Scholar 151

Chapter 151

…

After the oral defense, Lu Zhou took a break for a few days. He had to give his body a rest for the upcoming master's student life.

The student status was soon sorted out.

Just like this, Lu Zhou was a student of the University of Jin Ling again.

Except that, this time, he was a master's student.

After some serious consideration, Lu Zhou listened to Professor Tang's suggestion and studied his master's degree under Professor Lu Shenjian.

First of all, he wanted to further develop mathematical physics. Secondly, Professor Tang was correct. He had not fully experienced China's academic circle, so he had to expand his perspective.

Normal people could not even imagine how deep this perspective was.

Logically speaking, if he wanted to climb to a higher level of academics, having an academician as his tutor for the master's degree would be very helpful. For example, in order to declare a large-scale national project, he had to have an academician's amnesty. Whether it was to ask for money or to consult policies, it would definitely be better than fighting alone.

As an academician's student, he would also have opportunities to learn the frontier of knowledge, which Lu Zhou was the most eager for.

Due to these reasons, Lu Zhou applied to be a graduate student of Professor Lu Shenjian.

Professor Lu Shenjian welcomed Lu Zhou.

He had not taken on a graduate student in a long time. He had no energy or time, but when he saw Lu Zhou's abilities in theoretical physics, he decided to accept his request.

Theoretical physics was a high-level discipline, especially the field of particle physics. It revealed the mysteries of the universe at a scale of 10^-18 meters.

Mathematics was also an important tool for studying particle physics.

The combination of the two would produce unexpected results.

Therefore, Lu Zhou chose the imaginative direction of mathematical physics.

Professor Lu Shenjian was looking forward to working with him.

…

Laboratory building…

Lu Zhou reported to Professor Lu Shenjian as he began his master's degree studies.

Professor Lu Shenjian gave him a brief introduction to the situation and what to do as a master's student.

"… You've accomplished a lot in areas such as number theory and functional analysis. I don't understand number theory, but the mathematical tools of functions and algebra are very helpful for theoretical physics research. Since you've chosen mathematics physics as your main research direction, then my advice to you is to go to to a few physics lectures, either undergraduate or graduate, or read a few textbooks. This way, you can fill in the gaps in your physics knowledge."

Professor Lu Shenjian paused for a second before saying, “Oh yeah, did you publish your thesis?”

Lu Zhou replied, “I already submitted it to [Progress in Theory and Mathematical Physics].

The thesis had just passed the review process and had now entered the peer review stage.

Depending on the situation, it would be passed either this month or next month.

In any case, the journal was bi-monthly, so it would take at least 2 months for him to see the thesis.

Professor Lu Shenjian nodded and said, “I’m also subscribed to this journal. It’s a good journal. I’ve read your thesis, and the ideas that you put forward are good. If the reviewer is engaged in quantum mechanics research, they’ll definitely see the academic value of the paper. It’ll probably be accepted.”

The professor continued, “I’ve different requirements for your master’s degree than others. If you want to graduate, you’ll have to publish at least two SCI theses in the field of mathematical physics.”

Lu Zhou immediately asked, “Does this one count?”

If it counted, he only had to submit one SCI thesis.

Then he might get his master’s degree by the end of the year.

Hopefully.

The professor smiled and nodded as he said, “It counts. But don’t rush to graduate, you still have a lot to learn. Do more projects and accumulate some scientific research experience. I’ve already seen the talent development plan that the school has given to you, so I’ll definitely let you graduate by this time next year.”

He implied that as long as Lu Zhou completed the requirements, he would allow Lu Zhou to graduate by this time next year, but no sooner.

Embarrassed, Lu Zhou smiled.

He wanted to get his master's degree early, but since his supervisor said so, he did not insist further.

Anyway, a year was short, and he could do projects under the academician's wing.

"About your training program, I made a class schedule for you. Just take the classes according to the schedule. Also, one more thing."

The professor paused for a second before he said, "You might have known that I'm one of the leaders of the LHC China group. The "pentaquark" has entered the final and most critical stage."

"Now, the upgrade of the European Hadron Collider has been completed. Hopefully, the experiment will restart after the May meeting. I'll go to the European Nuclear Research Center in Switzerland at the end of April to participate in the meeting."

Professor Lu Shenjian smiled and continued, "If you can pass my exam by April, I might be able to bring you along with me."

The theory of the pentaquark was first proposed by the St. Petersburg Academy of Sciences in Russia in 1997. However, even Pollykov, who proposed this theory, was skeptical about the theory.

In around 2003, in the experiment on the spring-8 of the Synchrotron Radiation Facility of Osaka University, the existence of the pentaquark was briefly observed. However, in the Hadron Collider, no evidence was found. So, whether the quark particle existed or not had always been a controversial topic.

In 2013, the BESIII International Cooperation Group led by the Chinese state discovered the tetraquark in the experiment of the Shanghai Electron Collider. The experiment on the tetraquark was about to be executed by the LHCb International Cooperation Group.

If what Professor Lu Shenjian said was real, Lu Zhou would be able to witness history.

Lu Zhou undoubtedly wanted to go to that meeting.

From the tone of the professor's voice, the April exam was going to be difficult.

Lu Zhou coughed and asked, "Professor, can you at least give me a syllabus for the exam?"

"Syllabus? Sure," said Professor Lu. He smiled and said, "The syllabus is particle physics, go and study it."

Lu Zhou: ? ? ?

Motherf*cker, what kind of syllabus is this?

Can you be any less vague?

Chapter 152

The old man only gave him a vague syllabus, and he did not teach Lu Zhou at all. Lu Zhou was supposed to study by himself.

Lu Zhou went to a lot of physics lectures and became familiar with a few physics professors.

He had to plan his own study rhythm.

