The SPARC NEWSLETTER
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Something's Wrong With My Radio

by
W3IHM

I spent a bit of time on the fun things that can happen to electromagnetic energy when traveling through non-ionized, non-homogeneous media. That is, we did a blurb or so on VHF and UHF radio waves and the current terrestrial atmosphere of smog, CO2, and fallout. You know, ducting, and all that hooey I just rattled on about.

But that left out something that popped up today. That is, what happens to VHF and UHF waves and plasma. Plasma? What's a plasma? Well, when I was a small boy, in science class, Mrs. Sanders taught me that matter had three states, solid, liquid, and gas. She also used water as an example, like ice, water, and fog, for solid, liquid, and gas. Sure.

Well, all that "states" never mattered that such-much-nuch to me. I was mucho-more interested in letting that big old iguana, that Mrs.Sanders kept in the back of her room in a cage, have a shot at freedom. I was deftly curious to see if the rumor was true, that of how really fast that leathery whip of a critter would run. To me, it never looked more active than a box turtle. It was also some side fun to get out of class, and to watch the sisters in their long black robes, run that sucker down and try to lasso it with brooms, mops, and buckets, before it got outside. Yep,

those sisters probably got the red carpet into heaven on account of me.

But then, actions have consequences. I also had to miss the bus, stay after school, write 1000 times on the blackboard; “I will not let the iguana out of it’s cage.”, and then go clean out the sink swill traps in the cafeteria kitchen, and finish it off with a nice 3 mile walk back home.

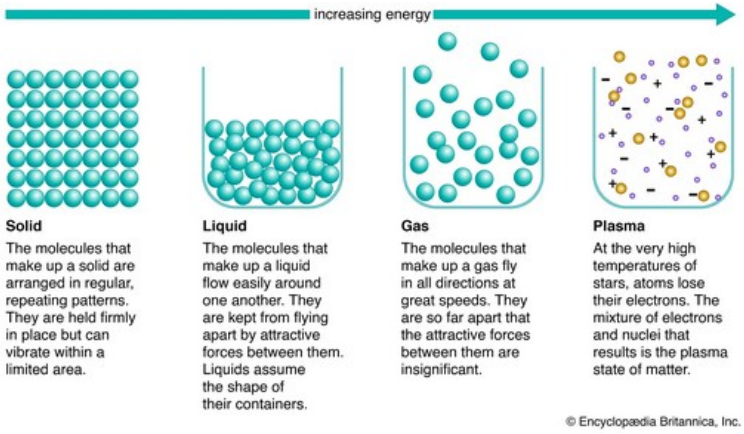
But that was not my main concern with my previous antics. My main concern was to avoid papa’s beautiful custom solid walnut ass paddle, which he called “Ol’ Betsy”. I also needed to get back before dinner, so I could take the phone off the hook upstairs, to thwart any calls from “Sistuh”, and also have a shot at supper before my older brother, Matt, the human food Hoover, ate absolutely every food molecule in sight.

For you youngsters, this was back when you could do such a thing as “labor”, “spanking”, and “enforcement” to naughty kids at school, and not have children’s and youth or lawyers called.

Oh, I found this out. They DO run FAST!

This whole business of “states of matter” stuff never tickled a neuron for several years. It did come up afterward, though, in a place where iguanas had nothing to do with it. It turns out, she actually gave me an oversimplified idea anyway. She left it as an exercise to the student to find out that there was another state of matter that came up later when I started to get into radio.

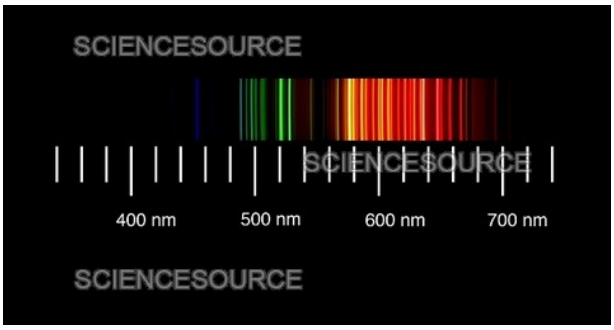
Let’s see. A plasma is the fourth state of matter, being higher as you go up in temperature. Here’s a picture I found in the encyclopaedia.



