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DR. FRANCE CÓRDOVA INTERVIEW
MAKERS: WOMEN WHO MAKE AMERICA
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Dr. France Córdova
Astrophysicist
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Interviewed by Emma Cott
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START TC:00:00:00:00

Dr. France Córdova
Astrophysicist

INTERVIEWER:

I'm really excited to talk with you. Now could you tell me a little bit about your family and the way that you were raised?

00:00:15

FRANCE CORDOVA:

I was born in Europe, in France. And uh my father was Chief of Missions for C.A.R.E, which provided relief after the Second World War to a number of places that were devastated by the war. So we moved around a lot in Europe for the first few years of my life and about three of my siblings were born there. I sometimes have to think about that because I have eleven siblings and uh so the rest of them were born either in route to California or in California, which is where my father uh decided to move after spending some years with

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C.A.R.E. So we really grew up from uh, and I, from the age of six in California and did all of my schooling there.

INTERVIEWER:

And where do you fall in the order of children?

FRANCE CORDOVA:

I'm the oldest of twelve children.

INTERVIEWER:

How do you see that having shaped your personality?

00:01:12

FRANCE CORDOVA:

I think that being the oldest of twelve children has probably shaped the choices I've made and a lot about my personality more really than any other thing because when you have that many younger siblings in the family you have a great deal of responsibility. So I kind of grew up being uh a little miniature parent doing a lot of babysitting. We all went to parochial school so I was always ironing uniform shirts. I folded a lot of diapers and unfortunately the revolution in uh diapers and disposable diapers didn't come along until uh long after I was grown up. And so... So I had a lot of uh a lot of chores around the house and especially in um... in babysitting while my... my parents were off doing other works.

INTERVIEWER:

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Did your parents have different expectations of you than of the male children in your family?

00:02:11

FRANCE CORDOVA:

My uh... The oldest brother in the family is a few years younger than I am and so they... they didn't really have too many expectations of him growing up. I think I was such a responsible child that most of the uh... the helping as far as a parent was concerned, uh at least for the older siblings, fell on to me.

INTERVIEWER:

And what about in your career? Was there a gendered notion in your family of what girls would do and what boys would do?

00:02:44

FRANCE CORDOVA:

I don't think there was a gender difference in what we did growing up. Uh most of the boys in our family were quite a bit younger and so I think I grew up mostly around sisters, except for one brother. Uh it was a lot of fun. Um I guess he took out the trash, but he... and grew up to be a very responsible person, but I don't think there was much segregation of duties. We all had to take our turns at washing dishes and uh just helping out with uh... with all the family chores.

INTERVIEWER:

What were your parents' expectations for your life? What did they want for you?

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00:03:24

FRANCE CORDOVA:

Well I... I think I dominated the conversation about what I would do. I think my... my parents had a lot of other things on their mind when... when I was growing up. My father just worked tirelessly at his business. He founded his business with a partner and uh spent a lot of time growing that, and we rarely saw him. He also had bouts of real illness. He was sick for much of the time I was young and so that hung over us, the concern for him. And so my mother was the... was always at home with us children doing all the kinds of things you could imagine in a large, growing family.

INTERVIEWER:

Was there one parent that you identified with more than the other?

00:04:15

FRANCE CORDOVA:

Uh... I... I don't think there was one parent that I identified more than the other. I spent more time with my mother because she stayed at home. Uh I... Uh in some senses I actually identified with my father more because I envisioned that I would be out in the workplace and I would be a leader in... in uh business or in academia, something I would make my mark. And so I... I looked to him as the role model for that - a person that started his own company and developed it and uh worked all the time. So... So he was my role model for that. My mother had a lot of the nurturing and mentoring qualities that rubbed off on her children, but arguably more on some of my siblings than... than on me. I... I was driven to really make a difference.

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INTERVIEWER:

Where do you think that drive came from? That's very interesting for a—
Whenever I hear about a young person who really knows what they want to do
or what they're called to, it's... begs the question.

00:05:25

FRANCE CORDOVA:

I think a lot of that drive has to come from something that you're born with. I
was just born driven.

ON SCREEN TEXT:

France Córdova As A Little Girl

FRANCE CORDOVA:

My husband jokes that I was born two weeks late, according to my mother's
due date, and that I've never caught up and have been fiercely trying to catch
up ever since. And uh so... I... I just have always felt compelled to achieve, to
be at the top of whatever I committed myself to. I've risen to challenges just
because they were challenges uh and for something's no other reason than
there's a challenge out there. So even when I play a board game with family
members, you know I want to win just on principle. [LAUGHS]

INTERVIEWER:

Can you tell me what kind of student you were before college? To what extent
were you sort of the girl in the front seat raising your hand?

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00:06:20

FRANCE CORDOVA:

I was a... I was a good student all the way through school and uh if not in the front seat, I was close to the front. Uh I... I wanted to excel in school. I did everything that was asked of me and much more. I was the teacher's helper and decorating bulletin boards. I... I just wanted to do it all. I had a big capacity for wanting to learn everything I could, but also be involved in school activities including sports, which I wasn't very good at, but I just loved being engaged. And I... I was real... I wanted to bring home the report card with all the A's. My father realized this about me and so he teased me if I came home with an A minus, he would... he would go very quiet and he'd look down the report card and then he'd say, "What's that A minus about?" So um there was this communication between us to drive for being as uh... as good as I could possibly be.

INTERVIEWER:

And when did you become interested in science? And if you have an anecdote of sort of a click moment in your childhood when you really thought, "Wow."

00:07:35

FRANCE CORDOVA:

I do have a click moment in my childhood when I really found science reaching out to me, and it stayed with me and... and motivated me and came back to me later and drove me to become a scientist. And that was in the seventh grade, we had a science project to do and uh... and it was actually research with books and encyclopedias kind of project. And I chose the atom

and I'm not sure why, but reading about the uh... the simplest model that there was of an atom, the hydrogen atom, and the particular model, the atom called the boar model, just... I just thought that was the most elegant, beautiful thing I've ever read. It was like reading a fabulous poem or story. I... I just connected with that visual of the atom. "How do we know that? That's amazing that scientists can know that much about something that they can't see." So I was driven to understand more about the process of how they had come to that model and the knowledge that they had gained, the tools that they had used.

INTERVIEWER:

Wow. Did your teachers, as a young girl, did your teachers encourage that interest? And did your parents help foster that interest in science?

00:09:03

FRANCE CORDOVA:

Uh I don't think any of my teachers or my parents encouraged an interest in science. It was just not something that uh women were identified with. And uh my... my parents certainly didn't know any scientists. Uh the school did not invite any scientists to come and... and speak to our class. It was uh associated with uh... with boys, becoming scientists. So much so that I... I went to a... a parochial school, which was called co-institutional which is actually very unusual. The... The girls were on one side of the campus, taught, uh by nuns, five orders of nuns and other teachers. And the boys were on the other side of campus and taught by priests and uh... and other

teachers. And the science classes, especially the physics classes, it was physics that I was most intrigued by, was considered a class for the boys.

00:10:08

FRANCE CORDOVA:

And so when several of the girls in my classes, juniors, asked to take the physics class, there was some discussion among the administration and they decided that five of us could take the boys physics class and they would have an equal number of boys allowed to take the girls art class. And so... So that was unusual uh for... for the time. And in addition we weren't particularly encouraged in that physics class. The uh... The teacher thought that we were taking up the space of boys. Uh boys who were C students got A's. All of us, women, girls, who were in the class were A students and uh we struggled to get B pluses and A minus' in that class. Those were not given to us lightly. So that was the attitude in- in high school.

INTERVIEWER:

Do you remember what was going through your head at that time? I don't know if you had already come to consciousness and realized, you know, this is a sexist policy or practice or if anyone saw it that way, but do you remember a feeling of injustice?