What was the difference between this and studying his bachelor's?

He could not feel a difference.

However, this was good as Lu Zhou was used to his own studying pace. If someone was rushing him and making him do homework every day, he would feel uncomfortable.

Every day, he would either read the system mission's booklist or some quantum mechanics textbooks or he might attend to a few lectures on theoretical physics.

The thirty focus capsules were very helpful and they helped him a lot.

Theoretical physics was only a third of the book list, and it was concentrated in condensed matter physics, with some relation to molecular chemistry and chemical materials.

This was obvious from the mission reward experience distribution.

After a whole month of effort, Lu Zhou finally completed the mission's reading section.

…

[Book reading (15/15), documents reading (50/50), one set of experiments (0/1)]

Standing in the pure white system space, Lu Zhou looked at the semi-transparent information panel and sighed.

"There's only one experiment left."

The experimental was about the real-time observation of lithium dendrite formation in lithium-ion battery electrodes. This experiment required the use of a digital microscope with timed photo function and the assembly of LiFePO4/graphite batteries in an argon-filled glove box. The BK-6808 battery test system was electrochemically tested and observed under a digital microscope.

He had no experience in material chemistry experimentation, so this undoubtedly was a hell of a challenge. Fortunately, he had someone to help him.

Lu Zhou looked at the mission rewards one last time before he exited the system space.

After exiting the system space. Lu Zhou took out his phone and called Liu Bo.

Lu Zhou said hello and expressed his desires.

After listening to Lu Zhou's request, Liu Bo asked, "You want to borrow the lab?"

Lu Zhou replied, "Yeah, is it ok?"

Liu Bo asked, "It's fine, it's just… Why do you suddenly want to do this experiment?"

"I read some literature regarding this topic recently and developed an interest. I want to understand it through experiments."

Lu Zhou made up a reason.

After all, he was only following the system's directions.

Liu Bo agreed quickly, "Okay then. We're doing research on electrode materials as well. If you're interested, you can come over to the lab tomorrow and I'll help you with the experiment."

Lu Zhou, "Thank you so much!"

Liu Bo smiled and said, "You're welcome!"

With Liu Bo helping him, this experiment was in the bag.

…

Normally, the labs had to be reserved in advance. You also had to do a report on the experimental content and equipment used.

After all, the lab equipment was not toys. It was worth millions of dollars.

However, for Liu Bo, lending him the equipment for the experiment was no big deal.

The carbon nanomaterials project team led by Professor Li was influential. It received funds from the country and from companies, so it was easy to book a lab.

"… We're doing electrode material experiments as well. If you're interested, how about you join our project team?" said Liu Bo while they were walking through the lab corridor.

He really wanted Lu Zhou's talents.

If it was before, Lu Zhou would have accepted in a heartbeat. However, he was no longer an undergraduate student. He had his own research to do now.

Also, materials science seemed kind of flaky…

Lu Zhou replied, "It's fine, I still have other things to do. I might have to go to Switzerland in May, so I don't have the time."

Liu Bo scratched his head and said, "I almost forgot that you're a master's student now. Not bad, Lu Zhou, your advancements are impressive. Are you interested in taking the master's yearly award?"

Lu Zhou coughed and said, "I already received the undergraduate one, surely they can't give it to the same person twice?"

"They could, you never know," said Liu Bo with a smile. He opened the lab door and said, "Come in, it's here."

The laboratory door opened.

Brother Qian was also inside, and he was playing with a piece of equipment that looked like an oven. The sides had water dispensers installed, so it looked a bit strange.

If Lu Zhou recalled correctly, this thing was a BK-6808 rechargeable battery tester. Not only did it have its own data processing system, but it could also automatically plot voltage/time, current/time, internal resistance/time and superposition curve and Cycle diagrams.

It was not cheap.

In comparison, Xiao Ai was not too greedy.

Lu Zhou sighed in his heart and walked forward.

Brother Qian wore a white lab coat as well, but he looked a lot more professional than Liu Bo. He turned around and looked at Lu Zhou.

He then pushed his glasses and asked, “The experimental equipment is ready. Should I do it or you do it?”

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Lu Zhou looked at Liu Bo who merely shrugged.

“Don’t take it to heart, he’s just like this. The equipment here is like his wife. It’s more important than his life… Just watch him do it.”

Brother Qian then said, “Doing experiments isn’t like mathematics, you can’t make any mistakes. Of course, I was afraid that you’ll break the equipment… Show me your experiment design.”

Lu Zhou took out the A4 paper and said, “It’s right here.”

The experimental steps and data required by the system were written on there.

Brother Qian brother took the A4 paper and nodded as he said, “The design is quite professional.”

Emm…

It’s designed by the system.

Lu Zhou did not say anything.

…

The experiment flow was simple. They should start with the battery and observe the phenomenon.

95.7% of graphite was used as the negative electrode material, and the binder was sodium carboxymethyl cellulose (CMC) and styrene-butadiene rubber (SBR). The current collector was a copper foil. The graphite layer had a thickness of 90 μm, the positive electrode active material used LiFePO 4, and the current collector was aluminum foil.

As for the separator, a three-layer separator of Celgard 2325 was used, and the thickness was about 25 μm.

To prevent oxidation of the material, everything was done in an argon-filled glove box.

Of course, it was not only to prevent oxidation of the material but also to prevent the LiPF6 component in the electrolyte from reacting with water in the air to form hydrofluoric acid.

Even high school students knew about hydrofluoric acid.

The stuff was dangerous. If it got on someone’s hand, the hand would be destroyed beyond recognition.

Brother Qian did the experiment professionally.

Soon after, the sample was made.

In order to prevent the sample from being damaged, the side-to-side assembly method was used. Brother Qian completely covered the LiFePO4 material with a layer of the separator, and carefully left the free end of the positive and negative electrodes at a distance of 2 mm.

