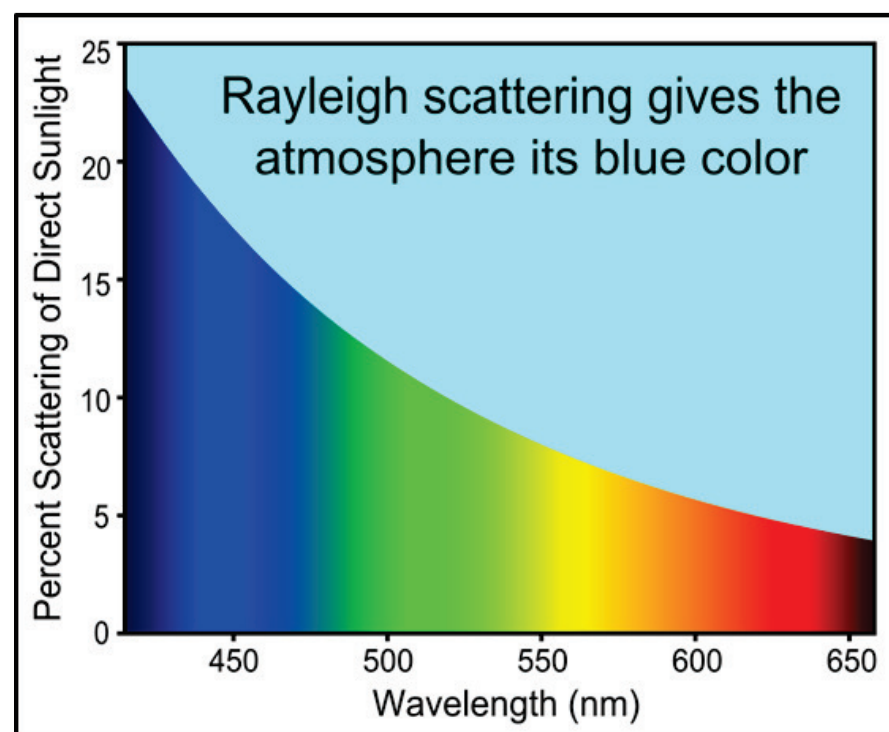
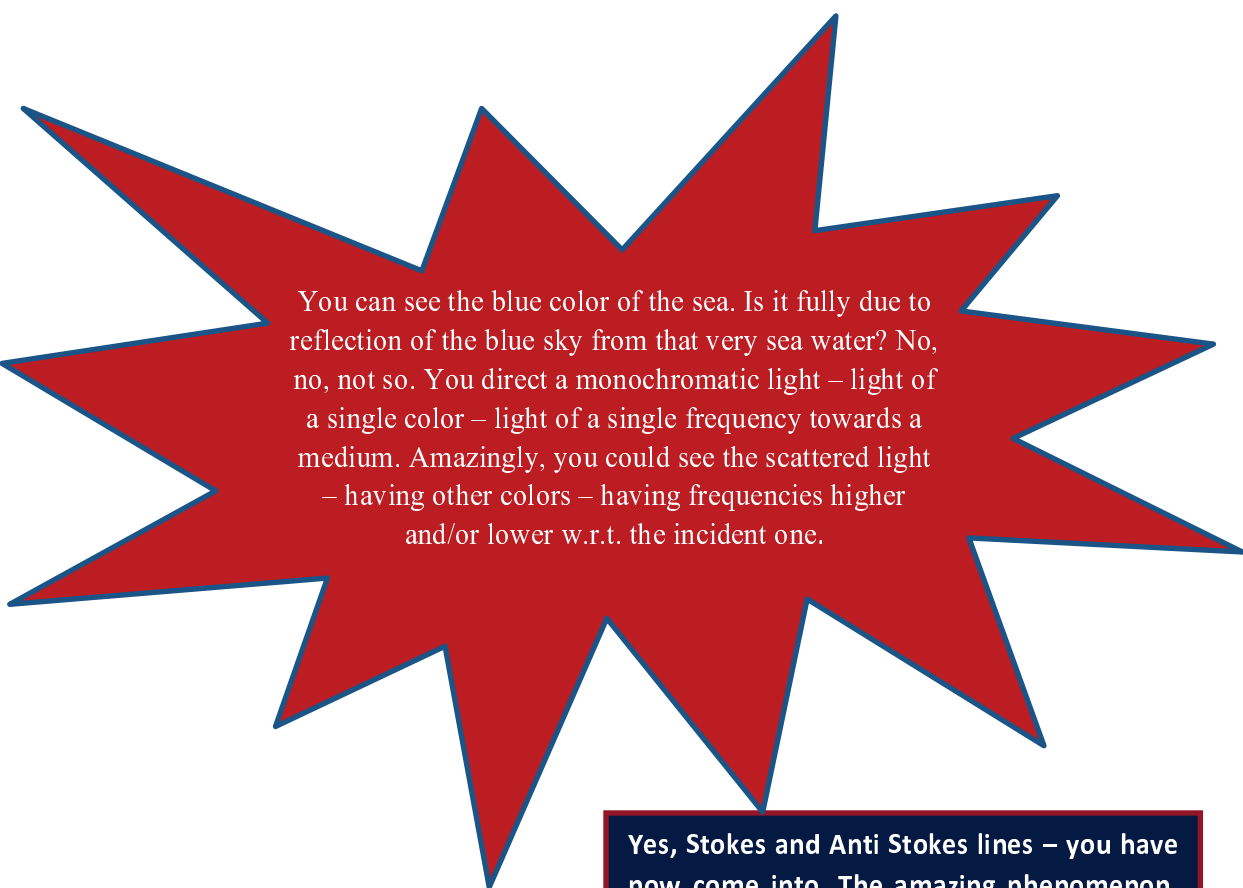