00:11:19

FRANCE CORDOVA:

I was happy to get into the class and um somehow I... I... I wasn't particularly reflective about gender issues uh at a young age. It isn't until later when you're more of an administrator and more in charge of the

experience for others that you... you try to create an environment in which everybody can succeed at whatever they want to do. So it didn't... It never occurred to me that it was uh an injustice that uh... that the science classes for the boys and the art classes for the... for the girls. Uh I... I felt just very lucky to be able to be in the physics class that I wanted to be in. I wasn't comfortable with thinking that it was harder for me to get an A than for some guy that was not a particularly motivated student. So that... That bothered me uh a little bit.

00:12:15

FRANCE CORDOVA:

But I... I don't think as a very young person you question um your... your culture and your environment very much because you have no reference frame. I didn't know. There wasn't a benchmark school across the uh... the freeway that I could see that the situation was any different. And I... And so... So my environment was all I knew and I just wanted to make the most of that environment.

INTERVIEWER:

Tell me about the decision to attend college where you did. What was the expectation that you had of yourself and others-

ON SCREEN TEXT:

France Córdova

Stanford University, 1985

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INTERVIEWER:

– had of you in attending such an elite institution?

00:12:50

FRANCE CORDOVA:

I was the first uh woman at my high school to be accepted to Stanford University. When I was in high school people only... students only applied to a couple of colleges or universities. It isn't like today, and so I applied to an all women's Catholic university back east that my parents were really in favor of me attending because we had a family relative who uh was pushing for that, was associated with that college. And I uh applied to Stanford University because my debate partner, who was a male, was applying to Stanford, so when I got into both places and somebody let the principal know that I was admitted to Stanford University, he called my parents in and he said, "You know, France is the first girl in our school to be accepted to Stanford." They'd only had one person before me, a guy, quarterback for our... our football team uh who'd been accepted and attended Stanford.

00:13:57

FRANCE CORDOVA:

And so my father started talking with his business associates and they assured him that Stanford was a... an excellent, conservative place where a lot of their colleagues had gone to school. I was... I also did apply because it was free to Berkley and that was out of the question. That was considered too radical by my parents. And so uh... So they agreed that Stanford... And it was closer of course. That would be great for the whole family. It was in California rather than on the east coast and so I– I went to Stanford. And then there was

a decision about what I would major in. There was such a strong feeling that women majored more in the liberal arts, that uh and I had had a lot of experience uh serving as an editor on the school newspaper, being in drama, in debate in high school, that it was a natural leaning of mine and I loved writing and reading, literature in general, uh to major in the liberal arts.

00:14:58

FRANCE CORDOVA:

But I... I did go to a physics class just to see what it would be like. It was uh... It was an amazing experience, one that I will never forget. It was all male... all. And so I sat in there on the first or second date of class, and the uh faculty member was up in the front of the classroom, and with an inclined plane, and the lights went dark in the room, and the light shown on the inclined plane and he was doing the standard friction demonstration and I looked around... I could hardly see anybody but I noticed that they were all guys and I thought, "Wow. This just isn't as much fun as the literature class I just attended." Where the professor was going on and on about oxymoron's and uh... and collective nouns and just making the subject come alive and so I... I think that exper- uh experience made me decide that maybe I should follow uh my inclination to be an English major. And also I wanted to be successful and that... There was more of a guarantee that you could be successful in a major that was more welcoming than a major where you would be unusual.

INTERVIEWER:

You did end up taking physics, though didn't you? In college?

00:16:18

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FRANCE CORDOVA:

I did not. And I did not end up taking any physics in college. I took a... I took astronomy. Uh wonderful class and astronomy is part of the science elective. There was a science elective, so I did take some science classes; biology and astronomy and that... that was uh... That was very interesting. A lot of fun, but uh I also took a lot of language. I love language and especially the study of linguistics and there was an option uh kind of a science language option to take more language than science and so I... I did that.

INTERVIEWER:

As you went through your college career, were you satisfied with what you were studying? It sounds like you were excited by the English classes you were taking.

00:17:01

FRANCE CORDOVA:

I really enjoyed my experience. I uh wanted to have some global experiences too, so I had a pretty fast track through Stanford. I graduated in three years and a quarter and I uh did an experience in Italy for two quarters, and I uh pursued uh Florence poet and translated some of his poetry and wrote some haiku and did the things an English major does in Italy. And when I came back I also took an anthropology class as part of social sciences and I loved that and I saw that the Ford Foundation was giving grants for summer study abroad, so I applied for and got a grant. I... I wanted to go to Peru. My anthropology professor said that he took his graduate students to Oaxaca, Mexico every summer and I should go there instead. And so I was the only

undergraduate in that group, but he put me out in a pueblo Zapotec Indians and I studied their language and uh actually did a study on the sociology of bilingualism in the pueblo because they spoke some Spanish, some Zapotec.

00:18:12

FRANCE CORDOVA:

And so I was entranced by other experiences and understanding them. It was also— My college experience was very much marked by the war in Vietnam and all the student demonstrations and even conservative Stanford, a lot of action on campus, a lot of questioning, um a lot of people coming on to campus to stir debates, uh dialogue and I... I found it a difficult... college a difficult place to be at that time. So I was anxious to graduate and get out and see what life had to offer.

00:18:50

FRANCE CORDOVA:

My college experience was marked by the Vietnam War, which had an influence on every campus no matter what one's personal feelings were about the war. But the... Part of the wartime experience came right onto campus. It stimulated dialogue among the students, a lot of reading, a lot of visitors onto campus and it... it made the college years more anxious for my generation of students. So I was anxious to graduate and get out of college and experience the... the real world. The real world was a phrase that loomed large in student's imaginations, that somehow we were being sheltered and protected from the choices that faced people outside the... the ivory tower. So I could hardly wait to get... to graduate and see what I could do.

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INTERVIEWER:

And you graduated and you immediately got a job doing something else. Can you talk about what that was and how you made that choice?

00:19:52

FRANCE CORDOVA:

My first jobs were really little jobs, graduating from college, because I did graduate early, and I had applied for a uh... I entered a contest sponsored by Conde Nast Publications for... to be a *Mademoiselle Magazine* guest editor. That was a big deal at the time. *Mademoiselle Magazine* is no more uh but at that time it was the college magazine for women. And they had a contest which went back a long time for young women in college to become editors for the... a summer month in New York City, and they would be mentored to publish the August edition of the magazine as the editors. And there were famous writers long before me who had entered that contest and won like Joan Didion and Silvia Plath, writers that I really admired.

00:20:54

FRANCE CORDOVA:

So I was determined to apply to be a *Mademoiselle Magazine* guest editor. So when I got back from my experience doing anthropological work in Mexico, in the Indian pueblo, I wrote about that experience and I... I was selected to be a guest editor. In fact, the guest travel editor for the magazine. So my first real job after college was going to New York City and being uh the college uh magazine editor.

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INTERVIEWER:

That's great And then you started working for the *LA Times* after that?

00:21:29

FRANCE CORDOVA:

Yes. Then I... I decided to use... I decided to use that experience to apply for a job at The Los Angeles Times Newspaper. I wanted to go back to the Los Angeles area where I grew up and be closer to my family and friends. And so in thinking about a job... I always went for the best place I could possibly get into and I still mentor young people that they should aim as high as they could. Well I... I didn't know what the credentials were to be a journalist. I just knew that *The LA Times* was about as big as it got and it was in Los Angeles so... So I went to The Times and I appeared with my little portfolio under my arms, just out of college, and I think they were amused that I'd walked in off the street and uh they said, "So... So what do you want to do here?" And of course I said I wanted to write and all and of course that... that job opportunity was not available to somebody walking off the street.