This step was crucial.

Brother Qian took out the sample and exhaled a long breath.

“Done.”

As Lu Zhou looked at the sample in Qian brother’s hand, he asked, “This is the battery?”

Brother Qian brother replied in a concise manner, “A simple and unsafe lithium-ion battery.”

Lu Zhou asked nervously, “Will it explode?”

Brother Qian shook his head, “It won’t explode, but it might ignite.”

A fire would cause big trouble.

Not only would the sample be destroyed, but the digital microscope would also be burned.

Lu Zhou guessed that this was one of the reasons why Brother Qian did not let him touch the equipment.

The sample was connected to the BK-6808 rechargeable battery tester and then placed on a digital microscope. Brother Qian set several parameters to the computer and said, “The data collection frequency is 1 Hz, and the battery is discharged to the cut-off voltage. Wait for it to be charged for 400 minutes… ”

Now, all they had to do was wait.

Lu Zhou looked at the instrument and asked, “Do we have to wait that long?”

400 minutes was almost seven hours.

Brother Qian pushed his glasses and said, “7 hours is the basic operation. Sometimes it takes days to see the results. Normally one person will stay in the lab. I’ll usually take turns with Liu Bo.”

Liu Bo replied, “That’s right, last year I watched more than 40 TV shows while waiting in the lab. Do you want me to recommend you some?”

Lu Zhou, “There’s… No need for that.”

He did not have time to watch TV shows.

After doing the necessary steps, Brother Qian briefly taught Lu Zhou about what to do in an emergency.

For example, what do to when the sample was smoking or smelled weird, how to clean the damaged sample, and most importantly how to protect himself.

No matter how expensive the equipment was, it was not as valuable as one’s own life.

Of course, the experiment was not that dangerous, so Brother Qian was confident to give Lu Zhou the key.

He still had some stuff to do with Liu Bo, so they could not stay here.

Lu Zhou sat next to the digital microscope and pulled out a quantum physics book. He would study quantum physics and occasionally looked at the digital microscope.

Later, he found out that he did not have to be so careful. The sample under the microscope did not change at all.

It seemed that Brother Qian's experimental skills were quite reliable.

Lu Zhou stayed in the lab all day, and he even called delivery for lunch.

Finally, the time was up. The discharge time was over. Lu Zhou waited for 10 minutes and kept the circuit open before he cut off the power.

He was almost finished with the experiment when he suddenly heard footsteps outside the lab. Liu Bo had just eaten dinner at the cafeteria before he returned to the lab.

As Liu Bo looked at the sample, he asked, "Done?"

He then skillfully operated the computer and said, "Then let's collect the data."

The printer started to hum.

Soon after, Lu Zhou received what he wanted.

A set of pictures showing the growth of lithium dendrites under microscopic conditions as well as graphs such as cyclic voltage curves that the system required him to collect.

Liu Bo started chatting to him.

“… Lithium is the most ideal anode material, but it’s also the most difficult to charge. When charging, the lithium ion that returns to the negative pole will never change to a flat lithium metal layer. Like a flower, it’ll form a beautiful and deadly tree.”

Lu Zhou looked at the printer and asked, “Is it fatal?”

“Yes, once this kind of dendritic thing is formed, it’ll continue to grow with constant charge. It’ll eventually puncture the diaphragm and contact the positive electrode like a fork.”

Liu Bo paused for a moment before he said in a joking manner, “Imagine if you connected the positive and negative poles of a battery, it would short circuit. Have you heard of the Moli company?”

“No… Why?”

Liu Bo shrugged and handed the printed A4 paper to Lu Zhou as he said, “Their products almost created history, but because of the use of lithium as the negative electrode, a major accident occurred. The NTT mobile phones were recalled. Finally, the company went bankrupt and was acquired. In contrast, Sony was very smart. They used graphite directly as a negative electrode, and the introduction of lithium-ion batteries quickly took over the market.”

Lu Zhou could not help but ask, “Did they not do a safety test?”

Liu Bo sighed and said, “Yeah, everyone asked that. But things are not that simple. Maybe they didn’t find any problems at all? Or maybe they thought they found a perfect solution? Who knows?”

Chapter 154

He had finally completed this mission.

He could finally know what the debris was.

However, there was no hurry in finding out.

Lu Zhou looked at the information screen and demanded, “System, open my characteristic panel.”

The system opened his characteristic panel.

The information screen flashed.

[

Core science:

A. Mathematics: Level 3 (4000/100000)

B. Physics: Level 2 (3100/10000)

C. Biochemistry: Level 1 (4000/10000)

D. Engineering: Level 1 (0/10000)

E. Materials science: Level 1 (3000/10000)

F. Energy science: Level 1 (0/10000)

G. Information science: Level 1 (2900/10000)

General points: 1975

]

He leveled up his physics. The next level needed 50k experience points, which was much harder to obtain.

Lu Zhou looked at his characteristic panel. He then quickly turned his eyes to his inventory.

He was shocked.

A tubular object was in his inventory, and it was the size of an index finger.

Flashlight?

No, it looks like…

It was slightly larger than a AA battery, and he could see the positive and negative sign on both ends. However, the battery was slightly bent in the middle.

Lu Zhou reached out with his hand and took the thing out of the screen. He slowly examined it but did not find anything special.

“Is it just a AA battery? Why would the system give me this?”

Lu Zhou looked at it for a while. He was confused.

At least the coke was branded “Future”.

However, this battery was brandless, and there were no clues.

Lu Zhou calmed down and started to think carefully.

It made no sense that the reward mission would give him useless garbage.

He thought about the mission while he looked at the battery. He guessed that it might be the legendary lithium-air battery?

Or at least a concept of it.