Fig. 08. Greater proportion of blue light scattered by the atmosphere relative to red light.^[10]



You can see the blue color of the sea. Is it fully due to reflection of the blue sky from that very sea water? No, no, not so. You direct a monochromatic light – light of a single color – light of a single frequency towards a medium. Amazingly, you could see the scattered light – having other colors – having frequencies higher and/or lower w.r.t. the incident one.

Yes, Stokes and Anti Stokes lines – you have now come into. The amazing phenomenon, of course, goes to the name: 'Raman effect', honoring the great discoverer: Sir Chandra Sekhar Venkata Raman. Oh, yes, the most charming quantum theory is there in the explanation of the Raman effect. Blue of the sea, of course, owes to this. . Professor Raman was awarded the coveted Nobel Prize for the effect named after him in 1930.



Fig. 09 (a): Blue colour of the sky

I looked, looked and look

Alokkumar De
March 2021, Burdwan (East)

You came before me
With a glittering color
Brightening your whole face;
Brightening my mind, indeed.

I bowed before you
With my inherent perception.
And a great willing thrashed me
To send you to and to see you on
The platform of the whole world.

You set for the tour, you went, and
Someday, again, you arrived before me.
It was amazing —
I saw your face embedded
With some different, prominent color!
I could not find the 'earlier you'!
Also, I couldn't judge
Whether you were brighter
Or somewhat pale.

I dipped into my interior
And again
I sent you to ever distinct tours
To every corners of the world.

Amazingly again,
You came back before my stretched eyes
But with another color,
Convincingly enough,
Over your face.

I looked at, looked into, looked through -
Again, again and again.

My earlier dream-filled eyes
Shadowed themselves with their own eyelids;
I dipped into the very interior
Of the heart of my own.
I dipped into the very wideness of the universe.
I could hear the silent voice of the almighty.

Once again, my eyes bloomed
Before you.
I saw you colored white:
On your holy, solemn heart, soul and face –
Everywhere.
Before me, lightening the wide world,
Pervading the entire universe;
Asserting all scientific laws, logics
And spiritualities;
Smiling over all the beauties of literature.

I looked, looked and look.



P.T.O./R.H.S.

References:

- [01] https://en.wikipedia.org/wiki/C._V._Raman
- [02] 1st photo from left has been taken from: <https://www.shutterstock.com/image-vector/cute-little-girl-asking-question-cartoon-1140473522>
- [03] 3rd photo from left has been taken from: <https://www.alamy.com/stock-photo-cartoon-boy-asking-question-79053257.html>
- [04] 1st photo has been taken from: <https://www.shutterstock.com/image-vector/illustration-mother-scolding-her-son-464606756>
- [05] 2nd photo has been taken from: <https://www.vectorstock.com/royalty-free-vector/little-boy-asking-question-vector-7680946>
- [06] Reflection of light – Science Learning Hub, sciencelearn.org.nz
- [07] <https://earthsky.org/space/what-is-the-electromagnetic-spectrum/>
- [08] [http://ww2010.atmos.uiuc.edu/\(Gh\)/guides/mtr/opt/mch/sct.xml](http://ww2010.atmos.uiuc.edu/(Gh)/guides/mtr/opt/mch/sct.xml)
- [09] <https://www.timeanddate.com/astronomy/red-sunset.html>
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- [14] <https://www.sfgate.com/health/article/Stanford-nanotech-project-may-find-tumors-3220802.php>
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- [16] Ref.: <https://www.firstpost.com/tech/science/isros-robot-recognized-by-imo-as-part-of-world-wide-radio-navigation-system-9100511.html>
- [17] <http://www.snlabs.com/raman-spectroscopy.html>
- [18] <http://epsc.wustl.edu/haskin-group/Raman/instrument.htm>
- [19] <https://www.sas.upenn.edu/~crulli/TheRamanSpectrophotometer.html>
- [20] <http://epsc.wustl.edu/haskin-group/photo.htm>
- [21] <https://www.sas.upenn.edu/~crulli/TheRamanSpectrophotometer.html>
- [21] https://ethw.org/Milestones:Raman_Effect_1928?gclid=Cj0KCQjwwLKFhDPArisAPzPI-NYgpHXuIMWZzM4y8dclChvU6v7O4iEgI70ZFIjHrWjuf2XtWv8aAoQZEALw_wcB



