Interview with Dr. Ge

Interviewer: Annie Zhao

Annie: Hello everyone! I am Annie Zhao, Ms. Tennessee Teen USA and president of White Station Journalist Association as well as Huagen Journalist Association. And today we are here with Dr. Jian Ge, the Science Talent Training Program director as well as astronomer and professor at the Shanghai Astronomical Observatory in China. We are so honored to be here today in this lovely reunion since we've interviewed him before as professor at the University of Florida and I'm so honored and grateful to be speaking with him again; thank you so much Dr. Ge.

Dr. Ge: Thank you, Annie. It is a great pleasure to be here, especially to get together again. It is such a wonderful opportunity, especially now talking to Ms. Tennessee [Teen], that's such a great honor.

Annie: Thank you. I am so excited to start, are you ready?

Dr. Ge: Yeah, sure!

Annie: Alright, great! Then, let's start with the questions.

$\{Q1-3\}$ Nathan

Annie: So Dr. Ge, could you update us on any progress or accomplishments you've had since our last interview?

Dr. Ge: Sure. It is my pleasure to talk with you about the updates since last time. The most important thing we've done over the past two years is establish the Science Training Center. It is not a program anymore, it is a center. We have official activities going on annually to help

students, especially talented students in science. And secondly, I am very fortunate to have started a very big space program to hopefully launch a mission called ??? [0:44] to go into space and observe nearby stars, especially Sun-like stars, to look for Earth-like planets. And this has been observed before, but the good news is that we have already studied this mission and already see that our mission, our design, can accomplish this amazing goal for humanity. So I'm really excited for this development.

Annie: Oh wow! That's incredible, that's awesome! Very great to hear. So, what do you do currently, and what does your day look like?

Dr. Ge: So currently, I am centered around two activities. On one side, I supervise and train students for their research, and fortunately our students are really doing wonderful, especially recently we got a student who won the top award from the International Science and Engineering Fair in Science Communications, and just last week we heard that the student won a very prestigious Davidson Fellows Scholarship. Actually it was the top award, \$50,000. Just give you a scholarship for more than one year of your college tuition. It's amazing. So those are part of my daily activities- train students to get them to do research. And the other part is centered on my mission design study. Because this mission took two-and-a-half years to design, to finalize the whole mission's scope, plan, science goals, and the technological developments. And so therefore it required work with over a few hundred science engineers, all over the world. Of course most of the people are in China, but we also worked with a lot of top scientists from other countries, such as the US, Canada, Germany, England, Australia, and Switzerland. Basically in many countries, people are participating in this kind of activity. So therefore, as the principal investigator for this project, I have to work with many different teams, organize activities, from

science study to technological study, even to the management of the whole program. So it is pretty much occupied from those activities.

Annie: Oh wow! I can't even imagine that I'm sitting in front of you. You're a very, very honorable figure, and doing such great work, like finding an Earth-like planet. I think that's incredible, I don't think anybody can-

Dr. Ge: That's the mission goal, yeah.

Annie: Right, the goal, yes. But that is still a very accomplishing mission, and also something that we can look forward to. I think it will be very interesting as technology progresses, as modern society looks toward space.

Dr. Ge: You know, I think that is definitely the direction. If you look at the young people here, you've probably heard we've found plenty of exoplanets, but to really have another Earth, of our own, and even possibly have life, so far we have not achieved that yet. But hopefully our mission can push humanity's next dream, and really find our brothers and sisters nearby. That's really amazing.

Annie: Yeah, for sure. So which subject in school would you say is the most helpful in your field?

Dr. Ge: Well, to be honest, for my field, because it's astronomy research, I think that research is the most important, because it's creativity, basically. Creativity, originality, is the most important, which means you really need to have the idea or vision of your field, and come up with original ideas. And then, make things doable, then you pursue it, then you can make things happen. So that takes quite a bit of a compilation of everything.

Annie: Right. And you do research every single day, right?

Dr. Ge: Pretty much. That's my pleasure. Of course, training students is also another pleasure. I started my PhD as a student, and then became a professor, and I train students. So normally the PhD students, then graduate, then undergraduate students. So now, I even like to train high school students, and train them to do PhD-level research. It's just incredible.