If that was the case, then this debris would be incredible. This battery would have high research value, but Lu Zhou did not know how to maximize the value of it.

Selling it for cash?

Sounds like a good plan.

If he could prove the value of this battery, someone would definitely buy it. The problem was that Lu Zhou could not explain the origin of the battery.

He could not explain the materials used or the damage of the battery. He could not explain anything.

If he could not sell it, he would just have to do research on it himself.

The technology inside the battery could be deduced by reverse engineering. He could pull out the positive and negative materials, and then collect the residual elements from the wall of the tube to reverse the composition of the electrolyte.

If the battery was really a lithium-air battery, and he could figure out how to protect the lithium negative electrode material in this battery, then the entire mobile phone industry would go nuts.

Lu Zhou said to himself, “If only I had a way to identify this negative electrode material…”

Reverse engineering was very difficult.

In order to reverse engineer the material, he had to use an atomic absorption spectrometer to identify the content of each element in the material and then used the scanning electron microscope to observe the structure of the sample surface. Then, he had to analyze the fine structure inside the sample through transmission electron microscopy.

Only then could he identify the material.

Also, the instruments needed would cost millions of yuan.

All in all, this was about money.

It could be a good choice to work with others. For example, Professor Li could help him with the experiment.

However, he still had to do most of the work himself. After all, it was still his experiment.

Lu Zhou looked at the debris and sighed.

I wish I have my own laboratory.

I'll have to leave this sample in the system space until then.

I still have to continue my life, even though I don't have money for a lab.

He placed the debris aside and looked at the mission panel.

He took a deep breath before he opened the mission list.

[

Mission 1: Knowledge is money

Description: The development of civilization is inseparable from the development of energy technology. Once the battery is mastered, it will grasp the key to the new era.

Requirements: Analyze the technology in “Residue 1”, generate at least one technical patent, and obtain at least 10 million RMB profit through patent.

Reward: 10,000 materials science experience points, 500 general points. One lucky draw ticket. (85% garbage, 12% sample, 3% blueprints.)

]

[

Mission 2: Witness of History

Description: The establishment of the standard model has predicted the world a hundred years in the future. What we need to do now is to restore the theory in the experiment.

Requirements: Join the China LHCb group and participate in the research on the pentaquark project.

Reward: 1??? Physics experience points (determined by participation). 500 general points. One lucky draw ticket. (100% sample)

]

[

Mission 3: Creating History

Description: The development of condensed matter physics can make our tools harder, our engines stronger, and our buildings taller. Use theoretical physics to ignite the spark of condensed matter physics!

Requirements: Blow up the Large Hadron Collider.

Reward: 1??? Physics experience points (determined by the degree of damage). 500 General points. One lucky draw ticket. (100% blueprints)

]

Lu Zhou: "…"

This high tech system should be called a destruction system.

Sometimes, it would give out some crazy missions.

He ignored the third mission.

Lu Zhou was contemplating between Mission 1 and Mission 2.

At first glance, he wanted to choose Mission 1, but he did not have the ability nor the funds to do reverse engineering.

As for Mission 2…

Professor Lu Shenjian told him that he could come to the Switzerland meeting, but he did not say that Lu Zhou could join the China LHCb group.

What do I do?

Lu Zhou hesitated for a moment before he finally made up his mind and chose Mission 2.

The opportunity to witness history was just around the corner.

It would be a pity if he missed it.

Chapter 155

Lu Zhou took a pen and when he looked at the question, his eyebrows twitched.

There were three questions on the paper.

They all looked difficult…

Professor Lu Shenjian smiled and asked, “What, you don’t understand?”

Lu Zhou smiled and looked at the questions as he said, “No of course not, it just doesn’t look easy.”

Professor Lu Shenjian smiled and did not respond. Instead, he crossed his legs and waited patiently.

Easy?

It wouldn’t be interesting if it was easy.

After all, he was an academician.

This question was not intended for master’s students, it was for PhD students.

If Lu Zhou could solve two questions, it would count as a pass. If he could solve all three, that would be excellent.

His four PhD students could solve all three questions.

While Professor Lu Shenjian was waiting for Lu Zhou to do the test, Lu Zhou quickly skimmed through the three questions. The first question looked the easiest.

It was about group theory.

However, it was not mathematics group theory, but the application of group theory in quantum mechanics.

Since the “group theory” branch of mathematics was created independently by mathematicians long before the emergence of “quantum mechanics”, it was unlike “calculus” which was founded by physicists and mathematicians. Therefore, group theory was an “important product” for physicists. It was difficult to learn and not easy to use.

For a “mathematician” like Lu Zhou, however, it was not too difficult.

[A group theory explanation of the accidental degeneracy of hydrogen atomic energy levels]

The question was short, but it contained a lot of information.

The phenomenon of degeneracy in hydrogen atoms higher than ordinary atoms was called “accidental degeneracy.” However, traditional quantum mechanics cannot explain the phenomenon of accidental degeneracy without the use of group theory.

Lu Zhou closed his eyes and recalled his quantum mechanics knowledge.

Then, he built a mathematical model in his head…

Lu Zhou opened his eyes and after taking a deep breath, he picked up the pen and started to write on the paper.

[Let the hydrogen atom Hamiltonian be H=P2/2μ-Ze2/r…]

[In the case of Coulomb potential, there is a Runge vector in the system, recorded as M'=…]

[The eigenvalue of the group Casimir operator C=…]

[…]

When Professor Lu Shenjian saw the speed of Lu Zhou answering the question, he was surprised.

He thought that Lu Zhou would take at least 20 minutes to do the question.

Moreover, Lu Zhou answered it correctly.

He planned to insult Lu Zhou when he could not solve the question, but that was no longer needed.

