Interview with Bob McLaren

Canada France Hawaii Telescope

Liz Bryson, Interviewer

Interview Date: August 5, 2003

Table of Contents

Begin Side 1, Tape 1

I. FAMILY BACKGROUND

McLaren: My name is Bob McLaren. I grew up in a small town in southwestern Ontario in Canada, called Watford, about 1200 people. I went to the elementary school there, Watford Public School, and then high school. I completed grade 13. There were thirteen years of school in Canada at that time. That was in 1964 and then I went to the University of Toronto and was an undergraduate.

Bryson: I believe in your biographical data sheet you said that you are the eldest of three.

McLaren: Yea, I have a younger brother and a younger sister.

Bryson: And what impact did this have, if any, on your development as a scientist?

McLaren: I don't think it had any impact on it, really, not that I can think of.

Bryson: What age did you start thinking about astronomy?

McLaren: I didn't start thinking seriously about astronomy until quite late in my career; in fact after I had completed my doctorate. My doctorate was in Physics. When I was finishing up my thesis and thinking about what I wanted to do next, I talked with my supervisor one day and he asked me, "What would you like to do?", and I said I wasn't really sure I wanted to continue doing the kind of work I'd done for my thesis, which was working in the lab and basement and I saw it as maybe just getting more accurate measurements of the kind of thing that I had been doing and I said I might be interested in something quite different.

My supervisor, a man by the name of Boris Stoicheff, had worked for a while with Charles Townes, the co-inventor of the laser, and Stoicheff knew that Townes had recently relocated to Berkeley and was applying some aspects of

laser physics to astronomy. So Stoicheff suggested well maybe a postdoc with Townes would be interesting. "Astronomy is something different, would get you outside but you could apply what you learned about lasers." So I was fortunate enough to get a post doctorate fellowship, a NATO fellowship, that would allow me to go to Berkley for two years and it was only *then* that I really started a serious interest in astronomy.

I'd taken one undergraduate course in astronomy, which was required as part of the Physics program, but up until then I hadn't had any particular interest in the field.

Bryson: Did you always have a penchant for science?

McLaren: Oh yea, definitely, science and physics, and math.

II. YOUTH – WATFORD, ONTARIO: 1946-1964

Bryson: I'd like to move back to Ontario for a couple more questions. How would you describe your environment growing up?

McLaren: Rural. Small town. As I mentioned earlier, Watford had a population of 1,200 at that time. It was a farm community. Just to give you some idea of what it was like in a small town when you're going to school. When I was going to what we call elementary school here, we call it public school, so grades kindergarten through 8, I walked home for lunch each day. So I had lunch at home by walking. Even when I went to high school, which was also in town, I could still walk.

My father was a pharmacist. The family had a drugstore in Watford since about 1869, so it was nearly 100 years by the time I was completing high school.

A family business that had gone through several generations and my father was the pharmacist.

Bryson: What was the science curriculum like?

McLaren: The science curriculum was pretty standard. There wasn't any sort of intensive physics or chemistry or physical science. So there was just the usual kind of mixture of life science and physical science. When I was in high school, I took both the physics courses that were offered and there was also a science club where we did some things and some projects.

I had a good friend who was actually one year ahead of me in high school and we had a number of science related projects. I suppose the biggest one was making model rockets.

Bryson: Did they work?

McLaren: Some of them worked. Yes. Most of them didn't, but some of them worked. At one point, I remember we had to cook up the rocket fuel and one type of procedure involved actually liquefying it. Finally, my friend's mom, his name was Doug Mickey, she kind of kicked us out of the house and told us that we couldn't make rocket fuel anymore on her stove, which was probably a good move on her part.

Bryson: What happened? Did you blow it up?

McLaren: Nothing serious ever happened.

Bryson: Was that you first experiment?

McLaren: Certainly the first experiment of any magnitude, yea that's right, the rockets we built.

Bryson: Did they work?

McLaren: A couple of them did. The ones we built weren't all that successful. Some of them would go maybe only a few feet up in the air, but these were not kits or anything. These were ones that we built from scratch. And the rocket fuel actually came from my dad's store. We would get sulfur and the oxidizer and so on from the store and mix up the rocket fuel, which was basically gun powder.

Bryson: Do you think that, you were right in the midst of the Space Age, you know man landing on the moon, that 60s era. Was that an effect on you or would you have probably gone this route anyway without the Age of Split Mechanisms?

McLaren: Well it was certainly the beginning of the Space Age. The landing on the moon was 1969, I believe, and that's much later. That's while I was doing my doctorate, well when I just started graduate school. The Space Age stuff that influenced me during the school years was things like Sputnik, the first modern man-made satellite in 1957, and then later the Mercury and Gemini NASA programs.

My earliest recollection was the large number of early failures there were in the American space program, the Vanguard program, the Explorer program. A lot of those rockets blew up on the launch pad. Actually, Doug and I didn't feel so bad because ours blew up too. We weren't the only ones. Yea that had an influence on me and I think also the advent of nuclear energy.

