

Astronomy Cast Episode 7: Getting Started in Amateur Astronomy

Fraser Cain: Last week we discussed the beginning of everything: the big bang. Pretty heavy stuff, so we thought we'd give you guys a couple of weeks to absorb that, and talk about our favourite hobby: amateur astronomy (obviously) and how to get into it.

So before you rush off to Wal-Mart and buy that \$40 telescope, hear us out.

First, Pamela, I wanted to know how you got into amateur astronomy.

Dr. Pamela Gay: I don't think I necessarily was going to be given a choice. My dad was an electrical engineer who was deeply passionate about astronomy and physics, but just for various career reasons went into electrical engineering instead. As far back as I can remember I was getting sci-fi influences, and getting drug out of bed to see pictures coming back from the Voyager space probes.

One of my earliest memories is going out to the backyard around age five or so, and looking through a little tiny refracting telescope that much more strongly resembled a pirate's spyglass than any piece of astronomical instrumentation. He showed me the Moon through it, and I lied: I said I could see Russian cosmonauts (and how I knew those things existed at age five, I don't know – I was an uber-geek at five). I lied and said I could see Russian cosmonauts walking their dogs on the Moon, and my dad let me get away with the lie!

I remembered what happened because he let me lie and I didn't get punished. It's strange the things you remember, and by being allowed to get away with that lie, I somehow ended up becoming a professional astronomer.

Fraser: How did you know that you were going to become a professional astronomer? How did you make that decision?

Pamela: I sort of wasn't smart enough to know when to stop taking classes? I actually started out college at James Madison College at Michigan State University, which is an international relations program. The program was nice and all, but I was taking astronomy classes (and I'd been taking astronomy classes for forever). No one – well, very few people – actually believe, "I can be a professional astronomer" and I wasn't one of those people that believed I could do it, so I figured I'd get a degree in international relations and do science policy or something like that.

I was hacking it in the astronomy classes, and going a little bit crazy with all of the young Republicans in my international relations programs (no offence to Republicans out there, but at 9am I can't deal with them in classes). The astronomy just sort of sucked me in and I got my undergraduate degree and said, "Okay, I'm going to graduate school," got my masters degree, got my PhD, and just kept going and landed as a

professional. I'm just doing it because I love it: it's not a job, it's a hobby I get paid to do sometimes.

Fraser: I actually had a really similar upbringing with you, actually. Both my parents were quite into science fiction – we watched *Star Trek* whenever the repeats were on. My dad woke me up in 1981 to watch the launch of the space shuttle, but he didn't do a lot of observing. My dad would buy a copy of *Sky and Telescope* every month, so I always had the pictures to look through. I think, for me, what really affected me was I got a copy of *Our Universe* which was this time-life book that came out in the mid-80s and was really thick. It had wonderful pictures and information about space, and I read it over and over again.

I think I was about 14 when I bought my first telescope. We'd set it up in the backyard and observe every night. It was a 4" Newtonian telescope – not very good, it didn't have a good mount or anything. When my parents' friends would come by, I would set up the telescope and show everybody, "here's Saturn!" and, "here's the Moon!" It was great – I think I always loved to share it, which was funny.

Later on, I actually organized a star party on the island I grew up on, Hornby Island (west coast of British Columbia), and organized this star party with a friend of mine who was also into astronomy. We'd have all of our parents' friends over and they were all – they weren't into it, no one else had a telescope, but they really enjoyed it.

Then I went into the business world, but I also maintained my interest in astronomy on the side, and eventually worked on *Universe Today* and kept going with it.

Pamela: And now you're here!

Fraser: So let's say that a listener wants to get involved in astronomy – is obviously listening to this podcast, but maybe hasn't done any observing with a telescope but isn't really sure what to get and is eyeing that Wal-Mart telescope with \$40 in hand. Where would you suggest people get started?

Pamela: I'd walk next door to the photography store and get a pair of binoculars. The thing about telescopes is there is technique to using them. A lot of the Wal-Mart telescopes, you're going to get frustrated with trying to figure out how to find something in the sky and stop using it before you actually do anything cool.

If you go out and instead get a pair of binoculars, first of all you can convince your spouse it's a good investment. You can also use them to look at your kids when they're in marching band or soccer or whatever sports they play. You can watch parades, go to the zoo and see animals. Binoculars are one of these investments you can use for your hobby, but you can also use them for all sorts of other different things.

They're easy to use. With a telescope there's fussing and fussing and fussing – and eventually you find an object. With binoculars, you look at the object with your eyes,

pull the binoculars in front of your eyes and look at the object through the binoculars with your eyes. The learning curve to get from having the binoculars in a box to using the binoculars to look at the Moon is almost none.

Fraser: Yeah, using binoculars is so fast. You can look up in the sky, see some blurry spot or something, pull the binoculars, turn and see things that have a much better view. If you're not sure if you're looking at the right object, you just look again and make sure you've got it lined up.

Yeah, I totally agree that binoculars are one of the first, best ways to go.