00:22:27

FRANCE CORDOVA:

So the... the person who interviewed me said, "Well maybe we could use a copy girl." And I said, "What's a copy girl?" And he said, "Oh someone that is just is a go for, that does all these things. It's a way to get into it and meet people and they can see what you can do, and I'm sure you can talk the people over in the lifestyle section into letting you do some stories and if they like them, then maybe they'll publish them." And so I... I thought that was... that was a great entry into this wonderful profession, and in fact it kind of

marked the way I entered science later and uh have always approached life is that you just get into whichever door is cracked open. You don't have to go in the front door uh but you have to convince somebody that you should be there and work even if it's for free and... and show them what you can do. And so I was a copy girl, a job that doesn't exist now because of course we have computers and everything. All the copy is done electronically, but then you rolled up uh copies of articles and you shot them through nomadic tubes to the next floor and other people accessed uh copies that way.

INTERVIEWER:

Wow Great story So you worked your way up to being a writer/reporter...

00:23:46

FRANCE CORDOVA:

I worked my way into the news service room, LA Times News Service. And it was an editing job, and so you'd get huge realms of copy and the head of the News Service would say, "I want that two pages reduced to two inches." And so it was actually very good practice for seeing in a very fast way cause you had to do a lot of these, what was essential about that. So it was like making an MTV special just a nugget out of something long and complicated. And at the same time I was invited to write as freelance person whatever I could and they would review that. My roommate was also a young person, a woman who was a photographer for Lifestyles, and so we just designed some stories on our own and we went out and did them. So we got a few things published, but I was gone long before I was an official writer or part of the news staff at The Times. That was not what I was.

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INTERVIEWER:

Ok. And how did— Can you sort of tell me the transition... how your life brought you to Cambridge and you ended up at MIT and went back to CalTech? Just sort of take me through that journey.

00:24:57

FRANCE CORDOVA:

I was working on a Ford Foundation funded project called The Contemporary University, which was centered on the east coast and involved several universities that had signed up to have their students working for a while outside the university on service projects in various communities including very diverse communities and bringing their scholarship out into the uh community. And they needed mentorship and so I worked with several other students, all CalTech graduates, I was a Stanford graduate at the time, uh as being the mentors for this project and our home base was in Cambridge, Massachusetts just off Harvard Square. So at that time, it was the summer of 1969, I watched a special on public television about the uh moon landing.

00:25:53

FRANCE CORDOVA:

Well, everybody was watching the moon landing, but I watched another special on uh public broadcasting about uh neutron stars, which were just being discovered. It was being hypothesized what they were all about. So those two experiences, which connected me with space exploration and also space physics happened my first summer after graduating from college and

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were really influential in eventually moving me into uh choosing a different pathway, choosing the pathway of becoming a scientist.

INTERVIEWER:

Do you remember what you felt when you saw that program? If you could just sort of take me there in an immediate way of watching this footage of Neil Armstrong on the moon or watching the neutron stars. What did you feel? Did you think, "I've come back to this long latent interests or...?"

00:26:45

FRANCE CORDOVA:

Uh watching Neil Armstrong step onto the moon was an amazing experience for uh millions, if not tens of millions, worldwide, but for me as a young woman who had been very interested in science and especially in the... in the heavens, in the cosmos, wondering about a lot of big questions. What's out there? How did it get there? Where did we come from? How was the universe created? And in seeing uh Neil Armstrong and Buzz Aldrin step onto another planetary body, our own moon, that I had watched from my-my bed as a young child out my window growing up and wondered about— was just one of those moments that brings you back to uh... to everything that you feel about yourself, about your early aspirations to know and to understand.

00:27:46

FRANCE CORDOVA:

I felt the same way when I saw a special about neutron stars uh approximately at the same on television, and it focused in on a number of scientist who were trying to understand the origin of some signals that they

had uh seen in data when they pointed ground based telescopes up and um got radio signals from uh what they thought must be very compact stars. At first people thought they were little green men. They were extraterrestrials trying to communicate with us cause they were pulsed signals every so many seconds, but it was realized by the scientist that these were probably the hypothesized neutron stars which were beaming on that time scale. Very compact size, about the size of a city, beaming signals our direction. And I just thought that was magic. It reminded me of the time when I was a young girl looking at and studying the boar model of the hydrogen atom.

00:28:51

FRANCE CORDOVA:

The same kind of question. How do they know that? That is just amazing that something that we can't directly see that we can infer so much knowledge about, that we have a beautiful model for what it looks like, what the size is, where the signal... how it might originate. And I thought that... that would be just amazing to be part of understanding that.

INTERVIEWER:

Great. So what did you do about it? You took a very proactive step.

00:29:19

FRANCE CORDOVA:

I decided that the next day I didn't uh have another—other jobs that I had lined up for the summer had not yet come to fruition and so I decided that I would do... I would uh boldly go, as NASA says, and go right down Mass Ave to MIT where a couple of the astronomers and uh planetary scientists who

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had appeared on the public broadcasting special, were at MIT and I thought, "How better than to find out if I can get into this world of discovery than to go and introduce myself?" So I went down the street and I- I figured out by just asking directions what building uh one of them was in and uh what his office was and I knocked on the door and... and he... he happened to be there I think he was absolutely taken with my chutzpah.

00:30:19

FRANCE CORDOVA:

And uh... And talked to me some more about what in particular... He took me very seriously, what particular I was interested in and when I described it he said, "Oh. You know where you really belong is over at The Center for Space Research. So let me walk you over there. I have just the person you should talk with." And it's really amazing when I think back on that moment and meeting Walter Lewin for the first time, because Walter Lewin actually sent me this week, some forty years later, a letter that I had sent to him around that time about how moved I was by the experience of learning more about science. And he was always a mentor. He's... He's become a great teacher of physics, he's been featured on the front page of *The New York Times* for his teaching methods and inspiring young people.

00:31:12

FRANCE CORDOVA:

But I was one of the first, he was a young scientist at the time, one of the first people that uh... that he inspired. And he took me seriously and when I said I'd work for free, he took that seriously and he put me to work. And uh turns out that even MIT can't employ people for free at that time and so they gave

me a little bit of money. Uh but he was... He gave me some work in the laboratory, but he was also intrigued that I was an English major. It was really being an English major, that was my first step into being accepted uh into a science laboratory because even scientists have to write about what they... what they discover and work on and at that time he was writing the first review article on a brand new field of science called X-ray Astronomy and it became my field eventually. And he wanted some- some help in organizing the materials for that. So he... he could see the value of an English major in a science lab.

INTERVIEWER:

Great. You're now working in the lab at MIT, um, how did that transition into getting into CalTech?

00:32:26

FRANCE CORDOVA:

Well I... I... I worked for a couple of months at MIT and I think they were impressed by what I could do, and they had a way to admit you even if you didn't have a bachelor of science degree, which was called admitting you as a graduate student at large. And they admitted me. I applied and I was admitted because several of the professors at The Center for Space Research, all of whom I still know and keep in contact with, uh were uh advocates for that. And so I started but then at that time is when my other work, the project that I'd signed up for, namely The Ford Foundation grant to start a quote "contemporary university" and mentor students in inner city projects, caught up with me and the leader of that project wanted more of my time, and he

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said it would not do for me to be going to graduate school. We would not be able to fulfill the terms of our grant.