I remember writing an essay once. When I was at the junior or senior level of high school, you had to write an essay for a contest and I wrote mine on the promise of atomic energy. Back then of course it was felt that nuclear energy was the answer to all our energy problems. Actually, I think I'm in a minority, but I

actually still feel that we'll come back to proper use of nuclear power at least for the next 100 years or so as being a better source of energy than fossil fuels, but back then I remember writing this little essay about the promise of nuclear energy.

Bryson: What lessons did you learn early on from those Ontario years that may have carried you through your scientific work ethic?

McLaren: Well I learned that I really liked working on math, and science interested me. That was established right from the beginning. I think that my mother and my father played slightly different rolls. I did projects with my Dad. He helped me with a lot involving electronics, building kits. That was one of the other technical things that I did. I built radio test equipment and that kind of thing from kits and my dad would help me with that. He'd help me with the soldering and figuring out the instructions. And then Mom was more advice on how to approach things.

I remember once, grade 10, I had a project, a life science project. It was a weed seed collection, if you can imagine. It was a summer project, I believe. Something we had to do over the summer and then have for the beginning of school. It might have been between grade 9 and 10, I think. Anyway, we were in an agricultural area and all the boys had to take a course in agriculture and I believe this was preliminary to taking that course. In any event, this was not a project that I wanted to do. It didn't interest me at all. One of my problems is that I'm a bit of a procrastinator, especially things I don't want to do. I put them off and I'd been putting this off all summer. These weed seeds you had to mount on a display and present them in class. So there was sort of a panic session I remember as school was approaching and I didn't have the weed seed thing done, and I'm trying to

appeal to some kind of sympathy from my mother and I remember her very clearly saying that, "This is just something you're gonna have to do and you can either stay in grade 10 for the rest of your life or you can do the weed seed project. You know and you just have to face up to it".

That's the only thing that springs to mind right now as being sort of a lesson that I learned from my mother, in particular, about facing up to things. I'm still not very good at it, but I still remember her scolding me about putting things off and how some things you just have to do and move on.

Bryson: So you might say your dad was the kind of person who helped nurture your scientific activity.

McLaren: Yea, my dad had a lot of interest in technical things. As I mentioned, he was a pharmacist. He had been a navigator during WWII, in the Royal Canadian Air Force, on Lancaster bombers. He actually knew a bit of astronomy from the celestial navigation he learned. So I knew the names of maybe ten or so of the brightest stars and how to find them in the sky. My dad had shown me that and he had a few left over bits of equipment from his Air Force days that I would play with once and a while. So the technical things, he was a help with, but most of the non-technical things and other kinds of advice I got from my mom. And still do actually. [both laugh]

III. TORONTO, ONTARIO: 1964-1973

Bryson: We're gonna move on to your Toronto years, 1964 to 1973. Would you describe your thesis topic please?

McLaren: The Ph.D. thesis?

Bryson: Yes.

McLaren: Well I was using lasers to study the properties of condensed matter. In particular, we were measuring the elasticity of solid neon. That was the project. Neon is a noble gas. Other than helium, the lightest one, and actually if you cool neon to about 20 degrees Kelvin it will first form a liquid and then it will freeze if you cool it a little bit more. There was some interest among condensed matter physicists about the intermolecular forces of neon and one way of learning about that was to measure how elastic it is and the way you do that is you measure the sound speed. So we were measuring the sound speed of neon, solid neon.

The way were doing it was, we would first have to make solid neon. So we developed this technique that involved using little plastic, actually Plexiglas cylindrical tubes, "cells" we called them, that we actually had made in a shop and we would put a window on one end and connect it to a tube on the other, put it inside a cryostat, helium cryostat and condensed neon in there, first condensing a liquid from gas, and then cooling it so that we could form a little crystal. And we'd form a crystal of neon inside this little cell about this high and maybe about this wide and we'd have to grow it carefully because we wanted a single crystal of neon in there. A lot of them were failures. They didn't produce a single crystal. So the next thing we have to do is find out what orientation this crystal was in, which direction the axis of the crystals were, and of course we couldn't touch it or anything because it was in this cryostat. So we had an old dental x-ray machine that had been scrounged somewhere and we had a lead collimator and we could

send a beam of x-rays through this crystal and take an x-ray diffraction picture and from that determine what orientation the crystal was in.

The sound speed measurement was made with a laser. At the bottom of the cell, we had a window that was made of sapphire, which was sealed so that the neon would stay in the tube. And then we'd shine a laser beam up through this window and up through the cell, and then it got lost up in the tube. The light then would go right through the middle of this cylindrical shaped crystal, it was inside the tube, and some of the light would be scattered out to the sides so you'd see a little beam of light going through the tube and this scattering, it's called Brillouin scattering, and some of that scatter was actually produced by sound waves in the crystal. What happens is that as the sound wave is moving, the wavelength of the scattered light is slightly different than the wavelength of the light that you sent in. It's actually different by the frequency of the sound wave. So if you take a very accurate spectrum of the scattered light you can discover how fast the sound is moving and that's called Brillouin spectroscopy.