Pamela: They're entirely satisfying because you can see objects that are fainter than you could ever see with your eyes, but you can get from object to object quickly. You're not lugging around a heavy object. Telescopes can get heavy and cumbersome to carry around with you. So you're getting a whole new face to the sky with this \$70 piece of glass and plastic, and you're having fun and they're easy to share. You just hand them to your kid and help your kid find an object. Hand them to your friend, your spouse, whoever is nearby going, "what are you doing in the dark?" and you can get them hooked as well.

Fraser: I think the best thing with binoculars kind of goes hand-in-hand with one of the most important things, to learn your constellations and be able to go out with a star map in hand and actually start learning where all the stars are. Everything in astronomy is based on those constellations, so if you know where Hercules is, you can find the globular cluster. If you know where Pegasus is, you can find Andromeda. So I think the next step is to learn your constellations.

Pamela: Here I think you and I have a slight disagreement. I love planispheres, and there's a really good one available for free.

Fraser: What's a planisphere?

Pamela: It's a round piece of paper within two pieces of paper. It's a dial that's just... take three pieces of paper, cut a hole in the top piece and allow the middle piece to rotate freely. The top piece you cut a hole that represents your sky. The back piece has all the constellations on it, and you rotate it until the constellations that are visible on the planisphere match the constellations visible in the sky.

Fraser: They have like a month and time so you can turn it so you could match the sky tonight.

Pamela: Exactly. These are also called star wheels, star dials... because you dial the wheels to the time and date you're at, and it moves your map to adjust to what our current changing sky actually looks like.

Fraser: Yeah, you can get them at museums, online...

Pamela: Edmund Scientific

Fraser: Yeah, and they're only a couple of dollars. They're not expensive at all.

Pamela: They're easy to use, and every good journey begins with a map, and this is one of my favourite maps.

Fraser: Yeah, my favourite is there's a book called *Nightwatch* which is what taught me my constellations. It's this spiral bound book, about 96 pages or so, and inside it's got a really nice view of all the constellations for each season. You can lay it out flat and use a red flashlight so you don't wreck your night vision, and you can learn your constellations. The great thing about it is it also has in all the constellations, it's got closer-in views that show where all the interesting objects are: where galaxies and nebulas and stuff like that are. So as you get better and learn your constellations you can switch over and start looking for some of these objects. *Nightwatch* is by Terrance Dickinson. I would say it should be on every amateur astronomer's bookshelf.

Pamela: I have it on my shelf, so it should be on every pro's shelf as well.

Fraser: The other thing I recommend is before getting a telescope, find your local astronomy chapter: do a search on Google for "astronomy society" and then your city (Chicago, New York, Vancouver, whatever) and you'll find your local astronomy club. There'll be some contact people, and they'll do an observing night several nights a month. What you can do is organize to go out there and look through people's telescopes and you'll find amateurs are more than happy to let you take a look.

Pamela: Amateurs are some of the friendliest human beings out there. These are people that have a hobby they're passionate about that they just want to share with somebody. They want to take you out and help you find the galaxies, help you find the planets, and get you as hooked as they are so they have another person to talk about the stars with.

Finding a mentor can be the best thing you can do if you really want to get started. It's one thing to learn from a book, it's another thing to learn from someone who's already gone through the learning process and knows all the tricks that you have to watch out for.

It's also good because you can play with their equipment before you have to invest in any of your own. Just like it's good to test-drive a car, it's good to test-drive a telescope. What is one person's favourite telescope might drive another person crazy.

So go out, find someone that you enjoy learning from, a club you enjoy being part of, and get involved with human beings and build a small astronomical community. Here in the United States, we have the astronomical league which keeps a list of major astronomy clubs around the United States. In Canada there's the Royal Astronomical Society of Canada. Both are good organizations that can help you get started, and help you find the local folks to get you started face to face.

Fraser: So let's say then that people don't want to wait and they've done the binoculars and they know they want a telescope. What's the big recommendation?

Pamela: My favourite first telescope is a Dobsonian telescope. This is basically a light bucket. It's a telescope mounted on what, for lack of a better term, I will call a lazy-susan. It's easy to point, it's easy to carry, it's hard to break and they're cheap. You can get a really good one for under \$200.

Go out, you can get a 6" mirror which will collect huge amounts of light compared to your binoculars or your eyes, and start looking at fainter galaxies. Start challenging yourself to find little tiny double stars that have very different colours. See what your eyes are capable of, and just go that next level of faintness into the sky.

Fraser: Yeah, the Dobsonians are actually pretty easy to move around. Now, it won't have computer control, which is good because it's good to learn the constellations and where objects are. You can swing them around, turn them, move them up and down, and look through the spotting scope to find out what you're looking at.

So I totally agree that for a couple hundred dollars you can get a pretty powerful telescope. They're not super portable, but they are definitely a really good view of the night sky. Then you can start looking at some of the more darker, deeper sky objects – galaxies, nebulae, stuff like that.