Annie: Yeah, I saw your website, and all the work. I was just blown away. Like how do you just do this as high schoolers? And without this platform that you give, I don't think normally we would be able to achieve something like that. So I think what you provide to students is incredibly valuable.

Dr. Ge: That's what I hope. We basically, especially because I like teaching, like mentoring, so therefore I really tried to think about what fundamentally is important for students to learn based on my own experiences. Then I found out, and I eventually proposed a new education concept called Project Driven Education. Basically, you do projects, you do something you really like to do, and then build your knowledge and skills around that. Not all things, not like our current education. You learn so many subjects, you have no idea what they're applied for. Therefore you lose the purpose, lose the direction, so therefore you may lose your enthusiasm for learning things. But here, you get something you really want to do, and then you go "Oh, I need to do the discovery of planets, using deep learning." Then you go "Oh, I need to learn deep learning. Or I need to learn data processing. Or I need to study. . ." Basically you build around what you need to do. So that's our students now. They're all focused on the project they choose, that they really want to do, and then we build their knowledge and skills, everything around that. And that's why they do so well. And what I see here, comparing PhD students to high school students, the only difference is they have more depth in knowledge and skill, but not in terms of understanding. So therefore, we focus on concepts. Basically we want students to understand all concepts, instead

of very complicated formulas or equations, but concepts. Everything is built on concepts. If you have two concepts linked together, that becomes a relationship, which becomes a building principle, a law. Like distance with time, that becomes velocity. Or distance with time changing becomes acceleration. Those eventually drive to the force, right? So therefore these things are built on concepts, so therefore our education is focused on all those concepts. Those concepts, eventually the student can understand, because they can relate to what they deal with everyday. And they can use that to lead up to some kind of research. And then the goal is to try and support that. The good news is that nowadays there is a big data era, so they have a lot of data, a lot of free algorithms, and free software. So we can take what we need, and put all these puzzles together, then we can eventually support your research. So that's our students. Really as good as, honestly, even better than some of our PhD students' level of research.

Annie: Wow. I really like your educational standpoint and that perspective of catering all of those subjects towards what that person's interest is, and obviously your Science Talent Training Program is supporting that, and how that really does work if you have a specific subject that you want to focus on, or learn about. You find out what you need to excel in that, and then you learn that, instead of learning everything and then finding something that you really like.

Dr. Ge: It's a lot more efficient. Simpler. I grew up, then maybe over twenty years learned things, but in the end, when you do research, you find that most things you forgot, probably useless. Then you waste lots of time. In fact, I feel if students started from high school, some even from middle school, they can right away go focus on research, projects. You really build your skills around that. Then you can build a super, highly creative person. And then, of course, if you're really able to have an idea you're able to pursue, and then accomplish it, that's all the secrets of our universe. It's just all something you set up with vision, with ideas, then you

achieve that, that's really all that matters in the end. So then we focus on that. That makes a lot of difference.

Annie: Yeah, for sure. That's great insight, Dr. Ge, thank you.

${Q4-6}$ Nathan

Annie: Dr. Ge, could you tell us more about the Science Talent Training Program and where it's headed?

Dr. Ge: Sure. The Science Training Center was basically established in 2020, last year, and before it was an outreach program at the University of Florida. Basically as professors we just tried to reach out to help students. But as a University program it has a lot of regulations, a lot of ??? and it's hard to have a year-round program. But students training, they want year-round. Not only in the summer providing a few weeks of training, which is not good enough. As you know, the research usually takes a long time, so therefore we eventually, last year in the summer, finally established the center, with the purpose of providing a year-round program. Of course we have the summer, two months where we focus on intensive training. Usually you have the first month doing the necessary skills, knowledge base that are required to do research. We will get those up to some level, and then students can start to choose their research project, and then carry on researching throughout the summer. And they use whatever knowledge or skills they acquired from the first part. And of course if that is not enough, then we have special lectures for special topics, and then students keep learning while doing research. Usually by the end of the summer, they already reached maybe the first milestone; they already got some early results. But then they keep going in the fall, in the spring. And usually when we get to spring almost everybody is ready for their science competition for ???, and the good news is, last year we had students participating in the science fair, almost everybody won an award in their category. Most of them

won top awards at their state or local [competition]. Of course, we have people who got international awards.