What we'd do is we'd take various different orientations of the crystal and you get different sound speeds depending on the direction and work all that out and you'd come up with measuring how elastic neon is and that in turn could be compared with the predictions of how elastic it was based on what the theoreticians understand about the molecular forces. So the real scientific interest here was to see if the models for understanding of the intermolecular forces in neon were good enough to predict the elastic constants and see if you got the

same values as you got when you measured it using this scattering technique. So that's what I did for about four years.

Bryson: Was it successful?

McLaren: Yea, we measured the elastic constants of solid Neon over a period of about three years. It was fairly successful in confirming what was then considered the best theory of intermolecular forces and how to calculate it, but I didn't have to do anything on the theory. It was purely experimental. It involved growing crystals of Neon, making the apparatus to do that; using lasers to bounce laser light off of them to measure the sound speed; using a particular kind of spectrograph, a Fabry-Perot Spectrograph, to get the very high resolution spectrum so you'd see the frequency shift from the scattered light; and then the x-ray business to determine the orientation of the crystal.

I had a couple people help me. I had a post doc that was working with me who was good experimentally and then a younger graduate student helped out a bit as well. So we had a team of three people. Interestingly, coincidentally, both of the helpers were Dutch.

Bryson: What would you say is the key to good research?

McLaren: Well I don't know if there's a single key to it. I'd say you have to have a good idea to start with. That helps a lot, but then I think you have to work hard. It's mostly perspiration and a little bit of inspiration, but it's hard work. I think that you have to resist preconceived notions and be open to admitting that you made a mistake or that you may have to reconsider things. You don't want to have too much preconception. I think that another key to being successful is that you

definitely have to enjoy it. It's hard work. Lots of frustrations involved. It's certainly not something for someone who really wants a 9-5 job to earn an income and is really interested in doing other activities. It's a real avocation. So don't do it if you don't enjoy it. Or don't try to do it if you don't enjoy it; I guess is what I should say.

Bryson: Who was the most important mentor in your career path during this time?

McLaren: You mean during the Toronto time?

Bryson: Yes.

McLaren: That's clear that's Boris Stoicheff, my supervisor. And there were a couple of other people that were very good that I took courses from, but Stoicheff, as you might expect, my supervisor by far had the most influence. He was very good.

Bryson: Tell me about him.

McLaren: Macedonian by extraction. A very affable person, but also high standards. Used to thinking a little bit outside the box. He was always open to new ideas, always open to trying things, not the kind of person that would give up on something just because somebody else said it was impossible or couldn't be done. He would want to try it; very supportive.

The kind of work I was doing is rather different from what astronomy students do. I was doing experimental physics, so I lived in a lab. I didn't have an office when I was a graduate student. They gave me a desk in an office for the final year when I was writing my thesis, but up until then I had a desk in the lab. So you'd show up every morning in the lab and you'd work with the apparatus and Boris would show up every day he was in town and he'd come down and talk with

everyone in the lab and see how things were going and give you some encouragement. He instilled a hard work ethic with a bit of healthy skepticism about what other people tell you, and high standards for what you actually publish. If he was going to put his name on something, he wanted to make sure it was as good as it could possibly be.

Bryson: What did you do during this time for fun?

McLaren: I got married fairly early, by most standards. I got married a year after I obtained my B.Sc. Marion and I lived in a married student apartment building that was just off the campus and I could walk to the lab every morning. Marion was teaching high school at that time. We were skiing then and went skiing once in a while. We played a good bit of duplicate bridge. We didn't play golf then; that didn't develop until we came to Hawaii. At least I didn't play golf. Oh we played tennis. Yea, we played a fair bit of tennis. So tennis in the summer, skiing in the winter, and we played some duplicate bridge and that was about all we had time for.

Bryson: What do you think you would have become if not a scientist?

McLaren: Probably an engineer.

IV. BERKELEY, CALIFORNIA: 1973-1975

Bryson: I'm going to move to Berkeley, California, 1973 to 1975. You said that you got a NATO award. Can you describe that a little bit?

McLaren: It's a post doctoral fellowship. I don't think the money actually comes from NATO, I presume it comes from the particular country that you're in, but it's a fellowship program that was called NATO Post Doctoral Fellowships. It was two years.

As I mentioned earlier, the idea was to change fields and go and work with Professor Townes who was applying lasers, which he was an expert in, having been one of the inventors of it, but applying that to astronomy. So the idea here was that what I knew about lasers could be applied in a new area and this is what Townes was doing and Stoicheff had worked with Townes for a while when he was a visitor in Townes' lab. I can't remember whether it was Columbia or MIT, but I think it might have been when Townes was at MIT. And Stoicheff thought a lot of Townes, and thought he was a great person to work with and thought that I would enjoy that. So there was some exchange of correspondence and Townes said, yea, I was welcome to come and join them and I had a fellowship so I could bring my money with me.

That was in October of 1973. We packed up the car and drove from Toronto to Berkeley.

Bryson: That must have been quite a transition from Toronto to Berkeley.

McLaren: Yea, it was and at that time we'd been married four years. Marion was pregnant before we left right? So there was that change coming as well. I remember her not being very comfortable when we were in Death Valley because it was really hot. We took maybe a week or so to drive there. We went through New Mexico and Arizona, and into California.