Pamela: You can get them that have encoders in them that can say, "you just pointed at Aldeberan, you pointed at Betelgeuse before that, I know how you moved the telescope to get between these two objects, now let me tell you how to find something cool you wouldn't be able to find otherwise," and they use little arrows to move you around the sky.

So it's actually possible to get a Dobsonian that will help you find things and be your resident tour guide. It won't move the telescope for you, but it will tell you how to move the telescope.

Fraser: So let's say that the Dobsonian is good, but I think people do want some of those features – some of that star-finding, some better optics. What would you recommend about that?

Pamela: Well, there it starts to get into a question of how much money you're willing to spend, and what are your eventual goals? If you're someone who wants to always be looking at the sky, the Takahashis are amazingly expensive; you'll spend as much on them as you will on a car, but you'll have sensational optics. Dobsonians are good, but they are hard to transport but you can get them in huge varieties. I've met some that you have to stand on 12' ladders to look through, but you could see quasars through the Dobsonian.

Fraser: I looked at one this summer and it was 21 inches, I think. It was a 16 foot ladder you stood at the top of, and then you could look in. You could see Andromeda and see the spiral arms of it. It was just unbelievable. It was fairly portable – wasn't too bad. It was cloth and the tops and the bottoms could come apart and they could move it around. So actually it wasn't too bad, but still –pretty crazy.

Pamela: Once you start getting into wanting a mechanized telescope, it all depends on how much money you're willing to spend. Celestron, Meade and Orion all put out perfectly reasonable telescopes in the "it costs as much as my high school student's car" variety. These will get you started: you can attach cameras to them, you can get what are called CCDs – Charged Coupled Devices, that are basically the same technology that's in a digital camera, but specially cooled and built just for astronomy use. You can get these and mount them on. You want to look for a telescope that is a Cassegrain focus. This means the light comes out, basically, the butt of the telescope. So the camera is mounted on the bottom part of the telescope, the light comes in the top, does some reflecting in the middle, and everything balances out nicely.

Fraser: A lot of the pictures people see on the internet (I'll highlight them on *Universe Today* quite a bit, once a week we do a new astrophoto), those are actually not so hard to get into anymore.

Pamela: No. I actually have a graduate student that I'm working with right now that's using a Canon EOS Rebel to do digital photography of the sky. You can go out and buy any SLR camera on ebay and do perfectly good astrophotography using good quality film, and then scan your negatives in and get amazing photos.

So there's lots of different directions you can go in. SBIG, Santa Barbara Instruments Group, makes amazing digital devices for measuring the sky, CCDs. They come in all different varieties, all different price ranges, depending on exactly what you want to do you can actually buy them nowadays that take colour pictures (that wasn't true just five years ago).

Fraser: Something other people are doing as well is using video cameras. They're stacking up pictures on the video camera. They take five minutes of an object and then stack them up using a computer, and the images they get are just amazing.

Pamela: Meade makes something called the Deep Sky Imager that is fairly cheap and does fairly good quality. You hook it up and it goes. It's a webcam designed for your telescope. You can stack all of these pictures – there's a group at Dexter Southfield School in Massachusetts that uses high quality security cameras, actually, that they've reprogrammed and re-done and hooked up to their telescope. They'll take a few thousand images, go through using software and find the best hundred out of those few thousand images and stack them together. You can get images of the space shuttle that allow you to see the paint job. It's really cool, the type of stuff you can do, and they're just using a 20-something inch telescope that anyone with a big enough backyard could buy for a few thousand dollars.

Fraser: So just to recap, start with your eyes. Learn your constellations, get a starwheel and a reasonably good set of binoculars. Head outside, learn your constellations, enjoy the time with other people. If you feel like that's it for you, find a local astronomy club, check out other people's telescopes to see what you can see, and then you can start the long road to spending your whole mortgage on your telescope.

[laughter]

But you don't have to, which is the point.

Pamela: No. I personally love my binoculars. So there's two things to think about: you can spend as much or as little as you want and still do good science. There are people out there who are visually, without binocular or anything else, observing some of the brightest variable stars and doing real science. At the same time, there are amateur astronomers who have built backyard facilities that would make any professional astronomer drool. There's this fascinating figure I learned last year: a person will often spend as much on their hobby as they spend on their car. So if you go to a star party, find the person with the telescope you love and go look at their car (then do some mental calculations). You don't have to do that. A good pair of binoculars will take you a long way through the sky.

Fraser: Wonderful. So this episode of *Astronomy Cast* is going to have some homework. You've got to let us know how it went. Have you been wanting to get into astronomy and you listened to the show and it's kind of getting you inspired? Maybe you've been thinking about taking the next step. Let us know how it goes. Go out, spend a night with your binoculars, learn some constellations. It's especially fun with family and friends to make a night of it. Drive outside of the city nights and spend the night looking at the sky.

Let us know how it goes, drop us an email: we'd love to hear if you've caught the bug yet.

Pamela: We can't wait to see your results!

This transcript is not an exact match to the audio file. It has been edited for clarity.