Annie: Uh-huh. That's amazing!

Dr. Ge: So that is the first part about our science program. It started with astronomy-related research, from astronomy to big data to deep learning. So those are all astronomy-oriented. In terms of heading to the future, we are actually starting to expand into environmental science, because that is sort of related to astronomy. And because environmental deals with the atmosphere, it's part of astronomy, because we have to deal with the better part of the influence. So therefore these two parts can interact with each other. And also, we share the same sun. The Sun impacts our global weather. So this year we tried to expand into environmental research, and typically students like this very much. And so we, in terms of heading into the future, have a lot of students interested in biology contacting us. So we may want to also include some of those online biology data analysis.

{Q7-9} Ruiwen

Annie: Dr. Ge, how do you manage your time and stress to work efficiently?

Dr. Ge: I think this is a common problem for almost everyone. I think the good thing I learn from my experiences is to set priorities. That's very important in order to do anything. Every day when you wake up, you need to make it clear what you have to do today. And clear the tasks, and then back the priority. Obviously, some of the things have to be done and have to be done urgently, you take out those. Some of the things can't be done or it's not urgent, you can do it next. Some of the things may do or may not do. You don't have to do it if you don't have time. And some of the things that you don't have to do, then you may have to leave it that way. This will eventually allow you to efficiently manage your time because you work based on priorities,

because some priority work, once you decide this moment, I want to do these things and stay focused, don't worry about any other things. I even invented my own technique called "temporary forgetting". So what I do is, once I decide this moment to do this thing for example with you now, I wouldn't think about getting some flowers to take care of or some trees to water. I focus on this and then forget about everything else. I just enjoy the whole process of the moment and then get it done. Therefore, that is basically allowing you to stay absolutely concentrated, focused, then you get the best out of it. And this improves your efficiency as well. This will also reduce your stress because stress comes from why and what, that is why ten years ago I was stressed out, the main thing is because you got too many things demanding your time and your effort, you only have one time to do one thing, so therefore, forget about everything else. If you constantly struggle to do this thing while you have to take care of other tasks, eventually you will become stressed out. So the trick is very simple, one time you only can do one thing so, therefore, forget about everything else. Make a good decision, make good judgment. Once you decide this is the priority thing I have to do, then I stay focused on doing this thing without worrying about anything else. Get this thing done then move to the next task. Therefore, if you look at my secret. I have a piece of sheet: I always write down my top priority list, once it gets done, I cross it out. Then I move to my next priority task. This way, I manage my time quite well and I am not very stressed out. Ten years ago, I was probably more stressed out, but now I am more relaxed and enjoying it.

Annie: Ah, so I summarize: prioritize, concentrate, temporarily forgetting other things, and focus on one task. Alright, great advice. So what are some challenges in your professions, and how do you overcome the obstacles?

Dr. Ge: For me, as an astronomer, growing from the amateur level, light astronomer, to pursue a PhD. To become a really professional strong astronomer, the most important challenges that I had are three things: communication, writing, and originality. So basically this means how it comes as an original argument. That is not part of my change, but I would say that is part I realize that it is important in career development. The first two talk about communication, you know I am from China, my English is horrible because in China our English is written and nobody speaks it. When I came to this country, I had to turn red face and sweat to talk and speak out my English, but the good thing is that I try to overcome it. I gradually pursue opportunities to speak even though my English is horrible, I talk to American people, tell my story, and that actually changes quite a bit. On the day when I was doing my Ph.D. I went to the lab. In the lab you have the building roommate. If you don't have the building roommate, you have to get help from other people that open up, not indirectly with other people. This tremendously improved my communication skills. Not only the physical people around you, but also you have to call companies, all the staff through the phone, to buy what you want. So that quietly improved your communication. So that part changed during my graduate school. I actually overcame quite well, well enough. So the Pennsylvania university took me as an assistant professor after less than two years from the Ph.D, which is amazing. So that part I overcame reasonably well. You guys should know, communication is absolutely important. By all means to talk to people, to communicate your ideas, your thoughts, your story. The second part of the challenge is writing. Although I can write, writing in science is not my strength. So the writing is horrible. When I started my first writing about my proposal, half of the words were changed by my supervisor, red colored. Think about how horrible my writing is. But I overcame it. What I was doing was to go to the administration. The university has a writing technique, which greatly improved my