Bryson: Did you find the post-doctorate experience worthwhile?

McLaren: Oh yes, very much so. I would suspect it is the most intensive and probably most productive period for a lot of scientists because you're fresh out of graduate school; you have lots of energy and also at that point still not much in the way of

incumbent responsibilities other than doing your work. You don't have grad students to supervise, you don't have courses to teach, and you don't have management responsibilities. You can pretty well spend all your time on what you're doing. I certainly found it that way and I think a lot of people do.

V. UNIVERSITY OF TORONTO: 1975-1982

Bryson: Toronto 1975 to 1982. Can you describe what some of your responsibilities were at that time?

McLaren: Well I moved back to Toronto in 1975 to take an Assistant Professor position. It was actually a joint appointment between the Astronomy Department and the Physics Department, but most of my work was in astronomy. I don't think I got a teaching assignment until 1976.

I remember the first course I taught was an evening course for mature students, mostly people that had jobs during the day. There were about 50 of them, I think. It was an introductory astronomy course, three hours every Thursday night for a whole year. The courses at Toronto were year-long, not semester courses when I was there. So we covered a lot of stuff. That was quite rewarding because the students were interested. They wouldn't have been there if they didn't want to be there. And then, after that, usually I would teach an undergraduate introductory course for science students all year long, and then there was a one semester graduate course in astronomy instrumentation. So that was the teaching load and then we developed some research projects.

I got graduate students fairly early on and so we were developing infrared instrumentation or trying to do so. And then we also got into some observing

programs when we started to work on infrared observations of Cepheid variables, which was the biggest single thing that I did with the graduate students when I was in Toronto. There were a number of them.

Bryson: And they were.

McLaren: Rick McGonegal, Chris McAlary, and Doug Welch were all involved in the Cepheid work. Dennis Crabtree actually worked in a different field. He worked on carbon stars and giant stars. So I had four graduate students total.

Bryson: What literary figure would you have employed as a postdoc and why?

McLaren: By "literary" do you mean a writer? That's an interesting question. How would I employ a writer as a postdoc? Freeman Dyson is a physicist, but he's also done quite a bit of writing and I've read a couple of his books and think he's pretty good.

Bryson: And why?

McLaren: Because I like the way he thinks. I think he'd be fascinating to have around. [laugh] I've never been asked that question before that's for sure. Yea. Quick answer anyway.

VI. EARLY CONTACT WITH CFHT: 1983

Bryson: Okay we're gonna move to early contact with CFHT. And we talked briefly about your work prior to coming to CFHT. Describe your earliest recollection of CFHT. In other words, where did you hear about it?

McLaren: Well I was back in Toronto. I probably heard something about it while I was still at Berkeley, just a rumor if nothing more, right. I certainly knew that it was being built at the time that I accepted the job back in Toronto in 1975. Once I was back

in Toronto, of course I was hearing quite a bit about reports of the progress. Sydney van den Bergh was on the faculty there and I think Sydney, and I'm not sure how he was involved with CFHT, whether he was on SAC, but he certainly knew what was going on. I remember in particular Sydney remarking on the fact that it was going to be a completely computerized telescope and in those days that was revolutionary.

Astronomers, especially the older ones, were a little uneasy about the telescope being controlled by a computer. So you'll see that a lot of the telescopes of the CFHT vintage, they may have a computer control, but they usually have a complete console of the traditional buttons and lights as well, just in case the computer didn't work. So I remember that and then hearing about the choice of what kind of computers they were going to use. Toronto was actually building a polarimeter for CFHT and I believe at that time our Department Chair, Donald MacRae, was on the Board, if not the Chair of the Board. So I had quite a bit of second-hand information I'd hear about CFHT and how things were going and so on and I was interested in the infrared. That was my field. I knew that CFHT was at a good infrared site and they were going to have an infrared upper end and it was going to have infrared instruments and I was interested in that.

Bryson: Tell me about how you arrived at the decision to move to Hawaii.

McLaren: Well, I was eligible for sabbatical in 1982 and I was interested in using CFHT in the infrared and also helping to commission some of the infrared instruments so it seemed to be a good time to be at CFHT. It was a telescope partnership with France and Hawaii, so it seemed like kind of a natural thing to do. I'd had at least

one and maybe two observing runs on Mauna Kea as a holdover from the Berkeley days right? The heterodyne spectroscopy work with Al Betz. Some of that was being continued on Mauna Kea, at IRTF, and also at CFHT. So I'd been there as well. So we decided that we'd take sabbatical in 1982 and came to Waimea expecting to be there just one year.

Bryson: Upon your arrival, what were your first impressions of CFHT?

McLaren: Oh, I thought it was great. It was frontier. We were a new telescope at a really challenging location in this rather rudimentary base facility that was using portable buildings and nothing fancy about any of it and just a lot of people that were working hard to try and make the thing work and sort of something new everyday. It was fascinating and very exciting.

Bryson: Who were some of your colleagues there at the time? Were there any colleagues you worked with from Toronto that had come down as well during these early years?