A plasma has the electron cloud of probabilities ripped away from the neucleii and scattered hither and thither. Plasmas also break apart molecular bonds, and the like, so elements are what happens. So, just like a hunk-o-wire, there is free electrons everywhere, which means the plasma is conductive. You can flow a current through it. Like this:

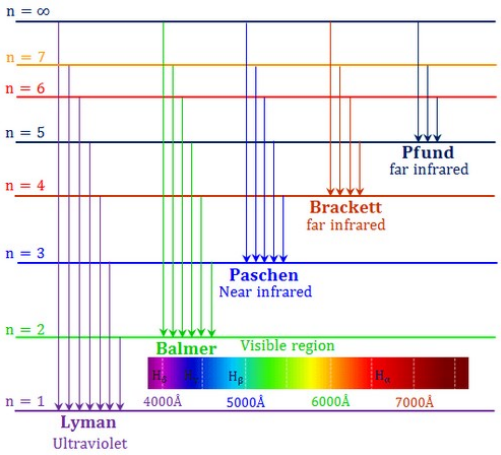
Ever see these neon lamp puppies? That glowing cloud in there is wha'cha call a plasma. That's what it looks like, for neon. In fact, it's so conductive, that we need to limit the current in these little neon bulbs, so they don't flow a large current, and shred their electrodes.

Each type of matter also has an "emission spectra"and an "absorption spectra", when that matter is in plasma state. Here's what you see when you shine a neon light into a spectrometer:



Notice the bunch of lines in the orang'ish end of the visible spectrum? That's why the neon bulbs glow that orange kind of color.

Emission and absorption light is one way we can also tell what a star is made of. We can tell by looking at it's spectra and matching it with a known one. Like for hydrogen, we get this big, scary chart:



There are people what do nothing but this kind of light color spectra stuff, but that's a whole rabbit hole I don't want to enter. Still, it's cool, and I can admire that it is a perfect occupation for a neurodiverse soul.

It also amazes me that the spectra emissions of a star a billion light years away, a gadzillion years ago, matches the same spectra that comes from a little glass tube full of some gas that I light up in my shack with a power supply. It's incredible how ordered this h'yar universe place is, but let's move on.

Suffice it to say, when electromagnetic waves shine on a plasma, depending on their frequency, they do the three things we talked about before. They can be:

Absorbed, modified and re-radiated, or dissipated in the material somehow.
Reflected, refracted, twisted, or bent away from the matter or material.
Transmitted through, or penetrate the matter or material, and pass through.

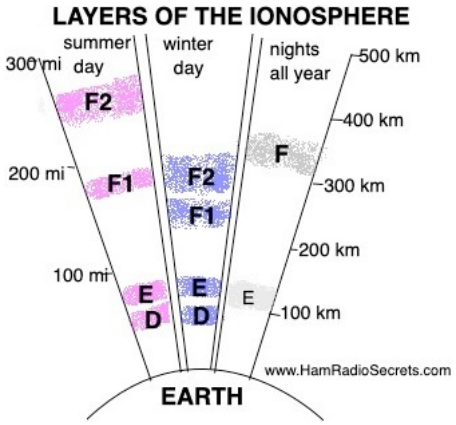
And for electromagnetic waves in the VHF and UHF frequency range, it takes some really energetic, highly dense plasma to have reflection and refraction happen. Most of the time, the VHF and UHF energy just goes through the atmosphere to space, maybe getting twisted a bit, or maybe absorbed somewhat. But sometimes, there is just the right stuff that reflection back to the earth occurs.

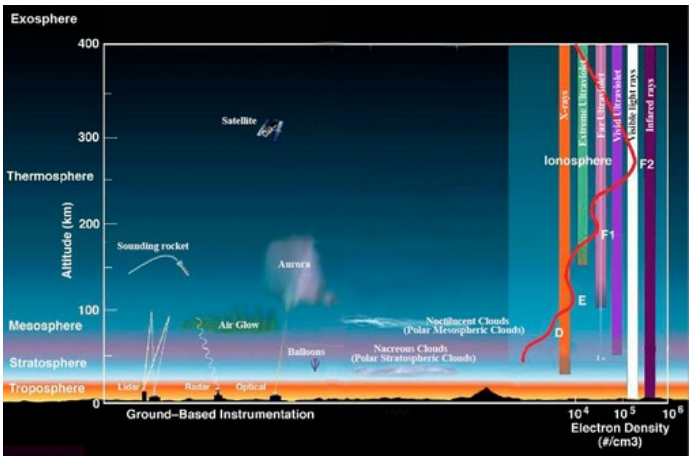
So what makes these upper atmosphere plasmas and where are they? The sun, my friend, the sun!