[For the energy level E(n+1) and the quantum number (n, 1), the degeneracy is Σ2(l+1)=n2…]

When Professor Lu saw the answer, he nodded in his mind.

First question, correct!

Lu Zhou did not notice Professor Lu's expressions as he was focused on doing the second question.

The second question was about the problems of Dirac's cavity theory in quantum field theory. It tested his understanding of Dirac's equation and some theoretical knowledge about field theory.

Lu Zhou was not afraid of this kind of pure theoretical question. With the help of the focus capsules, he remembered all of his textbook readings.

For him, this question was free marks.

Lu Zhou quickly picked up the pen and answered the question.

When Professor Lu saw Lu Zhou answering the question, a slight smile appeared on his face.

He was right.

This kid was talented in theoretical physics, even more than his four PhD students.

If the University had not given Lu Zhou a personal talent development plan, he would have wanted Lu Zhou to study a PhD with him as well.

Of course, he still supported Lu Zhou's talent plan.

Lu Zhou solved the second question and quickly moved on to the third question.

When he saw the third question, he was stunned for a second.

The third question was about "string theory".

The so-called string theory tried to solve the two main physics theories of incompatibility. It was the contradiction between quantum mechanics and general relativity. The string theory wanted to describe the whole universe, and it was known as the legendary "Grand Unified Theory".

This theory had a lot to do with mathematics.

Venezzino, who worked at CERN 1 , originally wanted to find a mathematical formula that described the strong forces in the nucleus. As a result, he found the Euler formula in an old maths book. This formula unexpectedly successfully described the strong force.

Even though it sounded fake, it was just a weird coincidence.

Like this, string theory was born.

The later wave of string theory such as superstring theory and the famous M theory of “unification of rivers and lakes” as proposed by Edward Witten were also developed.

The ultimate goal of physics was to establish a “Grand unification theory”.

However, China’s research on string theory was at an awkward stage.

Condensed matter physics itself stood on the opposite side of theoretical physics. The theoretical physics community was reluctant to accept this “mathematics freak”.

Even the leader of China’s theoretical physics and one of the most influential physicists in the world, Mr. Yang Lao, expressed his disapproval of string theory. On the contrary, the Chinese mathematics community accepted the proposal of string theory.

However, what confused Lu Zhou was that the third question asked him his opinion on string theory.

Opinion?

Opinion toward the theory? Or opinion toward the development of the theory?

Is this a subjective question?

Lu Zhou paused for a long time, he felt lost.

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“The core idea of string theory is that the fundamental unit of nature is not point-like particles such as electrons, photons, neutrinos, or quarks, but a very small one-dimensional string. And all of the basic particles in nature are produced by the vibration of the string. But so far our understanding of matter is still at the microscopic particle level, and no one can really see the existence of the string. The only assumptions that support these assumptions are mathematical formulas that look beautiful.”

Professor Lu Shenjian smiled and asked, “So you think that the development of string theory is useless?”

Lu Zhou shook his head and said, “Of course not. String theory isn’t useless.”

The professor was interested, and he asked, “Why?”

“Many theories are based on conjectures, like the establishment of the standard model. As technology advances, these theories will one day be tested. We just have to wait for string theory to be tested.”

Lu Zhou paused and smiled before he then continued, “Also, humans have to look at it from the long term perspective. Isn’t the research on quantum chromodynamics and even the large Hadron colliders in Europe established to test standard models? We can’t observe it right now, but one day someone will see the string for us.”

A moment of silence passed.

Professor Lu tapped his fingers on the table. After a while, he nodded, “Not bad.”

Not bad means passed?

Just in case, Lu Zhou asked him.

“Professor, did I pass these three questions?”

Professor Lu Shenjian smiled and commented, “Of course, the first two questions are completely correct. It seems that I’ve taught you well over the past two months.”

Lu Zhou: ? ? ?

Wait, you taught me?

The professor did not notice Lu Zhou’s expression, and he continued to speak, “As for the last question, it was a free marks question. Exploring academic issues is subjective, no matter how you answered it, I would’ve accepted the answer.”

Lu Zhou smiled and asked, “Then, Professor, will you take me to Switzerland?”

Professor Lu Shenjian smiled and nodded his head, “Of course, I’ll prepare the necessary documents for you. Try to get your visa as soon as possible.”

“Thank you, professor!”

Professor Lu smiled and replied, “You’re welcome. After all, this is what I promised you. Oh yeah, one more thing.”

Lu Zhou asked, “What is it?”

Academician Lu, “The China LHCb research group still needs a few interns. Are you interested?”

Lu Zhou was shocked by his question.

He had not expected himself to be this lucky…

…

LHCb was the abbreviation for the bottom quark detector. It was an international research organization. Many international researchers participated to accomplish a single research project.

For now, the main research focus of the LHCb was to find the pentaquark particle Pc+.

Even with massive amounts of computational analyses, it was still uncertain as to what this particle was. However, what everyone knew was that the invariant mass spectrum analysis passed J/ψp, and the mass of this particle is around 4.5 GeV.

However, it was a pity that the Beslll International Cooperation Group, which was dominated by China, used the Beijing Electron-Positive Collider. The energy zone was between 1-4.5 GeV, which was outside of the limit of the Pc+.

In order to create a Pc+ particle, one would need at least 6GeV of energy.

Therefore, the Chinese researchers had to conduct research at China in order to find that mysterious particle.

The China Cooperation Group was mainly managed by professors from the University of Shuimu, but all Chinese universities could participate. Professor Lu Shenjian was also one of the leaders of the China Cooperation Group. Their main objective was to research particle physics.

Lu Zhou joined the China research group as an intern. Even though it was a small role, he was still contributing to history.

Lu Zhou was excited to witness history.

Of course, he was even more excited about the mission experience point awards.