McLaren: No, not really. Rick McGonegal came to work at CFHT not too long after I arrived when he finished his thesis.

Bryson: So there were no contemporaries.

McLaren: Not from Toronto. Not contemporary quite. The closest that you could come to that by far was René Racine because he was Director in 1980-84 and I'd known René. He had been in Toronto before he went to Montreal. So I knew René fairly well. In fact, René Racine was Rick McGonegal's Master's thesis supervisor, while he was in Toronto. Then Rick switched to me for a Ph.D. So René I knew

pretty well. So that I would say was the person I felt closest to. In fact in some sense René was the reason I that went there. I had discussed it with him.

End Side 1, Tape 1

Begin Side 2, Tape 1

Bryson: What was a typical run like for a support astronomer?

McLaren: A typical run? Well a typical run, you would know something about the project already because you probably would have helped do the technical review when the proposals came in so you'd be familiar with it already. Then usually you'd have some correspondence either phone call or email maybe with the observer prior to get things set up.

Bryson: But you didn't have email then.

McLaren: We didn't have email until the very end of the time I was there, so usually a phone call or maybe just a letter. Often you'd see the observer at the base facility prior to their going up and you had another opportunity to talk things over and then you'd just go up usually the day of the run and make sure the instrument was working and meet up with the observer in the afternoon, go up after dinner and get them started. If things went well, you could be finished by 11 o'clock or midnight and if it didn't go so well you could be there later. But you always hoped, of course, that you had decent weather the first night so that you could get the person started. And then after that, you could check in by telephone to see how they're doing. So that was the pattern and, of course, the amount of attention the observer needed depended a lot on how familiar they were with the equipment and how complicated it was. For some of the runs I had to stay up there the whole

time because there were things that they didn't know how to do, in particular, if liquid helium was involved or some visitor instrument and so I'd be there for the duration of a run or most of it. But those weren't typical.

Bryson: Can you remember a particular observing run that you'd consider disastrous?

McLaren: Yes, I can. There was one. I don't remember all the names, maybe just as well. There was one early on. It was an infrared camera. An observing team came from France and there were a number of these projects. A lot of people were developing early infrared cameras and they'd bring them to CFHT to try them out. This man in particular came with a graduate school and things didn't go well at all. The thing didn't work. Anyway he just up and left one morning. He was staying at Hale Pohaku. This was the early days because I remember it was still the old construction camp at Hale Pohaku which means it must have been no later than the summer of 1983, so '82 or early '83. This guy just took off back to France. He just quit astronomy right there and the poor graduate student was left to clear everything up.

Bryson: You don't remember the year of this do you?

McLaren: It had to be1982 or the first half of 1983. And that was one of the first runs I had and it was quite a shock and then, of course, the graduate student was shocked as well. His supervisor took off. That one would be pretty close to disaster.

There was another one once where Brad Smith and a collaborator from JPL came to do some coronagraphic work and it turned out that the coating on the secondary mirror was really bad so there was huge scattered light that made it basically impossible to do the coronagraphic work because what you're trying to

do is see faint things around a bright object. So it was embarrassing when the telescope didn't work at all right.

There were a couple also where some dispute would develop between one observer and another. A couple of occasions where people were trying to share or split nights and you'd get into problems about priority. So those are the ones that I remember and I guess they all involved things that people did, rather than equipment. And you had disasters with equipment, too, but you kind of get used to that after a while. It's where the personalities get involved that makes for the real disasters, at least the ones you remember.

Bryson: I'm wondering if you're going to see less of this now that the observatories are moving to queue observing.

McLaren: Oh yea, it's much different now. You don't rely nearly as much on the individual observer, but back then the observer and the support astronomer had big responsibility, for a lot of things that now are handled some other way.

Bryson: Such as.

McLaren: A lot of the real disasters that I was involved with had to do with visitor equipment of one kind or another and there you don't have the kind of support from the observatory staff that you have with facility equipment. So things would come to the telescope that just weren't ready to come to the telescope and people that weren't ready to be there either. You get much less of that now, I think. So there isn't the same opportunity to have these fiascos that we had twenty years ago.

Bryson: Most observatories experience growing pains during their early years. Identify a major problem you experienced working as an astronomer at CFHT and how it was resolved.

McLaren: A major problem. Growing pains. I'll just mention a couple. There were a lot of problems with the telescope control system. It wouldn't behave properly; it wouldn't point properly and track properly. In that case, my recollection of it is that there wasn't any really single thing to fix that. It was just a long effort of cleaning up one thing after another and persistence, really, to get that solved. It just involved sticking with it.

Some of the early instrumentation had problems. Spectro 1, which was the Herzberg Spectrograph, wasn't in good shape when it initially arrived. It had to go back to DAO to be reworked. It came back and it worked just great, but at the time it was difficult because everyone was unhappy that it didn't work and we were insisting that it had to be up to a certain standard before we could put it on the telescope. I think some of the people at DAO thought that we were being too hardnosed about it, and they had put a huge effort into making it perform really well.