English writing skills. I basically realized what technical writing should emphasize, summarize at the beginning, what transition from one sentence to another idea, so therefore there are some tricks. Then you watch some of the papers, people writing, then invent these all together. That also can overcome another major weakness. That's about the two of the challenges. The third one is not my weakness, but it also challenged me in any way. I was in the gradated school as the fifth years of the graduated student, I was dreaming about to be a professor, it was really out of people's thought in astronomy because astronomy is a very competitive field, they usually require two post-doctoral successive 6 years of postdoctoral period before becoming an assistant professor. I felt I am ready because I can write a proposal to get funding for a million dollars, I can get telescope times in the astronomical building, I can get a paper published, I can refer to people's papers, I thought that it was a professor's job. So I applied, and I actually got into two top shortlists but they came back saying they can't offer me a job, then I found why? They were both very exciting for me, I am the youngest, and a junior student gets to the list, compared to a professor. Eventually, they offered me a job. The senior people chair told me privately why they did offer me a position. They said you had done one research in your PhD. you were doing quite a few areas, you did wonderfully. But we don't know if this idea comes from you or from your supervisor. That really gives me the reminder, your original idea is what most important, that make me realize quickly, then I focus my original idea, I started my post-doctoral totally different from my PhD research, and I pursued my original idea got my own grants and got my high engineer with me, then people appreciated, that's why I quickly got the Pennsylvania University in two years. Then after four years in the Pennsylvania state as an assistant professor, I became an UF full professor, jumping from a PhD. to full professor only took four to six years. That maybe quite rare people can do it. That is to say, weakness is not a challenge, I did get a

job, but on the other hand, I learned from these lessons. So, therefore, I say, the original idea is so important in the United States and in the academic world. So I pursue the original ideas that eventually pay off for me, probably it is more than written words these values that most other people that why most other people struggled for six years in the post-doctoral still could find technical position, why I could get this. So that's why I share it with your guys, really value the original idea, pursue that and make it happen. U.S is the leading the whole world because of the original ideas, they can pursue and make it happens, like the network, it's US create it and form it, people commit the data from one lab to next lab, starting from there is the one of the strongest field, that's another thing of the strongest area related to data sharing through network, then they invent these companies. This is from the idea that do some things, if I found something not committed for you, then make it happen. That is important.

Annie: Dr. Ge, I love how you face your challenges, your struggle from running away from them. You seize every opportunity to get advantage of opportunities, and besides originality, how important it is. I think our audience members can really benefit from what he just said here. Although he recognized that he could never run away from that, instead, he faced them no matter how many times and never gave up. That's very advocatable, that's something that we can all learn from him. Thank you. Next question, just by your heart, just you mentioned, what part of your job makes you feel accomplished and satisfied?

Dr. Ge: To be honest, research is all my favorite thing. I feel the most enjoyable thing is you have the vision, you have the idea, and eventually, you can make the idea happen. It's more like from nothing to becoming something, that kind of realized the whole process is a great accomplishment to me. For example, students do nothing when they are doing a PhD. These all

the things are part of creativity; you came up with this original idea, you pursued these things, and made it happen. That indeed is the most satisfying.