There's some regions in the upper hinterlands of the atmosphere, where the upper atmosphere thin whiffs of gasses get ionized into plasmas by the big, fuming, spitting, fission reactor meltdown in the sky, we call the sun. These gasses are way lower in pressure, so the molecules and atoms are spread way out. It's not like the neon bulb, but more like a thin fog of highly excited particles. The gasses are also getting hit by some really energetic stuff from the sun, so when a collision happens, the collision is of way high energy. There are few collisions over a volume. But there is a lot of volume, so it adds up. We end up with these thin, ion clouds,

sometimes.

These are loosely defined as D, E, and F. There are people who study the chemistry and ionization processes that ol' Sol does to the fogs, mists, smokes, and farts, as they make their way up in altitude, but we radio hamsters just kinda lump them into these "layers" and then associate frequency ranges where the D, E, and F are reflective.





In the HF range, lots of these layers bend radio signals back to earth, but generally when you go up in frequency less of this bending happens. Like on 6 meters, the E layer does this every once in a while, and the F layer does this when the sun goes through it's peak, during the 11 year cycle.

On 2 meters, it takes a very strong ionization cloud to reflect 144 MHz at all. I don't think that the F-layer has ever reached this high, and E-layer propagation happens very seldom. Now, meteors make some pretty hefty ion patches, and meteor scatter does happen on 2, but you gotta try with a yagi and a power amp on SSB. I want to get FT8 up here and see what can be done.

On 222 MHz, apparently it is quite rare to have E or any other kind ionosphere reflection, except for a specially big meteor burn, but even that is real rare. Also, not many of us have

SSB/CW rigs and big yagis on 222 MHz, either. I sometimes wonder if now, with some real weak signal software and modes, maybe even a bit of 222 MHz ionization can support some 1000 mile contacts. I am trying to build my 222 MHz station, now, with a long yagi and amp design, so more on this later.

Ok, but there is stuff between the ham bands. Like TV channels 2-6, and the FM broadcast band. These frequencies can be open to ionospheric reflection. The most common is E-layer skip that happens from time to time on the FM broadcast band.

For example, when I was first writing this article, I was listening to the FM radio. I had my little Grundig table radio on, when I heard some fluttering signal, along with some weird buzzing sounds coming from my radio. Is this thing busted again? I tuned and heard some QSB, and an announcer talking about some auction in Iowa. What?! Maybe it's an NPR syndicated story or such much. Wait a minute….

I went into the next room, turned on the big receiver I have with a yagi, and started listening on some of the open FM frequencies. Most all of them seemed full of buzzing, humming, fluttering, and other stuff. So I tuned around, and jockeyed my little FM yagi around finding the strongest signals, to try and steer in something clear enough to listen to. I ended up leaving the beam headed S-SE. There was a lot of stations I don't remember being on here, plus lots of buzzing, QSB, and squawking noises, so I tuned around a bit more and listened.

There was this strong station on 92.1 MHz. I stopped because I heard some country music and the DJ talking about the upcoming traffic problems at DFW. "DFW"? I thought. Why would a local station be talking about mundane Dallas traffic? Wa-a-a-ait a minute, now. It must be some sporadic-E propagation! Woo!

So, as I listened, I got excited and started an internet search for country western stations in the Dallas Fort Worth area on 92.1 MHz. There was one, KTFW, "The Hank" country FM. I quickly streamed it, and the audio stream matched exactly what was coming out of my receiver! Wow! I had just found some of that FM sporadic-E DX. That be Dallas, Texas, in my living room, on my Hi-Fi FM broadcast band radio, 1200 miles away! Cool!

The signal faded up and down for about a half hour, and finally disappeared into a bunch of noise. I then went on the hunt, and tuned around. I heard several other stations come and go,

but I could not solidly ID any of them. They faded out too fast, or the announcers never gave any clues as to where they were. What was worse was that several stations had syndicated audio feeds that provided no local information. Sometimes the fish get away.

Later, I found that “The Hank” had an e-mail, so I took a chance, and wrote a short message to the station, wondering if the station would give me some sort of confirmation. A QSL card would be nice, but I don’t think that radio stations have them. Anyway, it is best to send them an e-mail, and explain yourself and the propagation in the letter, because sometimes, the folks at the radio station are unaware that propagation like this ever happens.