00:33:28

FRANCE CORDOVA:

And I understood that, but it was a big disappointment because here I was finally getting back to something I was really interested in uh but I had already made a commitment for something else and so I... I said no to MIT after starting there for a couple of days and jo- rejoined my project and threw myself into that. And so I did that for uh a while, for a number of months, but then I saw that I... there were things about the project that I just felt were not what I had signed up for, and that I just had to take control of my own future and if you... My feeling is that if you're doing something that just doesn't resonate with where you think you should be then life is too short. You should go on and make a change. So I de- ...So then I had a choice of what to do and I felt uh that I'd really like...

00:34:29

FRANCE CORDOVA:

I was discouraged enough at that point because of the way the project was turning out that I just wanted to go back home to my large family and my folks and go back to Los Angeles. So I did and that's when I walked into *The Los Angeles Times* and so and... and... and asked them for a job and they gave me one. So my pathway is complicated because I am now doing a random walk, going back and forth between science but not being sure. Getting a start but then finding other things that take me out of that pathway. Going back to

what is safe and in my case it's writing and having uh joined that career, which I think is a great one, but uh and so I did that for a while.

00:35:23

FRANCE CORDOVA:

And... And then after doing *The Los Angeles Times* work for several months, about six months or so, and it was coming upon the start of another academic school year, I finally just came to terms with myself and I said, "You know what do you want to be five years from now, France?" And I was in my... getting close to my mid-twenties. I must have been about twenty-three or four at the time and I thought by the time I was thirty I really do want to be a physicist and by golly I'm just going to go do that. Through my research at MIT, I had to come to know about the work of a lot of well-known scientists including those at CalTech, which is right around the corner. Literally right around the corner from where I grew up. And so just as I had done at MIT, I walked into CalTech and I said I... I know you know some of the people I've worked with at MIT and I'd like to have a job here.

00:36:23

FRANCE CORDOVA:

And so the first person whose office I walked into, he was very surprised but calm, he actually turned out later to be my thesis advisor and we're great friends till this day. And he said, "So what can you do?" And I... And they had a very different environment, laboratories, projects and all than they had at MIT and I said, "Well uh I think I can do some computing." And uh we got into conversation about that. I... I really had never done computing programming so I'm not sure why I said that. I think I met some students ahead of time and

they had convinced me that that was probably easy and they could help me. And so he said, "Fine." He said, "We need computing programmers in uh x-ray astronomy,"... was what he was in. So he handed me a book, I'll never forget that, a book of a very, very famous scientist who went on to win the Nobel Prize, an Indian, Chandrasekhar, uh who had a lot to do with shaping the field that I was eventually going to join.

00:37:29

FRANCE CORDOVA:

And he said, "We'd especially like to program some of his mathematics so that we can use it to analyze data from satellite experiments. And by the way I'm a principal investigator, co-principal investigator, on an experiment that's about to take off. So it'd be great to get ready for that. So why don't you think about that and take this book." I mean it was an amazing book, very difficult mathematics. So I went back to the office space he had assigned me. It was with two other graduate students and they... It was really them that—that helped me survive. They... They just... "Ahhhh. No problem." You know. "We can do this together and we'll help you get through." And... And um so I just... They gave me a four-tran-four manual, uh probably there are few people here who remember four-tran-four and early programming language. It seemed pretty simple actually to me. I had always had an aptitude for math and it just seemed like math in a different kind of language.

00:38:34

FRANCE CORDOVA:

I had a great time as a graduate student at CalTech. It was a small environment. The professors are very close to students, mentored them uh

very well. I had the opportunity to do both ground-based observations of the class of stars that I was interested in as well as satellite observations. And satellites were very new to that field of high-energy astrophysics. And I was really on the ground floor as a graduate student getting to analyze first hand some brand new data. And so I um got to travel to different places in the world and do my ground-based observations of a class of stars. There are many hundreds known by variable star observers doing backyard observations basically, but there were hypothesis that this class of stars would emit x-rays because there are binary star systems in which the two stars are in close proximity to each other.

00:39:39

FRANCE CORDOVA:

So it was thought that the transfer of material from one start to another would be an event that would generate x-rays, especially because the star receiving the matter was a degenerate, compact star with high gravitational fields and sometimes could have high magnetic fields. So uh both of those were conducive to producing x-rays and we wanted to find out if indeed they did. And so I did a lot of observations of satellite passages of these stars as our satellite experiment was mapping the heavens, and for a long time it just generated uh null uh data of what we call upper limits on the data that we could predict that any x-rays observed would be below those threshold limits.

00:40:30

FRANCE CORDOVA:

But then I uh got a phone call one... early one morning from an amateur uh astronomer out in the desert in Arizona who told me that one of the stars

that I was looking at had gone into a visual outburst, so I called my thesis advisor and absolutely insisted that our spacecraft stop its scanning mode and be pointed at this uh star, binary star system. And he asked me, looked... I actually visited him and looked me right in the eye and he said, "Are you sure because it's a very expensive proposition to do that and we don't have much time left with this experiment?" And I... I just said just kind of crossing my fingers behind my back, "Absolutely. What we find will be revolutionary." And so he said, "Okay." And so he called up the Goddard Space Flight Center and they pointed the satellite there, and I held my breath and then I got my data on magnetic tapes and sure enough there was a signal to beat all heck.

00:41:36

FRANCE CORDOVA:

It was an amazing pulse signal from this uh... this star and it really changed the field of high-energy observations of this class of star. So I was very fortunate as a graduate student. First of all, I was fortunate that I had the time to read the literature and could see that people predicted this from physics and then I believed them and that I convinced my advisor to use a very expensive resource to go after it and at a critical moment because they were only in... outburst state for a short amount of time to chase it down. And then we did many uh follow-up experiments like that and we found out whenever these binary stars were in a state of outburst, which meant that they were transferring matter from one to the other, they did emit x-rays. It opened up a whole field of science.

00:42:26

FRANCE CORDOVA:

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What that meant for my career was that I got a lot of job offers when I got my PhD. Most of them were for post docs at very good places; MIT, Harvard, Colorado, uh Naval Research Lab. And uh one offer was uh a permanent job at Los Alamos National Laboratory, which had an extensive satellite observing program and it wanted to use the satellites in what they call dual use, namely for uh observations to monitor the nuclear test ban treaty, but also to put on uh additional uh... uh experiments, little telescopes to do astrophysics observations, and they wanted to have scientists there that could help design those experiments and then interpret the results.

00:43:25

FRANCE CORDOVA:

And so I was given a job offer and I thought, "Who this is... this is great because if you have a permanent job then your not going from postdoc to postdoc and you can really sink your feet into it and uh... and have a... a great uh... great career." I like the National Lab environment and they let me do basic research, all that I wanted and apply for funding from NASA, and so um... So off I went there and they proposed me, when the opportunity came, uh for the 100 Brightest Scientist Under Forty, they proposed me for that and surely my discoveries in astrophysics and the agenda that I had set for myself helped me get that nod.

INTERVIEWER:

How did you come to your job at NASA?

00:44:16

FRANCE CORDOVA:

My first university position was at Penn State University. I had had a great appointment at Los Alamos Lab for almost ten years and then Penn State offered me the position of being head of the department of astronomy and astrophysics. While I was there I was nominated to a committee to select the winners of the National Medal of Science, actually propose the winners because uh it's really a presidential decision. And so serving on that committee, I was called to the attention of the head of the committee who was a good friend of the head of NASA and when the head of NASA was casting about for a chief scientist he asked who was out there who might be a good chief scientist for the agency. So I was nominated by that person and I was interviewed by the head NASA who then decided that I would fit well into that role and invited me to come and be his chief scientist.

INTERVIEWER:

How was that different from other chief scientists that they have had in the past? You were the first woman to...

00:45:24

FRANCE CORDOVA:

I was the first... The position of chief scientist is definitely something that every NASA administrator has to decide whether he wants to have. It is an advisory position. It advises on the scientific program but also on the budget for science, which is big. It's substantial and uh consequential and so the NASA administrator at the time, Dan Golden, wanted to have that position. He was an engineer and he wanted to bring science back to the agency as having it be a driver for the missions of NASA.