This was definitely more exciting than the Princeton mathematics conference. He wondered how many experience points he would get.

Fifty thousand?

A hundred thousand?

Hopefully, he could level up his physics to level 3.

Suddenly, Shi Shang interrupted his thought process.

“Zhou, what are you smiling about?”

Lu Zhou, who was applying for a visa on his computer, coughed and said, “Haha, nothing, I just thought of something interesting.”

Huang Guangming walked over and looked at the computer screen. He then asked in surprised, “Passport? You’re leaving the country again?”

Lu Zhou nodded, “Yeah, around early May. I’m going to Switzerland with Professor Lu Shenjian.”

Liu Rui was doing his homework when he said, “You’re too good, too good.”

He was used to Lu Zhou’s shenanigans.

Still, sometimes, he still felt hopeless. He was so behind.

Huang Guangming was shocked, “F*ck, going to Europe this time? Is it a mathematics conference?”

Lu Zhou smiled and said humbly, “Not mathematics, this time it’s for physics. I’m just going with my boss. I’m only doing miscellaneous work.”

Huang Guangming did not believe it.

Shi Shang suddenly said with an embarrassed tone, “Lu Zhou, can you please do me a favor?”

Lu Zhou generously responded, “What favor, say it.”

Shi Shang smiled and asked, “Can you bring something back from Switzerland for me?”

Lu Zhou, “What thing?”

Shi Shang, “Valmont makeup… I think it’s called Valmont.”

Huang Guangming was surprised, “F*ck, you use makeup?”

“F*ck off! It’s for my girlfriend… Uh, I’ll pay you back.”

Lu Zhou nodded and said, “Sure, I’ll buy it for you if I see it.”

Lu Zhou was happy to help his friend.

Speaking of which, should I buy some local products from Europe?

What’s there in Switzerland? Swiss army knives? I wonder if I can bring it on the plane…

Lu Zhou could not come up with anything to buy.

I guess I’ll just buy some milk powder, Xiao Tong is about to enter the senior year of high school, she needs good nutrition.

As a brother, this is all I can do for her.

Chapter 157

Han Mengqi's eyes widened, "European Nuclear Research Organization? Isn't that SERN?"

Lu Zhou replied, "SERN? It's CERN."

Han Mengqi was suddenly serious and she said, "Please be careful, this might be a conspiracy."

Lu Zhou: ? ? ?

What is this girl on?

Lu Zhou changed the subject and asked, "Is there anything you want? I can buy it for you."

Han Mengqi shook her head, "No, it's fine."

Lu Zhou asked, "Are you not interested in makeup and skincare?"

Speaking of which, he rarely saw her playing with makeup, but she did have a lot of plush toys.

"My mom's company does makeup and fashion, and she goes to Europe every two months, do you not know?" said Han Mengqi nonchalantly.

Emm…

Lu Zhou suddenly realized that his offer was stupid.

…

After Lu Zhou joined the LHCb organization as an intern, the organization did not ask him to carry out specific scientific research tasks. Lu Zhou felt like this was because of his lack of knowledge in quantum chromodynamics.

Therefore, he began to read quantum chromodynamic theses.

In the meantime, a big event happened in the world of mathematics.

The German god, Schultz, successfully solved the special case of the Weight-monodromy conjecture and published it in the latest issue of Annual Mathematics journal.

Also, he used his own “P.S theory” to solve this algebraic conjecture.

Not only did he prove a world-class mathematics conjecture, but he also proved the value of his “P.S theory”.

In less than a year, he had fulfilled his conference announcement, “Solving Deligne’s conjecture with my own theory.”

There was no suspense for the Cole Prize in number theory as the twin prime conjecture undoubtedly dominated the field of number theory in 2015.

The Cole Prize in algebra was also decided by the release of this thesis.

Many people on foreign mathematics forums had begun to discuss the potential winner of the 2018 Fields Medal. It would probably be one of these two people.

However, Lu Zhou did not pay much attention to this matter.

He was unfamiliar with algebraic theory as he had only briefly studied it.

As for the thesis, he did not have time to read it.

Finally, it was May.

Professor Lu Shenjian took Lu Zhou and left for Geneva on Friday.

There was also another researcher from the University of Jin Ling. Professor Lu had brought a PhD student. However, this student already arrived in Switzerland last month.

There were no direct flights to Switzerland from Jin Ling, so the pair had to transfer at Shanghai to Zurich.

After more than ten hours of flying, the airplane finally landed on the runway.

Outside of the airport, Lu Zhou saw the PhD student standing next to a black Volkswagen.

The student said, “Hello, I’ve heard a lot about you. You’re quite famous. My name is Yan Xinjue, you can just call me Yan.”

Lu Zhou humbly replied, “Just call me Lu Zhou. I’m not that famous, nothing worth mentioning.”

Yan Xinjue smiled and said, “Don’t be so humble. You might be the winner of the next Fields Medal. The University of Jin Ling is rooting for you.”

“You’re giving me so much pressure.”

Lu Zhou did actually feel the pressure. His competitor, the German guy named Schultz published more than a dozen theses and already won numerous awards.

Meanwhile, Lu Zhou had yet to win a single mathematical award. Yet.

Yan Xinjue smiled and patted Lu Zhou's shoulder.

"It's good to have some pressure. It motivates you. I've already arranged a hotel. Let's go. Get in the car."

He took Professor Lu Shenjian's luggage and placed it in the trunk. He then returned to the driver's seat and started the engine.

Lu Zhou sat in the back row while Professor Lu Shenjian was riding shotgun.

Professor Lu Shenjian looked at the car and asked casually, "This car's not bad. Where did you get it?"

Yan Xinjue smiled and said, "I borrowed it from Professor Grayer."