Anyways, after a few days, I received this E-mail back from the chief engineer, who was not Hank, but Gary. He turned out to be a ham, too! Here it is:

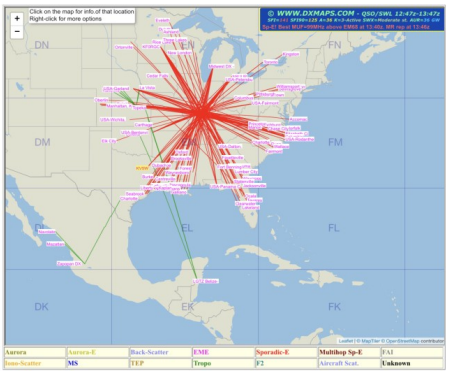
ON AIR ON LOCATION ONLINE
THE 95.9FM RANCH THE SOUND OF TEXAS
92.1 HANK FM REAL COUNTRY 921HankFM.com
THE 106.9FM RANCH TEXANS, OUTLAWS & LEGENDS
K-HITS 95.5 CLASSIC HITS

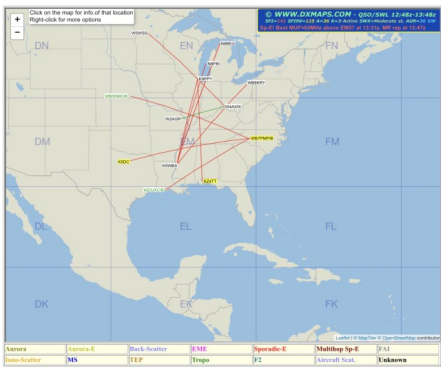
Sam,
It was great to hear of the reception of KTFW Hank FM at your QTH.
I can confirm your report.
Gary KG5CW

Gary Graham | Chief Engineer | LKCM Media Group

Office: 817-484-1220 | Mobile: 817-522-8415
115 West 3rd St. Fort Worth, TX 76102 | lkcmmedia.com

While all this was happening, I thought that surely the 6 meter band would be busting open, too, being lower in frequency. I thought surely, but I was quite wrong. Six meter rig on, and nada. Nothing on six. Why would that be? Did the transverter die? Nope. Beacons still Q-5. Ok, look at these DXMAPS, showing signal reports on both the FM band and six meters at around the same time. FM on the left, 6 meters on the right.





Yes, the FM band was wide open, having a nice E-cloud over Illinois, Iowa, and Kentucky, but the same cloud was pretty near invisible on six meters. For some reason the ionization was not reflecting the lower frequency of 50 MHz, but reflecting “The Hank” at 92.1 MHz from DFW.

At one time, it sounded like DX stuff went all the way through the FM band that day, up to 108 MHz, but I heard no aircraft localizers just above 108 MHz in the aircraft band, and nothing else as I tuned the 6 meter band. It was apparently an FM broadcast only kind of opening.

This kind of antic goes on down on HF, too. Sometimes 12, and 11 meters are stone dead, but 10 is roaring with all kinds of signals, and sometimes vice-versa. You know, you would think that if 10 is open, 15 will be? Not always likely. Trickery of the ionosphere!

Remember that the ion cloud positions and angles have to be “just right” for certain radio frequency signals to reflect back to earth instead of passing through, or absorption. All the HF bands do this. We would not try to use 160 at high noon, would we? No, the D layer eats 160 for lunch during daytime. But at night, the D goes away, and then 160, and 80 open. So we have some familiarity, but it gets more exciting when we go up to VHF.

Now UHF, above 300 MHz or so, I suppose, does no E-layer reflecting. At least, I have never heard anyone talking about the ionosphere do anything up here. Neither have I heard of anyone else doing reflection up this high with ham power levels. But I may be wrong. Maybe a rocket burn, burning starlink reentry, or big meteor could make signals bounce 800-1500 miles or so? It makes me wonder. Maybe we are just missing something. So, how about FT8 on 432 MHz, anyone? We probably know when/where Starlink satellites come burning in, 1-2 a day now. A couple of long 432 yagis aimed at the right place, eh?

OK, that’s enough for this subject. Sometime, I want to play you the audio of an open FM band, so you will know what to listen for, next time you are in the car, and your FM radio starts acting strange.