KUNHARDT **FILM** / FOUNDATION

INTERVIEWER:

Talk about what it was like-

ON SCREEN TEXT:

France Córdova Outside The W.M. Keck Observatory

Mauna Kea, Hawaii

INTERVIEWER:

- to be a young person and a woman that was a chief scientist at NASA? Did you have supporters, detractors? Did that play in at all, your gender?

00:46:14

FRANCE CORDOVA:

Um I'm sure that my gender played into my role as chief scientist for NASA, but exactly how deeply and how broadly I'm sure I have no idea. Uh the... It was a uh... It was new for NASA to have a woman as a chief scientist and I was relatively young. A lot of times the chief scientist position is given more to somebody who's done a lot of other things and is closer to retirement. Not always, but that is a model. And so it... It was a real opportunity. I-I almost didn't accept it, but... but when I did I decided I'd really go after it. And when I'm in that mode I don't listen to detractors. There are always detractors uh no matter what you do and whether it's you're new in that position or not, there will be people who don't like what you're doing, they don't think you're the right person for the job, they are envious or they um... they want the job. Whatever it is there are people who um who will be uh detractors and I...

Perhaps growing up as the oldest of twelve children I learned to tune out noise and I consider that noise.

INTERVIEWER:

Great answer. What was some of the noteworthy work that took place at NASA while you were there?

00:47:42

FRANCE CORDOVA:

NASA, in my opinion, is always doing noteworthy work. Uh there are the various scientific missions that bring about such a large return on the investment and have been so consequential for science and our understanding of the cosmos and of nature in general. At the time I was at NASA, we had some planetary missions that were very important. We had the very famous Colby Mission, the Cosmic Background Explorer Mission, which verified the prediction about the... the radiation, the distribution, spectral distribution of radiation that uh... uh was verification of the hypothesis about the big bang. And so that... that prediction that that was the way our universe initiated predicted that radiation would be distributed over the spectrum in a certain way, and that mission verified it to incredible accuracy and that earned the... uh... uh motivators, the principal investigators of that mission the Nobel Prize in Physics.

00:48:59

FRANCE CORDOVA:

So that was one important result. Another that I'm particularly proud of because I worked very hard with the NASA administrator on was the

AstroBiology Mission. And that started in a very interesting way. At that time Carl Sagan, the great um interpreter and proponent, communicator of uh science and of space science in particular, was alive and he was very involved in advising NASA on how it should-

ON SCREEN TEXT:

Carl Sagan, 1980

FRANCE CORDOVA:

– communicate more with the public. I think he really, really drove that with great intensity and he would visit me, visit the NASA administrator frequently. And his vision for understanding the... the solar system and understanding the possibility of life beyond earth was very profound.

00:49:52

FRANCE CORDOVA:

So one day I was sitting in the office of the NASA administrator, Dan Golden, and I had invited, at his behest, a number of planetary scientists. So we were all sitting around in a round table fashion just talking about what was it that was important to do. And Dan Golden goes to the wall, he takes off a picture of the planet Earth as viewed by Apollo 17 with... you could see the oceans, the clouds around it and all from space, beautiful, you know pale blue dot as Carl Sagan calls it. And uh he said, "See that?" He said, "I want to discover things that look just like that but orbiting around other suns." And everybody stopped and looked at each other and uh somebody mumbled, some brave

soul, "Well uh we can't do that yet. We don't have the technology." He said, "What... What... What do you have? What can we look at?"

00:50:55

FRANCE CORDOVA:

And they talked about the spectra and how we could have spectral missions that could... we could interpret because of the uh... the signature, the chemistry that's going on other bodies, that there was life, that there would be biotic life that would be producing these signatures. And he was very excited about it. So the whole field of astrobiology, which had been like a boutique, a little unfunded discipline within uh space science, got a lot more funding and attention and in fact a whole astrobiology institute grew up around that idea and many scientists came to NASA to talk with him about it, and so I think he was a great uh advocate for astrobiology that grew out of the time.

00:51:42

FRANCE CORDOVA:

I think the most uh profound thing if... The NASA administrator Dan Golden, at the time, were interviewed that he would say about my impact on NASA was that I brought science to NASA. And people would say, "That's surprising. NASA is all about science." Yes, it's about engineering missions that do science work, but it was absent from the office of the head of NASA, that he did not know what were the fundamental questions. Because everything you do should be motivated by what is that you want to understand out there. So I brought the people into NASA that could say the big questions that we need to solve as human beings are these and of this panoply of questions, NASA can best address these few questions.

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ON SCREEN TEXT:

France Córdova At NASA

FRANCE CORDOVA:

And he said, "Yes. We're going to go after those questions." So that's what he would say I brought to NASA.

00:52:48

FRANCE CORDOVA:

Among the big questions that we thought it was important for NASA to address were the origin and evolution of the cosmos, including understanding the big bang more profoundly and the origin and evolution of galaxies and stars, and questions like how... why do galaxies look so funny and bazaar and uh did stars come first or did galaxies come first? And what was their evolution up to the different kinds of galaxies that we can see today and how did the Milky Way, our own galaxy, come apart... about? Uh we also identified the origin and evolution of our own planetary system as being very important.

00:53:43

FRANCE CORDOVA:

The moon, the inner planets with their rocky cores, the outer, gassiest planets, the Oort Cloud uh that has so many unusual and is so prolific with the kinds of bodies that it has, inhabiting it. How did the whole inner and outer solar system come about? And then finally the origin and evolution of ourselves. Uh how do we define life? And from a chemical and... and physical

KUNHARDT **FILM** / FOUNDATION

and biological basis, and how would we identify it elsewhere if there were another moon or planet uh that had life on it, how would we know that? What are the signatures of life?

INTERVIEWER:

Wow, fantastic. Not a bad day job. Why did you decide to leave NASA?

00:54:35

FRANCE CORDOVA:

I came to NASA for a term of three years because I didn't want to leave my professor job at the university. I envisioned going back to the university and teaching, possibly being an administrator again and I wanted to join NASA for a time and experience it. I wanted to understand public policy and why it was so important. I wanted to have an impact, so I negotiated with my dean and my administration at the university, and with NASA on an appropriate term. The maximum you could take a term was for four years. The university said, "Two." And NASA said, "Let's compromise at three." So three years was my term at NASA. After that, or as I was approaching that... the end of that term, I was approached by a number of universities to take positions as a dean, uh vice president for research. Those were mainly the positions that I was offered to take advantage of my experience in Washington, D.C. And that's something that as president of a university I do today. I look for people who have both the university and governmental experience to bring to Purdue.

00:55:53

FRANCE CORDOVA:

KUNHARDT **FILM** / FOUNDATION

When my term at NASA was coming to an end I was given offers at a number of institutions around the country to be either a dean of science or a vice president for research, and uh I thought seriously about whether I should do one of those or go back to Penn State, and I finally decided to go to The University of California, Santa Barbara. It has an excellent physics department and uh they gave me the opportunity to be vice chancellor for research and uh it was bringing me back to California. And there's a thread through my narrative of just coming back home, and that felt close enough to the family that it would be a nice opportunity.

INTERVIEWER:

Can you talk about your leadership style? Is that a choice to share it? Or is that what feels natural to you?

00:56:50

FRANCE CORDOVA:

What feels natural to me is to work as a team and to give credit to everyone because nothing is accomplished by individuals on their own. It's all accomplished by a lot of people working well together. So it's easy for me to try to make decisions more collectively. In the end I have to take responsibility if I'm in charge for those decisions and uh so... so once in a while you have to be more assertive than other times. But I find if you spend a long enough time talking with people, even if you come with different perspectives, different attitudes, initially with different opinions about how to progress, in the end you will arrive at a shared uh view.