Bryson: That was commissioned in 1982 by Herzberg.

McLaren: And the solution there was that we just went and talked to them and explained why it had to perform up to the standard and eventually it was quite successful in doing that, but there was a challenge at the time for everyone involved for that to happen.

Bryson: Out of the early years that you spent at CFHT, what was the best piece of advice you ever received?

McLaren: The best piece of advice? Well, everybody gets the advice of don't try to solve big problems while you're working at 14,000 feet. [laugh] Everyone learns that. Think about it at sea level and that kind of thing. I'm not sure if it's a piece of advice, but I think a lesson that you learn is persistence, don't give up. A lesson I learned, I don't think there's any particular individual I associate with it, but a lesson I learned from my work there is always be a bit skeptical about things. Don't believe the first thing you hear about something. Check your facts. Check the assumptions. Don't jump to conclusions. Try and take a measured approach when you're faced with problems and that way there's less chance of making things actually worse from your initial reaction or heading off in some wrong direction. Take the time to analyze and make sure you have your facts straight. I'm sure one could have learned that lesson in a lot of other environments as well, but I certainly learned it there.

Bryson: What are your fondest observing memories of the CFHT years?

McLaren: Fondest observing memories? Humph. I think when people get great data that's what you feel best about. So a happy observer, and I've met quite a few of them over the years that went away pretty happy. I'd say if I had to pick one, it might be the work with Gordon Walker and Bruce Campbell with the hydrogen fluoride cell and the radical velocity measurements. You know, trying to look for planets around nearby stars, partly because it was such a pioneering project. If there were complete fairness in the world of science, *they* would have discovered the

extasolar planets before the others did, but it doesn't work that way right? And we know why that happened. They were looking for longer periods and so on. But the technique they had was beautiful, innovative, and two great individuals to work with. I always looked forward to those runs with a certain amount of anticipation and also a certain amount of anxiety because the hydrogen fluoride wasn't the safest stuff to be dealing with, you know. So I certainly remember that and some of the other infrared work that was done. I remember a run we had with Eric Becklin lunar occulation of the galactic center. Again, a fairly innovative thing that we managed to pull off and that was interesting.

Bryson: We're going to move to a little bit about instrumentation. What instruments were available when you first arrived?

McLaren: Photographic plates, the image intensifier camera for the photographic plates. There was one of the electronographic cameras that worked at prime focus. There was the Fourier Transform Spectrometer and the bolometer, and the indium antimonide infrared photometers. I think that's about it.

Bryson: And you worked on?

McLaren: I worked with the infrared stuff, the photometers in particular and a little bit with Jean-Pierre Maillard on the FTS, but not too much. Oh excuse me, and Coudé spectrograph was there, of course.

Bryson: So tell me, life at the summit, who were the employees on the day crew?

McLaren: When I was there? I'm not sure I can remember them all. There was Gus English. There was Charlie Pomaski. There was Bobbie Song. There was Eric Willet and there was Don Nakaoka. The ones I remember.

Bryson: Do you have a favorite story about one of them?

McLaren: Let's see. No. I don't think I have a favorite story about any of those. They were all sort of characters in their own way and their personality. I can't think of any particularly good story at the moment about any of those individuals.

VII. ASSOCIATE EXECUTIVE DIRECTOR OF CFHT: 1984-1987

Bryson: I'm going to move to your appointment to Director. Why did you take the appointment of Director?

McLaren: You mean the Associate Executive Director?

Bryson: Yes, that's correct.

McLaren: I guess I wanted to stay at CFHT and I thought I was interested in management and I saw it as an interesting thing to do.

Bryson: What were your administrative duties at that time, do you remember?

McLaren: I assisted the Director in the things that he did. That was Gérard Lelièvre. I helped with reviewing the observing proposals when we got them every six months, in particular the ones for the instruments that I was responsible for. I worked on the budget. Back then, I did a lot of writing because there was a lot of material that had to be written for the Board and annual reports, and in those days, everything was done in both English and French.

There was a lot of translating to do. The people that did this translating, which was Gérard, and Claude Berthoud and myself principally. We always, except for Claude, who could go either way, but Gérard would work from English into French and I would work from French into English. So we'd always work into the language that we knew best. There was probably at least a week or so worth of

cumulative translating that we did. I got to understand French, at least that kind of French, fairly well to translate it. We worked with SAC when they'd meet, we worked with the instrumentation people and on the various management issues.

Bryson: How were the duties parsed out? That was between you, Claude, and Gérard at that time.

McLaren: I guess things having to do with infrared instrumentation. That was my area. Things having to do with particularly Canadian issues, liaison with Canadian institutions and Canadians astronomers. That was my job. I think those were the only things that were predominantly in my area, everything else we just kind of just shared, I think. When it came to paperwork, signing things, if Gérard wasn't available, I would do it or if he was away. Things that were specific to me, those are the ones that I can remember the best.

Bryson: Do you recall what the budget was at that time?

McLaren: Not exactly. I think it was probably around 4.5 million dollars or something like that.

Bryson: Who determined the allocations?