Professor Lu Shenjian, "Not bad, how's the project going?"

Yan Xinjue replied while driving, "The head of LHCb Europe asked for a Dalitz plot analysis of the resonance state of the baryon decay."

The professor shook his head, "This isn't good."

Lu Zhou asked, "What is not good?"

Yan Xinjue shrugged and said, "Because the discovery of the pentaquark is a foregone conclusion. We've been doing theoretical analysis since last year at the Thomas Jefferson National Accelerator Laboratory and the Moscow Institute of Experimental Physics in Russia. I found the indirect evidence of the existence of this thing. I'm confident that I can find this thing."

Lu Zhou asked, "Then why are you still doing experiments?"

Yan Xinjue replied, “So I can publish more theses. The country pays for it anyway. Doing an experiment at the LHC is expensive. It cost a couple of millions just to rotate some particles.”

Chapter 158

Like Professor Lu Shenjian, Yan Xinjue was also a full member of the LHCb cooperative organization, which was higher than the position of an intern.

After arriving at the hotel, Yan Xinjue parked the car and helped Professor Lu Shenjian carried his luggage to the hotel.

He started to talk about tomorrow’s schedule.

“It’s around 270km from here to Geneva, so we’ll get some breakfast tomorrow morning and we’ll arrive there by lunch.”

Lu Zhou asked, “Why don’t we just take a plane instead?”

Yan Xinjue smiled and said, “Plane? Switzerland is tiny, driving is more convenient.”

Lu Zhou guessed that the guy was obsessed with driving.

They did not speak again that night.

In the morning, the three went on the road. As per what Yan Xinjue said, they arrived there by lunchtime.

The found a restaurant in this “United Nations City” and got some food. They then drove to the headquarters of the European Organization for Nuclear Research on the Swiss-French border, the so-called CERN.

They parked the car in front of a modern hotel. While Lu Zhou was dragging his suitcase, he suddenly saw an old man walking over.

“Welcome, my friend from China,” said the old man with a smile. He extended his right arm and shook hands with Professor Lu Shenjian. He then said to Lu Zhou, “You look new. A student?”

Lu Zhou smiled and shook his head, “Hi, I’m Lu Zhou.”

“Grayer,” said Professor Grayer as he nodded with a smile. He continued, “I’ve heard of your name before, from my friends in Princeton. Regardless, you guys must be tired, I’ll take you to your rooms.”

Professor Lu Shenjian smiled and said, “Yeah, I’m getting old, it’s not the same.”

“Everyone gets old, that is inevitable… This way.”

The three rooms were connected together. The entire sixth floor was filled with researchers from China. However, there were only researchers from the University of Shumi. The people from the University of Jiangcheng and the University of Huake were still on their way.

“Professor Grayer is also a big name in the field of theoretical physics. He has known Professor Lu for a long time. He helped us a lot for the BESIII project,” Yan Xinjue explained to Lu Zhou. He then continued, “Do you want to have a tour around here?”

Lu Zhou replied, “That would be great.”

It was important to become familiar with the new environment.

Lu Zhou followed Yan Xinjue and walked around the hotel.

There was a strong research vibe around here.

Very few research organizations could attract so many physics researchers.

Speaking of funding alone, CERN did not have the most amount of funding, but half of the world's theoretical physicists worked here.

One might bump into an honorary professor from a prestigious university just on the street.

Lu Zhou was envious of this place.

He took a photo in front of Building 1 of the European Nuclear Research Center.

This research center had been deactivated and had been converted into a museum-like venue for the public. Inside the research center, there was a commemorative plaque for the birth of the Internet.

Not only did this place contain the world's largest hadron collider, but it was also the birthplace of the first internet server.

The original intention of all this was just to analyze experimental data.

It was because of this that CERN was not only a sacred place for physicists but also a place for programmers and hardware engineers. They maintained the super-calculation of processing data and connected the theoretical physics laboratories from all over the world.

Even the research facilities of Google or Microsoft was of no match for this place.

After the visit, Lu Zhou ate some food at the cafeteria with Yan Xinjue before they went back to the hotel.

He took out some research documents from his luggage to read when someone suddenly knocked on his door.

When he opened the door, it was Yan Xinjue again. This time he stuffed a document into Lu Zhou's hands.

“There’s an ad hoc meeting at 8 o’clock in the evening. The internal documents are here, so look through it.”

Lu Zhou took the documents and asked, “Meeting? About what?”

Yan Xinjue, “Assignment of tasks. CERN’s voting results were just released. The high votes passed the reanalysis of the resonance state of the previous baryon to the decay of the sputum. We’re responsible to analyze data section B with Syracuse University. Their suggestion is to simultaneously write the analysis report and finally verify the correctness.”

“What should I do?”

After all, Lu Zhou still had to do the system mission, so he wanted to participate.

He did not want to be useless and only receive one experience point in the end.

There was no limit as to how much experience points he could earn.

“Wait for the task assignment. What you have to do now, is to look through the documents I just gave you. Then quickly get into the zone. We need a mathematician to help us,” said Yan Xinjue. He smiled and patted Lu Zhou’s shoulder, “I believe in you.”

Chapter 159

Since Lu Zhou was responsible for the calculations, he had to deal with the data that Professor Lu Shenjian would give him.

Although Lu Zhou was well versed in functional analysis and group theory, he was still new to theoretical physics analysis.

Fortunately, Yan Xinjue helped to fill in his lack of theoretical knowledge.

Third day as an intern…

In the sixth-floor conference room at the hotel, Lu Zhou stood in front of the whiteboard.

The meeting room was next door and he could hear the fierce arguments from the research team of the University of Shuimu.

However, this had nothing to do with him.

He tried to ignore the physical problem and treated it as a mathematics problem.

However…

This was not easy.