KUNHARDT **FILM** / FOUNDATION

INTERVIEWER:

Do you think there's a difference in the way that women lead as opposed to men?

00:57:45

FRANCE CORDOVA:

My actual experience has been that there is a difference in the way men and women lead, although I hate to admit that, because I... I don't like to draw gender distinctions. I am of the opinion that we're... we're all born fairly similarly except for some genetic things in us. But that most of our behaviors are learned behaviors and that we can all aspire to be anything that we want to and do anything we want. And so I've... I've always resisted the notion that only men can be this or that and... and mostly women do something. Uh so... So it was... It's been kind of a learned surprise to me that actually women and men do lead differently, but maybe that is a learned behavior.

INTERVIEWER:

What are the differences that you've seen?

00:58:48

FRANCE CORDOVA:

I see women working more collectively with each other. Uh I see women sharing responsibilities. I see women giving more credit to each other. I see women not anxious to make sure that everything that is successful is the result of their leadership, but uh giving credit to others for uh that decision. Including a lot of staff, women are many times more congratulatory of all the staff efforts that have helped uh lead to something uh important. And um

so... So those are some of the... the behaviors. It would be unthinkable to me to take credit for some things that I find that others don't have any trouble at all. [LAUGHS] It's just a difference.

INTERVIEWER:

Looking back, where do you place your experiences doing so many different things? Writing, going to Oaxaca, you know, doing the various different scientific things that you've done. In your career trajectory, do you see things that are more humanities based as being sort of a deviation or is it all part of the same trajectory?

01:00:05

FRANCE CORDOVA:

I think everything I've done is part of the same trajectory, although some people could argue it's more of a random walk than a very straight trajectory. I just have a wide capacity for understanding and appreciating all kinds of disciplines. I... I think everything is important, otherwise it wouldn't exist. And the little clue that you pick up from uh doing something in anthropology is as important to shaping the choices that you make as a clue that you pick up from literature or from doing a science experiment. So to me it's all part of the great excitement that the universe provides. It's a very interesting diverse place out there and the more experiences that I can enjoy and appreciate, I think the uh the richer path that I will have for myself, even if it does seem kind of broad at times.

INTERVIEWER:

KUNHARDT **FILM** / FOUNDATION

And how does that come into play with being a university administrator?

01:01:14

FRANCE CORDOVA:

Universities are big, complex organizations; lots of moving parts.

ON SCREEN TEXT:

France Córdova

Purdue University, 2007

FRANCE CORDOVA:

There are a lot of disciplines within a university all, I think, equally important. I think it's important that our students have the opportunity to learn things in the social sciences, history... could not be more important in understanding how you arrived where you are and making some decisions about where to go, whether it's as a country or as a uh... as a state or a local community. Um the sciences are incredibly important in deepening our appreciation for what nature has wrought and people have understood and synthesized and made out of that knowledge. And the liberal arts are enriching in all aspects of our behavior from our interactions with each other to how we appreciate other cultures including their expressions of culture, whether it's theater or the arts. So I think my broad background is a real plus in being a university leader that I... I think there's nothing too unimportant to investigate and... and appreciate, and that it really has the potential of enriching us in some way.

KUNHARDT **FILM** / FOUNDATION

INTERVIEWER:

Over the course of your career, you've often been the only woman in the room. From that first physics class you described to when you were head of the astrophysics department at Penn. What does that mean to you to be in the minority and what kind of consciousness has that given you?

01:02:49

FRANCE CORDOVA:

I often have been the only woman in the room from science, to rock climbing to NASA... my NASA experience, uh to being a university administrator or out in the community. Uh more and more there are other women in the room but many, many times in my life I've been quite alone. It hasn't affected me as much as some people expect that it would and people are often curious about that experience because I don't look at males as aliens, as exotic beings. I... I look at them as my mentors and friends and colleagues and enablers. And to me they're just people, just as a woman, uh is all working together towards the same common goals. So I'm much more interested in what an individual's views are and the background and experience they bring to some uh goal than whether they're a man or a woman.

INTERVIEWER:

Why do you think that girls loose an interest in science early on? Or stop pursuing science early on?

01:04:07

FRANCE CORDOVA:

I'm not sure why women often uh drop out of sciences early on. Uh I have just found and I know so many students, women who are in science and how exciting and interesting that it is, that to me it's... it's not really possible to lose an interest in it. But I think my own background is evidence that there are plenty of things to derail you, and if you can't get back, find an opportunity to get back into it that you can stay out of it. Uh and that goes for men... men and women in all phases of life, all disciplines, that there are many, many obstacles, hurdles, things to throw you off course, so unless you have an inner passion for something you might not find yourself getting back on that particular course. And I've been fortunate that science has, from a very early age, been a driver in my life.

01:05:06

FRANCE CORDOVA:

So when I've had the opportunity to get back onto that path, I've chosen it. I think there... there is a problem with math in our country and that it is taught or not taught, that is uh... that defeats a lot of people, men and women, but somehow it seems to touch women more than men. I think women want to excel, they want to do things they are good at. Uh a lot of women now have lots of opportunities outside of science whether it's medicine or law or business that could look more exciting to them. But they- They need role models and mentors and opportunities that shows them... show them how exciting science can be, science and engineering. And then when they get a taste of it and if they have the tools like the math and the background, at least an opportunity to learn those tools, then I... I think that we could have more women uh involved in science and engineering.

INTERVIEWER:

There's also this drop off that happens to a lot of women scientists after they've completed their PhD, or start to go into their post Doctoral work, and start to rise in the upper echelons of the scientific community. Why do you think that drop off happens? And what are some of the many things women are juggling that could make a career in science difficult to pursue?

01:06:30

FRANCE CORDOVA:

Well we find by... through careful observation that women drop out of the so-called pipeline at every... every phase of it, every transition point. Uh from childhood to going into high school and the choices that they make about the courses they take, to going into college, the choices they make there and all the steps into going uh to becoming a full fledged scientist. And those... those are for... for lots of different uh social reasons and encouragement and uh being among them. Um but in uh certainly when a... a young professor is just starting out that's a very daunting prospect for anybody, man or woman, and women... The times... The age at which one would go through the early stages of the professoriate for example, are almost exactly correspond with child bearing years, and so the choice to have a family uh can... for some can work out beautifully and for others can be a real challenge and how to integrate that into the life of a scientist.

01:07:46

FRANCE CORDOVA:

And so I always tell women to choose well your partner. Uh because that will make a tremendous difference in your lifestyle and whether you can truly balance it all and I was... I was lucky. I did choose well. Sometimes that's almost serendipity as much as by active choice. You have to be a little bit lucky. Um so... So there... There are a lot of uh pressures on women to... to do it all and uh women want to be excellent. They want to be terrific mothers and very influential, impactful in their child's life. What mother wouldn't be? And they want to be impactful in the laboratory and to be a success of it. Sometimes there are stages when you don't think that you can do all this, so that's when you need some help and some mentorship in getting through.

INTERVIEWER:

Is this something that you've had personal experience with, either your own as president of Purdue or seen other women, faculty members at Purdue with? And is this something that you're able to address as an administrator and as a boss?

01:08:55

FRANCE CORDOVA:

Yeah. I think every boss, male or female, is able to address this and should because you should always want to help people realize their full potential, help them achieve their goals, and so I've taken an active part, whatever job I've had, in speaking with women, mentoring women, either creating, advocating for or being personally involved in programs that help women go to the next level. Uh when I was at NASA I visited all the NASA centers and many other institutions and I'd always ask for a special moment aside from

whatever my big venue was, talking to the troops, to just meet with women who were in the early stages of their career and we'd get right down into it. They'd ask me very personal questions about raising a family, when's the right time to have children, uh when's the right time to go for a leadership position.