McLaren: They were set by a formula then. It was a certain amount in 1983 or 1984 dollars, I think, and then it was adjusted using the cost of living adjustment. So it was a formula adjustment for cost of living.

Bryson: How was a consensus reached if you disagreed about something?

McLaren: Who?

Bryson: You, Claude, and Gérard.

McLaren: The three of us would just meet and thrash it out, face to face meetings. I don't think there were that many serious disagreements. At least I don't recall all that many.

Bryson: Explain the different agencies that you answered to during this time.

McLaren: Well the CFHT Board, of course. The primary reporting we did was to the Board and to the National Research Council because that is the Canadian agency responsible for CFHT. Although back then, there wasn't that much correspondence between the NRC and CFHT, I mean, probably less than there is now. Basically, they provided the funding, and they would have usually a strong representation on the Board. It was usually within the Board that there was interaction with the NRC. Involving my own personal employment arrangements, the conditions for that were set up through a discussion with people at NRC. There certainly wasn't anything like day-to-day or even week-to-week correspondence with NRC.

Bryson: Was there a TAC as well?

McLaren: Oh yea, SAC and TAC. That hasn't changed. That's been the same basically since the beginning of CFHT.

Bryson: I was reading in a newsletter, you were writing about how much as an Associate Executive Director you traveled. Do you have any idea how many airline miles you accumulated?

McLaren: No. You mean while at CFHT?

Bryson: Yea.

McLaren: Probably something between a quarter and a half a million, but I'm not sure.

Bryson: Any memorable travel stories?

McLaren: Nothing too dramatic. Every other summer the Board meeting would be in France. In those days because it'd alternate between Canada and France, the summer Board meeting. It was always a long trip. I remember once having flown, I think it was two red-eye flights to get to Paris, once to the West Coast of the United States and then overnight to Paris, and getting to Paris just to discover that the local airlines were on strike and we were supposed to get to Marseilles, so it was even a longer trip, but we eventually got there. So there were some long trips, but nothing that was a real disaster.

VIII. DIRECTOR OF CFHT: 1987-1989

Bryson: What year did you accept the nod for Director?

McLaren: Well I started the term of Director in the middle of 1987, so I guess the appointment must have been in 1986, or at least a year ahead.

Bryson: When Gérard Lelièvre turned the reigns over to you he gave you three envelopes. What were they for?

McLaren: It was a joke. I'm trying to remember exactly what they said. I remember the punch line. It was something like this. I may not have it exactly right. There may be various versions of it, but the out going person gave the new person three envelopes. These were supposed to be instructions about what to do when you faced serious problems or difficulties. I think the first one said something like, "Blame the former Director or attribute it to the former Director". Faced with the second serious problem, you'd open this and it would say, "Form a committee or an advisory committee". And for the third serious problem, it said "Take three

envelopes". So in other words, time to move on. I think that's the way it went, but it's been a while.

Bryson: What do you regard as you major accomplishment during your tenure as Director?

McLaren: I would say that the people we attracted to come and work at CFHT while I was there. We had some real success stories with recruiting. A lot of that though was advice I got from Jerry Sovka, who was a very good judge of people, of that type of people, engineering and technical. We had some really excellent people that we managed to attract to Waimea and that's how you make progress. It all has to do with the people. I think that is one of the most important functions of the senior management is to attract good people to come and work for your organization, to retain them so they don't get lured away by somebody else once you got them, and then put in place the infrastructure and the support and the environment that they need to function. The job is to get other people to do things. I think we had some success in that area.

Bryson: Do you recall some of the people that you were able to bring in?

McLaren: I can recall a few of them. The danger, of course, is that I'll forget somebody that should be mentioned. There was John Brewster, a software person that came from Hewlett Packard. And then Dave, the mechanical engineer. Dave Cowley, an excellent engineer. He made tremendous contributions to raising the level of mechanical engineering at CFHT. Probably Dan Sabin, he was a good mechanics person. There are probably others whose names escape me at the moment, but that's an area that I feel pretty good about. Oh yea, we got Doug Simons to come as resident astronomer.

That and I think just getting the telescope up to the level that it should be at and trying to finish the commissioning of the telescope and make it a first rate quality operation. I think that one success story, partly an accident of course, was the high resolution camera. The DAO people had this tip-tilt guiding camera that they were keen on, that they thought could really improve image quality. There were a lot of skeptics about that and some kind of theoretical reasons for thinking it maybe wouldn't work that well on a telescope that big. I remember thinking, well there's enough doubts about this thing that maybe it's not worth putting a lot of effort into it and making it into a facility instrument right off the bat, but on the other hand, I think partly, remembering the lessons about not being too sure of your first impression, so why not give them a chance. If they get observing time, let them come and use it and not be too concerned about the pessimism.

They came and they used it and it was a tremendous success, and not only a tremendous success in and of itself. I think it really showed the promise that adaptive optics could hold and that while the image quality at CFHT was pretty good, there were tremendous advances that could be made through adaptive optics and the high-resolution camera in my opinion is one of the pioneers of not just adaptive optics at CFHT but adaptive optics worldwide. There was real potential there and of course now we know that the skepticism was based on some wrong assumptions about what was involved.