$\{Q10-12\}$

Annie: And as Dr. Ge previously mentioned on his journey to being prof and now to his current position, I think that's incredibly extraordinary. I don't even have a word to describe it anymore. I was listening to him inside, I was just bubbling up. I was like, "that is amazing. How is he doing this," and right now when he is telling us his story, it seems like oh there was some struggles I overcame it and now I'm here, but actually behind the scenes, the amount of hard work, the sweat, the tears, the blood, everything that he put behind it we haven't seen that, but know that it is there and know that without it, it is very hard to accomplish what he has accomplished and we just need to recognize his significance in our society today and the significance of what you do behind the scenes everyday. Your hard work, your discipline and everything how it contributes to who you are today and so with that said I think this reflects a lot on how Dr Ge and how he is the person how he does things and how he became the person he is today. I have another question. So what are some unique characteristics of your job?

Dr. Ge: My job?

Annie: Yes, I think we would love to hear that

Dr. Ge: My job actually is the unique part. I feel that on umm... This... How to say unique? Umm... it basically means you know we do basically follow our patients. My real interest so that is the one thing I feel is really something I care the project here and the direct I want to head so in the area on workout so those probably reflect well in my research and you know have the only those you've reunited to do and then you spend time you feel you have the internal drive you to overcome, again to point out, the challenge at all times and allow you to spend the nineties effort and like you know master also said, you know, he's sometimes even without sleepover week. I have had these kinds of similar experiences for many occasions and you know sometimes you see my (obviously you know) the coach for a couple of hours. Every, you know, maybe not even everyday; just keep working until getting, you know, medicine happens sometimes because you do have a deadline. So umm... those are the things I found in order to get to that far is important indeed it is something really you feel was it, you want to put your life on it.

Annie: Mmm.. your life into it

Dr. Ge: That's, that's right

Annie: Yes, yeah that's very important. And you know a prevalent issue today, Dr. Ge is burnout in the workplace, whether it's a professional workplace or even in student life. We see it a lot. How do you prevent burnout?

Dr. Ge: I think the way to do it is these earlier I mentioned you know is you basically, the way most people burn out is because they do not divide the tasks into four categories. As... as described.

Annie: Four categories

Dr. Ge: One is urgent and important. And the other is important but not urgent. The third one is may do may not do. The third one... Fourth one is may not do.

Annie: Okay

Dr. Ge: If you always do everyday, divide your tasks into these four and then you choose the urgent-important to take care of. then the important but not urgent and then you really have spare time. Then you do something may do may not do. For example, if they're watching the NBA

Final for example, may do may not do. Right? Or maybe something to do. Love to... what...you know video game for example. Right? That's not very you know the things that I found out right? Is very some of our students that before they join our program they are their parents always said that they like to play game but after joining our research they found wow that's really challenging exciting that quit game. okay so that's kind of thing you can see here that is what I can see there is something you don't have to do, why you want to do that is because you got bored you got nothing to do, so then this game is keeping you entertained like that instantly. So this kind of way I feel is important why we, you know, set these up. Something important. You want to get this clear so you never stress out. So that's the people stress out is because they don't make a priority they want to do everything and then they even not analyze what's in committed what confident so therefore that's usually what I ask my students to think through it before do it. So that's the kind of things my lab and my student research is always encouraging to do before doing everything. Think through it, so which means... Think through... Think what you want to do, something you can... other thing you may also. You know... family reunion. Think all things; make planning. Well planning, then do good execution. So you heard people say: making any ??? comes before good preparation. And the only thing ??? for is execution. So therefore you have to get good preparation work. Get good work. And then, if you just use that program, you'll do well. Right?

Annie: So summary -

Dr. Ge: That's just that's right

Annie: So in summary, you should prepare a lot. And also, split all of your tasks into four sections. One is urgent-important. The second one is important but not important. The third one is may do or may not do. And the fourth one is may not do or don't do that at all. Okay, I think if

we all do this, or I was gonna try it today, myself. But I think that would really help efficiency and productivity as well. If you are clear what you are doing throughout the day. If you're clear what you're doing throughout the week, it doesn't have to be based off of every hour, right?

Dr. Ge: No

Annie: It just could be, throughout this whole day, I want to accomplish these four things, and let me see which category I can put these four things in, and by the end of the day you can see how accomplished you are, and you know how-

Dr. Ge: yeah

Annie: Productive you've been throughout the whole day.