01:09:55

FRANCE CORDOVA:

And now as a university CEO, I am able to really have the whole university working on this goal. I happen to be at the present time a principal investigator for a well-funded National Science Foundation project called Advance to literally advance the careers of women in the professoriate. And that... in our case... In Purdue's case, it includes a special focus on minority women because they have other uh particular social biases and environments that they grow up in that are even less mentoring than others. So I'm... I'm actively engaged in talking with, mentoring women, helping to get programs uh... uh implemented and then uh funded to encourage them to persist.

INTERVIEWER:

This strikes me, especially with you, because you have always sought out the challenging option in your career. But there seems to be a perception that women don't like to be challenged in their career. Do you agree with that?

ON SCREEN TEXT:

France Córdova With Vice President Biden

White House, 2010

01:11:03

FRANCE CORDOVA:

I have never experienced fear of being challenged. In fact, I run to the challenges. I like things that are competitive. I am naturally competitive. Uh, if I'm participating in an activity that is not organically competitive, I am able to make it so. Um, so that's something that just drives me. I enjoy it whether it's setting a goal to climb a mountain or ski something uh that's challenging, or in uh run a white water river, I'm... I'm the person that will choose the highest class level somebody will allow me to do. I have often chosen things outside my comfort zone and sometimes you crash and uh get mangled up a bit uh and but... But that's just naturally me. I... I don't find that other women do not also relish challenges.

00:11:59

FRANCE CORDOVA:

I find people, some men and some women, are more unwelcoming of challenges, but I don't think of that as being a feminine or a masculine thing uh particularly. I've... I've never wanted to be held back because I'm a woman. I even thought when I was growing up Catholic the notion that only men could be bishops or cardinals or the Pope, that just seemed unreasonable to me and I thought, "If I wanted to do that, I would find a way to do that." It turns out that that was not my direction.

INTERVIEWER:

You are someone who has really done it all and you raised children. Im sure you get this question a lot: How do you balance it?

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01:12:39

FRANCE CORDOVA:

My own personal situation is that I got married uh after I had established my career and that's a choice I made. I think it's because I grew up as the first uh sibling among many and I had a lot of child raising responsibilities from an early age. So I wasn't anxious to jump off the diving board at an early age. So when... when students ask me or young people, "When should I get married? Should I get married at the beginning of my career, uh later on?" I say, "This is my own experience, but whenever you want to get married, get married. Whenever you want to have children, have children, because that is um... that's time when you should do it. And you can make it work no matter when you choose in your career to do it." So I was already on my way to being a... a... a university administrator when we had very young children.

01:13:37

FRANCE CORDOVA:

I remember flying to Penn State to be the head of the department there, my first university job, and I had a one year old on my lap and a three-year-old sitting next to me. And it never occurred to me that I would not be able to do this job just because I had young children. My husband uh was... Uh choosing him was arguably the best choice that I've made in my life and uh the only one that I made pretty quickly without a lot of deep thought about it. He just seemed so appealing at first blush and I... I could just see in everything about his being that he would be a great father. That was just through his... just shined through him. And even though that wasn't a conversation, it's not what you say when you ask somebody to marry you, uh it was... it was my

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sense. And so he was the first proposal that I accepted because I knew where this was going, and um and it just turned out to be instinctively a great choice.

01:14:41

FRANCE CORDOVA:

And I do think that people have a lot of instincts about that choice and you... you know if you're going to have to balance things that you have to choose a partner that is going to help you balance them, and why would you choose something that wasn't enabling in that way? That would kind of say something about you that you weren't going for the big goal, which is that you wanted to realize your... your own personal goals for your career, the excellence in the things you've chosen. You want to make an impact, but if you read family in the person you marry, you have an instinct about whether that person is headed in the same direction. And in our case we... we... we share duties a lot, but I will be the first to admit that he takes the bigger share. I uh just... There's never been any doubt of that. He's followed me on my moves because he's a science educator and he's very... uh there's a lot of need for science education at uh... at all levels of K through college. He's never had any trouble finding a great position wherever we've landed and been very much appreciated for his skills.

ON SCREEN TEXT:

France Córdova and Christian Foster

FRANCE CORDOVA:

So we make it work. But he is a very nurturing person and I've been lucky.

INTERVIEWER:

So moving onto more of the Women's Movement. What did you think of the Women's Movement? Were you a part of it?

01:16:13

FRANCE CORDOVA:

I uh... I think if you're a woman in a certain age range you are part of the Women's Movement whether you have a flag or a shingle or a uh... it written on a lapel piece. I think you can't help to have been affected by uh women's advocacy for other women and for them to have opportunities and for there to be fairness and inclusiveness in the decisions that are made by others in positions of power. So I'm absolutely sure, although I probably couldn't pinpoint, uh, exactly where and how it impacted and helped me. I was never a flag-carrying feminist. In fact I resisted doing that because I thought it would not sit well with my universe of male colleagues, that they needed to respect me for my skills and... and not give me a seat at the table because I insisted on principle that I be there.

01:17:22

FRANCE CORDOVA:

I wanted to insist that I'd be there because I had written as many papers, because I'd given as many talks, because I was a professor at a certain level or whatever it was that uh... that out of respect for what I had accomplished and what I could contribute, that I earned a place at the table. Uh so...

INTERVIEWER:

Yeah, great answer. Do you consider yourself a feminist?

01:17:48

FRANCE CORDOVA:

I don't identify as being a feminist per say, even though I'm the first to say that I benefit from the feminist movement. I don't like labels in general and I... I resist them, although there's lots of people out there to put labels on uh... on everybody. It's just easier to catalog them. But I'm... I'm a person... About me it is said that I have a high capacity for uh enjoying, tolerating ambiguity and I like seeing all sides of things. So I can enjoy as much an argument from a person that says they're a feminist as from a person that is, you know... thinks they're opposed, but isn't really. I mean I... I always see the common ground between people and I think labels sometimes make a situation polarized when... when actually everybody is moving towards the same goal.

01:18:48

FRANCE CORDOVA:

Who would say they're against diversity and inclusion? Right? But early on the feminist movement might have taken some attributes that made them seem more... more strident than being about those particular values.

INTERVIEWER:

So what does that term mean to you, then?

01:19:08

FRANCE CORDOVA:

What does the term mean? I look at it as an older term, actually, as a term that came from an earlier generation of people, from the Gloria Steinems

and... and the people that fought hard and then they were labeled with that term and it had, depending on how you were looking at it and your perspective and whether you were involved, you could enjoy that term and say, "Yes. That is me. This is what I stand for." Or you could resist it and say, "Wait. This isn't going to help me achieve what I want to cause a lot of people are going to see me as that and I want them to see me as a scientist or a... whatever it is; a doctor, a lawyer and uh I don't want them to label me as something they have a biased towards. So... So I think early on it's with any movement in this country or anywhere where it's a strong movement for something that is perfectly justified. As soon as you start putting labels on it, it polarizes people and...

INTERVIEWER:

I know that sports are an important part of your life. I was wondering if you could comment on Title IX and its significance?

01:20:17

FRANCE CORDOVA:

I think that Title IX was one of the most important pieces of legislation passed in this country. Uh there have been a lot of things that uh I and my generations and the ones that followed have enjoyed. One of them is creating a National Parks System, which I love and think was a very important thing to do. But I always site Title IX right up there with the pieces of federal legislation that I think were profound, transformative for generations to come. And Title IX...It's interesting, it's been largely interpreted as being a part of what's helped the sports world become uh more um diverse and equal

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opportunity, but of course Title IX is about so much more. It's about every discipline being open to uh... to both genders.