Like a lot of things where the analysis is correct, but the assumptions are wrong. That gets back to this, don't be too sure of all your analysis. It doesn't hurt much of the time to just go out and try things even if you're skeptical about them.

That's how I feel about HRCam. I mean I was skeptical too. I suspected that it really wouldn't do that well based on what other people thought and I was wrong. It did really well. So I'm glad that while I was skeptical about it, I didn't let that rule the day as far as what I did. I decided, let's go ahead with this and see what it does.

Bryson: In reading about CFHT, I think that's one of the essence of the telescope, of that particular observatory, is that ability too, to sometimes try to capture, to work with things when we don't always know they work. We're kind of innovative that way. That's risky but we've had some very good things come out of it as well.

McLaren: CFHT, one of it's great strengths and I think part of the reason that it's done well is that relatively speaking, it's pretty free of bureaucracy and micro-management and a whole bunch of committees and so on looking over the shoulder. It's relatively free of politics. It's amazingly free of the kind politics that really slows things down. That's not to say that there wasn't a lot of scientific politics involved in choosing between instruments. It's a pretty fierce competition and there are disputes about instruments, but it doesn't have a lot of the baggage that some other national observatories and facilities have.

Bryson: We don't have the constant federal accountability.

McLaren: Accountability and all the constant array of experts and committees and so on and so forth that sort of become an end in themselves after a while, that is just a monster that has to be fed. CFHT is it beautifully simple in that regard. It's its own corporation to begin with so it can hire people. It can pay bills. It can buy things and so on completely on its own authority. It doesn't have to ask someone

else's permission or follow a big set of regulations in order to do these things. It's got its own personnel policy. It can hire people and it has a tradition of just producing great science. The agencies provide the money and a little help with the manpower, like the resident astronomers

Bryson: What if you had to do it all over again what would you have changed as Director?

McLaren: What would I have changed as Director? As Director? If I went back and did it all over again? Boy. I don't have a quick answer to that. This is the real benefit of hindsight. I think that an earlier start on recognizing the importance of Hawaiian culture. That's definitely hindsight. That wasn't evident at all, at least not while I was there. Maybe I wasn't hearing the signals, but if I had anything do over again, I would have gotten a ten or fifteen year head start on dealing with the difficulties associated with the native Hawaiian community and maybe we could have headed some of it off. I don't think that would have been primarily a CFHT responsibility, but CFHT certainly could have done something if we'd understood what the situation was.

Bryson: Keeping with that thought. What is the one thing about astronomy that you wish the public understood better?

McLaren: That involves my perception about what I think the public understands about astronomy. I guess I would say that they would understand that it's a humanistic activity. It's a cultural activity and that astronomers are people that in many ways like any other person. They're not some kind of different species and that, you know, they have goals and objectives and they make mistakes just like everyone else.

Bryson: How would you project that? Do you have any magic solutions to how that can be changed?

McLaren: Yea, sure. I think the way you correct that is you talk to people and you interact with them. Recently we had a fellow by the name of Don Goldsmith come through here. Don's been involved in outreach and publicizing astronomy for his whole career and I think he worked for a while with Carl Sagan. The single piece of advice that he gave at the end of his talk which was on how to do outreach in astronomy and he gave a lot of observation about it and anecdotes and so on, but the single piece of advice he gave at the end was "never turn down an opportunity to talk". Never turn down an opportunity to talk to people. I think that's excellent advice and I'm trying to follow it. I remember recently a couple of times I said "okay" when maybe in the past I would have said no. And this was part of his point. Even though you think the information transfer may not be often worthwhile. They may not have a clue or even care what you said, but the very fact that you talked to them, is, in and of itself, an important contribution to promoting astronomy. So it's not necessarily, "I talked to an astronomer and here's what I learned". It's just, "Hey, guess what, I talked with an astronomer". And that doesn't take a lot of effort. I mean, all it takes is rearranging your priorities a little bit and showing up. I think that's good advice.

IX. COMMUNITY LIFE AT WAIKOLOA

Bryson: I'm going to finalize with one question here is about community life. What were some of the challenges you found living in Waikoloa during those early years and what was it like to be in such a rural environment?

McLaren: Well, I mean, I'd grown up in a rural environment so it wasn't *that* different for me. I'm not a big city person like some people are, so it didn't bother me that much. I think that especially then, 20 years ago, it was still rather isolated. Not so much the rural part, but the isolation. You're a long way from anything. Even to take the kids up to school was a 25 minute drive. So once they got into the upper years of school where there may be after school activities, or this kind of thing, there occasionally might be two or even three round trips in a day between Waimea and Waikoloa. So it was quite a bit of driving and quite a bit of time. Shopping, of course, always involved an hour's travel round trip at a minimum and if there was something that you had to get in Hilo, you were talking at least a half day. After you'd explored the Big Island, and had been around Hawaii, then any kind of vacation travel involved transoceanic airfares and trips. So I'd say the isolation is a challenge and some people just found it wasn't for them, right?

End Side 2, Tape 1

Index of Names and Instruments