{extra Questions} Michael

Annie: Today with me here [are] Nolan Gao, Nathan Wei, Michael Wei, and Maggie Yan from the Huagen Journalist Association here in Gainesville, Florida, and we actually have a few questions from these journalists here. So Maggie's question for Dr. Ge is "What is your theory on how the universe began?"

Dr. Ge: Okay, well this is a very good question, you know, many people probably ask this question. I personally feel there is no right answer at this point because this is a great mystery, why do we have the so-called "Big Bang", like a single point, that has so much diversity, of everything in the universe. So therefore there is no standard answer because that really is the cutting-edge research people are trying to understand. Including nowadays, people discovered that dark energy is part of the universe, that means that 70% of [our universe is made of] this mysterious material we have no idea about. So therefore, [when] you ask [someone like] myself

how the universe was formed, we may have also wondered [how] things end. My opinion is black holes are one of the good examples — black holes, once material gets in the black hole it can never come out. So the light, everything, information, is kept in the black hole. So this means that black holes can grow, they can take more material. So this makes me always wonder, for the universe, something only can get in, it cannot get out. So maybe it'll take a long, long time, but everything, in theory, could get sucked into a black hole. But on the other hand, our universe, think about it, our light never travels beyond our universe because we can only use light to travel from one place to another place. So the universe, in theory, — to the outside — is a black hole as well. So therefore, — the universe is the biggest black hole — then all these real black holes, they suck in from inside [the big black hole]. So this could be linked together, one [black hole] feeds one or the other, even though we can't understand anything in the black hole, a black hole will collapse one day and at that point, it could build part of a future universe. You might be thinking that that could be a possibility. So I feel that this definitely is a cutting-edge area of research and anybody who has an interest could come up with their idea and then try to pursue research, maybe they'll be able to find the mystery of the universe.

Annie: Yeah, that's something very interesting. When you were saying that, I was like "Oh, wait. That could've happened!" I think a lot of viewers also have this question like Maggie had said, "How do you think the universe began?" because there is so much unknown out in space, but I'm glad we got to hear his perspective on it. And we also have a question from Nathan, which is, "How or what do you think is the possibility of travelling to those Earth-like planets in space?" **Dr. Ge:** I think that because of technology now, obviously the fastest travel we can do is with rockets, you know, 20 or 30 kilometers per second, that's probably the maximum you can do. The current technology uses fuel and the future could use some more advanced plasma or some

other faster travel tools, that certainly is one possibility. But on the other hand, my personal view is that we have to think about travelling purpose. I mean like in Star Trek, you can beam me from one place to another and it's really just transferring information from one side to the other side then we build the human body. Of course, that is just sci-fi, but on the other hand, do think about it. Our communication is through the information from one side of a cell phone that travels to the next side where people can receive it and they can duplicate it. So in other words, in the future we could invent some way, light-speed travel plus 3-D printing some kind of things, you transfer information to the exoplanets that have conditions like Earth and then use materials there to use 3-D printing to make DNA and artificial cells, eventually making life there. So then you transfer the information and knowledge there. Then they can rebuild civilization like we have here. So that might be, I imagine, a possibility.

Annie: Yeah, that is a possibility — I can't even imagine that! I mean hearing that, it sounds like a movie, but it could just happen. I mean if Earth-like conditions, like he said, and plus we have advanced technology now and we can even edit genes with CRISPR-Cas9 and things like that. I'm sure, in no time, we should be able to do something like that and create a life with technology and why not create it in outer space, right, or on a different planet?
Dr. Ge: So that would limit our travel limitations, right? Because if you travel with just light beams, it's much easier than travelling with 150 pounds of myself to space. So therefore, if you're able to do that, — go to another site and then use the information and figure it out — that might be the biggest way. Then all you do is you get there, you get someone to see things, and then transfer the information back — you can see [it]. You know, you see Jeff Bezos travelling to space; you don't have to go there, but you can get a sense. So that is probably another possibility.

Annie: Yeah, for sure. Thank you!

Dr. Ge: My pleasure.

Annie: And I hope that cleared a few questions up. If there are any other questions, you can leave it in the comments or send a message to Dr. Ge directly for him to answer. Thank you!