Fig. 09 (b): Blue colour of the sky. Also see the water.^[11]

একলা
অরিন্দম চন্দার

একলা আমি, একলা তুমি -
একলা যে যার নিজের মতো।
একলা আশ্রয়, একলা মেজাজ -
একলা প্রকাশ হারাও যতো।

একলা বুঝি জন্ম পাবেনা -
আপন তানে, আপন কাজে।
ভেবেই দেবো একতারাতো -
তোমার আমার সুর যে বাজে।

বাজে না তালি একটা হাতে -
বিশ্বয় তা'য় নেই তো কারো।
দুহাত-ই যে একলা তোমার -
তাও তো তুমিই ভাবতে পারো।

যাদের তুমি আপন ভাবো,
ভাবছো আরও, আরও আপন -
সব 'আমি'-রাই মিলিয়ে যাবে
সফল হলোই সুখ্য ব্যাপন।

বিষয় মাথা সংলাপেতেই
সম্পৃক্তি - তা-ই কি ঝোঁকো।
ততুবলে সন্ধাননা -
হাতড়ে ফেরো, হাতড়ে আজও!!

In his 1930 Nobel lecture he (Sir C. V. Raman) remarked "... the character of the scattered radiation enable us to obtain an insight into the ultimate structure of the scattering substance...the new field of spectroscopy has unrestricted scope in the problems, relating to structure of matter. We may also hope that it will lead us to a further understanding of the nature of light and interaction between light and matter"^[21].

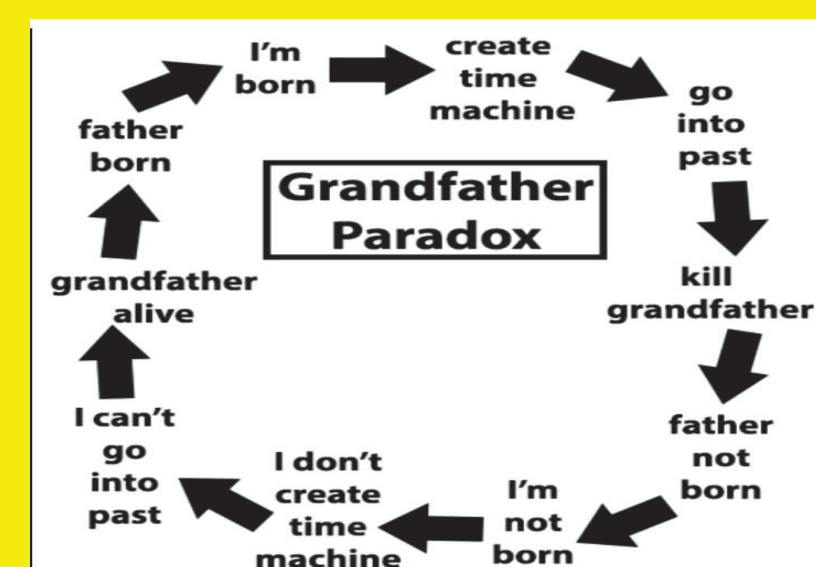
PARADOX

Puja Choubey

A situation or statement with two or more parts that seems strange or impossible together.

Grand Father Paradox :- The Grandfather paradox is which inconsistencies emerge through the past. The name comes from paradox's description : A person travels to the past and kills his own grandfather before the conception of his father or mother , which presents the time traveler's existence. Despite its title, the grandfather paradox does not exclusively regard the contradiction of killing one's own grandfather to prevent one's birth. Rather the paradox regards any action that alters the past , since there is a contradiction whenever the past becomes different from the way of it was.

Source of information:- Internet-www.wikipedia.com\www.openbooks.com



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