-...-

Field Day Pictures

by

Sam, W3IHM

I saw several of you folks with your phone cameras taking movies and pictures this past field day. How about sharing them with me, eh? I want to try and put together some semblance of an article about FD, with names, and stuff like that, showing what a good time we all had at the FD this year. This will be to entice and cajole other hams to come to our field day next year, so what say? You can thank me by doing this little thing. Just send it to my e-mail.

-...-

Website Updates

by

Matt, N3NTJ

Have you checked out the website lately? Supposing you wanted to see a past newsletter. Well, you are now in luck. I created a “SPARC Newsletters” page on the website and have the newsletters already posted. It is under the “About SPARC” tab on the website. Now, you can go back and peruse past newsletters at your leisure. That brings up another thing….

SPARC Market Place

by

Matt, N3NTJ

Do you know that you can sell things directly to the club members? Sure, but it has to be ham radio related. For instance, the new Marketplace page I created on the SPARC website already has some items. It’s for members who have stuff for sale or are looking for items. We already have three items listed. There’s a tab at the top of k3ir.org for members to easily find the page.

The club currently has these three items for sale to help pay for the solar system, and ultimately reduce our power bill. So you can buy something, and feel good about contributing to the club’s well-being, too. Check the website, for more recent items listed/sold.

1. **Tokyo HC-2000 HF Antenna Tuner.** With the price of eggs nowadays, the eggs are not included. Sorry. Tuner only. $400. For sale by SPARC. Contact Harry at **hbauderrm@gmail.com**

2. **Icom AH-4 Remote Tuner.** HF+6m. New – still in box. $425. For sale by SPARC. Contact Harry at: **hbauder@gmail.com**

If you're a member of SPARC and have an item for sale or an item that you are looking for, contact us to place your ad here.

Meeting Night

Like most clubs, there sets in a sort of monthly pattern of meetings, etc. Like, for SPARC, the usual average monthly general membership meeting is held the fourth Tuesday of the month, at 7:00 PM, at Lancaster County Public Safety Training Center (LCPSTC). Sometimes these things change, especially in the winter. Why are you looking at this newsletter for such information? Go to K3IR.org and check the calendar tab.

License Test Sessions

Want to upgrade your license? How about get a license? You will need one to be a ham operator. There IS a test. You are required to know something. It's not just a $$$ thing. Demonstrating that you indeed know something is another matter altogether. So you will need to study some materials. There is plenty of on-line information to help you get your license. Ask us. We are here to serve. Go to k3ir.org and ask for help.

Usually, testing is conducted at the SPARC site on the first Tuesday of every month. The fee to take the exam is usually $14.00 payable on the K3IR website or in person, cash or check only. Go to K3IR.org and check the calendar tab to make sure.

If you do not already have one, go to fcc.gov and register for a FRN (Federal Registration Number). You will need this to interact with the FCC.

You can also pre-register to take the technician test, or upgrade, at Hamstudy.org. There is also a link on the K3IR web site to follow. Check the k3ir.org website for the latest in fashionable ham test news.

Upcoming Hamfests

by
K3KMT, et. al.

As usual, when not out playing hamfest gypsy, did you know that Ralph, K3KMT keeps a list on his worldwide international world famous corporate Quicksilver website of local hamfests? He has a more complete, updated list than anyone else I know of, on this website:

https://www.qsradio.com/index.html

This is great, because I don't have to do this anymore! Go here to this web site and have a look.

Yes, "Quicksilver" is what alchemists used to call the element mercury (Hg).

Volunteer – The club needs you.

SPARC currently has 131 "active" members on the roster. We have a lot to offer to our members. At this time we have a dedicated group of hardworking volunteers who keep the site running. Some say this is typical with most organizations. I don't think SPARC should be "typical" We need more real active members. Jobs range from the highly technical to the mundane but ALL are important. Please look at the list below and see if there is a place for you.

IT Team

Tower climbers and ground help

Operating building maintenance and cleaning

Operating building equipment maintenance and improvement

Porta Potty cleaning (not Pumping!)

Adopt a Highway crew

Elmers and Elm'ettes

Hamfest help, planning, etc.

Meeting programs and talks

Antennas! ...always more, bigger, higher.

Someone to take the trash home and pitch it when it’s full.

Someone else to either eat or toss the old stuff in the fridge.

Someone to put the 6 meter beam up on a rotor.

Solar power wizard experts.

Fiscally rigorous scrupulous bean counters.