01:21:17

FRANCE CORDOVA:

And it's... I've seen it make a huge change in the classroom. And I am at root a... a... a teacher of young people and I've seen it transform classrooms that I have taught, uh classrooms that my children have participated in. It's empowered women not just to be athletes, but to be vocal, to let smart show, to raise their hand in class, to say it's okay to be knowledgeable about a subject, it's okay for the other guys in the class to know I'm good at math and I'm proud of it and by the way I'm a heck of an athlete and I... you know shot three goals on the soccer field last Saturday. So I... I think it's really been uh... It's uh just given women an opportunity to shine in every dimension and all of that has been because we've equalized the broad playing field.

INTERVIEWER:

Do you think it's easier to be a woman or man in today's world?

01:22:30

FRANCE CORDOVA:

Do I think it's easier to be a woman or a man in today's world? I... I think honestly, I think it's easier to be a man. Uh I uh think that everybody's trying to level the playing field and provide a lot of opportunities. I think women wouldn't still be having conferences for women, uh wouldn't be still writing empowering books, having mentorship programs. Even the program that I'm the principal investigator for at Purdue, called Advance, that is trying to

promote women through the academy and mentor them uh to the next stages of their professorial life, those... those wouldn't exist if uh there truly were a level playing field, and a lot of times I'm asked uh what's the transformation I'd like to see. And I'd say, "I'd like to not be going to these conferences for women and giving these speeches about my career and who I am," other than in the context of just being you know... How about you become pres-... How did you become president of a great research university and be a woman or the first woman to- to have that position? So I... I do think that men are not faced with the same uh biases. The biases have gotten more subtle over the years, very much more subtle and more well managed by people. But... But they are definitely there.

INTERVIEWER:

Do you think women avoid power?

01:24:13

FRANCE CORDOVA:

I don't think that women avoid power. They try to avoid words associated with them that make it look like they're going for power. They're as strategic as the next man and uh that over time some words have become loaded like ambitious, driven. I happen to like... I sometimes jokingly say, especially because I have a policeman who's a driver for me on campus just to make sure I don't run over students and I get to my appointments on time, and I like to say I'm a driven woman, which has the dull context. Um but I'm... I'm told that word is like ambitious, that one uh doesn't want people to see you as being too domineering, uh commanding and um so there are definite...

01:25:09

FRANCE CORDOVA:

I think there's no question that there's a style associated with women's leadership that you learn by being knocked around over time, that men's definition of what's a leader is more associated with male leadership and it's harder for them to see it in a woman; that a woman is leading in a different way. And so over time women have moderated their style to... to accommodate a male perception of them. Now will that change? I absolutely believe it will as more women get into positions of power and they are more embracing of different styles, and they will choose people that they think can be leaders for a lot of different reasons. But... But that's still out there. It's very much um...

01:26:08

FRANCE CORDOVA:

The way I look at it is um, like my own discipline, physics, is a very old discipline. And I tell some women that if you want to be a physicist, maybe you should be a something-physicist, that something being brand new that hasn't been well defined. There aren't hundreds of years of conferences and uh gurus and all that have set up the role models for that. So be a nano physicist or a... a computer physicist, combine new fields in something, get your physics in there from the way you approach the universe, but if you're a classical physicist, you got a hard road there because it's got centuries of role models that don't look or act anything like you. So if... You got to get in there with the new style. You've got to get in there in a new way by combining some disciplines.

INTERVIEWER:

What's the most meaningful or useful piece of advice you've ever received?

01:27:11

FRANCE CORDOVA:

When I was invited to join NASA's as its chief scientist, and I would become the first woman in that position and the youngest person to take on that role, I had a lot of misgivings and I talked with my science colleagues and they all told me not to take it because it would take me out of science and out of academia at least for awhile and I was a department head at the time. And I was doing well in that leadership position. Our department had a lot of momentum, and so then I asked my colleague, who was uh a woman, the head of the history department, and her subject is women in science. She's written a number of books on that. And I asked her about it and she said, "France, how can you go on this circuit talking to all sorts of groups of women about taking on larger roles and responsibilities in leadership positions, hanging in there and persevering and then not take this opportunity that'd give you a big stage to increase that message nationwide in a very respected, visible position?" And so I said, "I... I guess your right." And so I... I took that position because of that. It was actually the first job I took uh not for myself, but because of the opportunity to get that message of empowerment to other women.

INTERVIEWER:

Great. What is the one piece of advice you would give to a young woman on either— you could choose a couple or whichever are most inspiring— building a career, work life balance, relationships, raising children, or pursuing your dreams?

01:29:00

FRANCE CORDOVA:

Um. Well I talked earlier about work-life balance and I really enjoy talking to groups of women, especially young women just starting out in their career, uh about this subject. They have so many questions. They want to be assured that the choices they're making are the right ones, that the timing is right. And so I always tell them that whatever time they pick to get married or have children is the right time as long as they feel that it is the right... and their uh obviously connecting more with the person that they're making that decision with. So... And that everything else will just naturally happen. And yes there will be choices to make. You might decide that you have to stay home on a Friday night and be uh with your children, but those... those aren't real... those aren't hard choices. That's... That's where I think the real issue is, that the choices you have to make will be much more clear cut because all the joy of being a mother and a wife will... will come into play.

01:30:09

FRANCE CORDOVA:

You'll be filled with all the right instincts, hormones, call them whatever you want to, uh that will guide you and so as long as you're true to yourself and your own instincts that you... you... you can do it all. You might not do it the same way the next... the male in the next office is going to do it or your male

uh peer graduate student will do it. Uh your life will be different than his will be, but it will be every bit as rich and maybe you'll climb uh further faster.

01:30:44

FRANCE CORDOVA:

My spouse and I get along very well together and always have, but the tenor of our relationship has certainly changed from the passion of the first encounter to now being the parents of young adults, and we arguably enjoy each other more now than we did during the time that we were raising children. I think the hardest part that we ever had was in small differences about how to raise the children when they would get into their own little troubles and uh challenges and we would have real differences in opinion about how to address those, whether to be harder or softer, tow the line, be more permissive, uh "She really shouldn't go out with that character and she should be home by this time," and so on. And so our... our arguments such as we've ever had have more steamed around uh child rearing, and so it was with the best intentions and we respected that but we... we did sometimes have different points of view. But both of our children grew up well so we figured that in the end, whoever was right and won, that was a good thing.

INTERVIEWER:

What did you want to be when you grew up?

01:32:09

FRANCE CORDOVA:

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I wanted to be a detective, a um Trappist monk, a... an existential writer and a scientist. All of those things at the same time.

INTERVIEWER:

What's the accomplishment you're most proud of?

01:32:34

FRANCE CORDOVA:

I have a general answer to that because there's no one thing that I'm most proud of. I'm... I'm most proud that I've lived a life of integrity, that I've been true to myself and as fair and honest to others as I am able to be, not perfect in that realm at all. But I've basically followed my own uh instincts and haven't compromised in that.

INTERVIEWER:

What was your very first paying job?

01:33:07

FRANCE CORDOVA:

The first thing I got money for I was really proud of because I saw a notice on a bulletin board at college to apply for a grant to do summer research in the Latin or South American country of my choice, so I applied for that grant and I got it and that gave me the freedom to spend four months just doing wonderful research south of the border. And it really effected, had a great impact on some future decisions that I could make.

INTERVIEWER:

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What three adjectives best describe you?

01:33:45

FRANCE CORDOVA:

I'm energetic. I'm analytical or thoughtful. And I um... I'm inquisitive.

END TC: 01:34:05