[M2π=(Mμ+Md)/2Fπ1<0|ΨΨ'|0>]

[From <0|Λ(x)|π^b>=ip^μ·FπΨ^(ab)e^(-ipx), the resonance energy of Λ* can be calculated as…]

The dense letters and numbers were mixed together.

He stared at the whiteboard for a long time.

Suddenly, Lu Zhou asked, “Is there two resonance states near the 1.02 BeV?”

Yan Xinjue was shocked. He looked at the draft paper and then at the whiteboard. He asked, “How did you calculate that?”

Lu Zhou stared at the blackboard and muttered to himself, “Line 27, adding the Fermi subfield to the Lagrangian, and introducing the Yukawa potential function…”

Yan Xinjue also entered into deep thinking mode.

After a while, he finally said, “Your thought process is unique… but it should be correct. Did you enter the IMO mathematics competition?”

Lu Zhou shook his head and said, “Nope, but I did the standard college entrance exam for University of Jin Ling.”

Yan Xinjue said, “Unbelievable, you should get a gold medal.”

“It’s too late now, I’ll leave the opportunity to others.”

Lu Zhou took a deep breath.

He was not inspired.

This type of theoretical physics was different than a number theory question. The former needed computation and abstract thinking while the latter needed inspiration.

Just now, he consumed 100 general points and computed this data.

However, the use of the general points had side effects. Lu Zhou felt as if his brain was overflowing with information.

However, this was all worth it.

After the system installed the knowledge into his brain, not only did he managed to get the answer, but he also received the thought process of the problem.

For a dumb student, the answer would be enough. However, for someone that studied quantum chromodynamics, the thought process was the important part.

Five minutes ago, he had no idea what to do with these numbers and equations. Now, he could use his mathematics knowledge and solve these problems…

Yan Xinjue saw that Lu Zhou was in deep thought, so he did not bother him.

It was now late May, and Lu Zhou finally managed to process the massive amount of data.

However, this was not enough. He still had to complete the final chart drawing.

This chart was called the Dalitz chart.

Each line in the chart represented the blood sweat and tears of physicists…

Lu Zhou stared at the computer screen. He would write on the draft paper then typed on the keyboard.

He suddenly said, “I now know why Princeton graduates would meet on Wall Street.”

Yan Xinjue yawned before he asked, “Why?”

“Don’t you think this stuff is like analyzing stocks?”

“… You’re correct,” murmured Yan Xinjue. He was speechless.

Lu Zhou sighed and said, “I think that once I understand this stuff, I can work at an investment bank on Wall Street.”

“Nope, if you understood this stuff, you could receive the Nobel prize.”

“Maybe.”

Of course, Lu Zhou was only joking about working on Wall Street.

He still had other dreams.

Although theoretical physics could not give him a fat salary, it gave him something more.

Like system experience points.

Once he mastered the high tech system, he could conquer Wall Street easily.

Having this fantasy in mind, Lu Zhou suddenly felt like the work was getting less boring.

Finally, on the last day of May, Lu Zhou completed the final “Dalitz map”.

At this moment, there was still one week left until the date of the LHCb report. He had plenty of time to complete the final step of the image analysis, and to double check the data calculations.

Lu Zhou closed his laptop and stretched. He then thought about what to eat for dinner. Suddenly, Yan Xinjue came back from getting takeout. His face was serious.

Lu Zhou wanted to ask what had happened, but Yan Xinjue sat across his desk and asked seriously.

“One good news and one bad news. Which one do you want to hear first?”

Lu Zhou asked, “Good news?”

Student Yan, “Syracuse University already analyzed the data from B1.”

Already?

Lu Zhou was surprised by the speed of his competitors. He then asked, “Then what about the bad news?”

Student Yan, “Bad news is that they are one step ahead of us.”

Lu Zhou: “…”

F*ck sake!

Where’s the good news?

Chapter 160

On the way, Yan Xinjue started to talk to Lu Zhou.

“Mutual testing to ensure the correct analysis results sounds good, but there is only one reality. CERN can’t accept two theses from the same subject, so CERN will accept whoever finishes first.”

Lu Zhou asked, “So are we going to have a briefing? I’m nearly done.”

He could still use the system general points to speed up the progress.

He would only need another 50 general points.

Motherf*cker, if only I used the general points earlier!

Yan Xinjue shook his head and said, “You would have to apply for the report three days in advance. We only applied yesterday, so it’s too late.”

“Sorry.”

Yan Xinjue smiled and said, “It’s fine. This is not your fault. The University of Syracuse is very strong. They have more mathematicians than us. You’re obviously familiar with the mathematics situation at University of Jin Ling…”

Lu Zhou said, “Yeah, I understand.”

He did not have much else to say.

University of Jin Ling’s mathematics department was growing, but they were no match for a Top 10 American university.

There was not even one mathematics academician at the University of Jin Ling.

Yan Xinjue sighed and patted Lu Zhou’s shoulder, “This is normal, we can’t always win. Don’t be discouraged. At least you accumulated experience. There are many more opportunities in the future. With your knowledge of mathematics, I know that you will succeed in this line of work.”

Accumulated experience?

Lu Zhou suddenly felt unhappy.

His scientific research was stolen by others.

He wondered how the system would evaluate his mission.

There were a lot of people inside the venue, not just the “acceptance people” from LHCb, but also researchers who came here to listen.

Although CERN was a research institution, they also did numerous lectures. Whether it was physics or computer hardware and software, the lectures here were world class.

People who worked here often played three roles. They were researchers, professors, and students all at the same time.

When Lu Zhou entered the venue, he saw Professor Lu Shenjian talking to an old man.

That old man was full of laughter. His voice was so loud that Lu Zhou could hear him speaking from far away.

“University of Jin Ling’s research ability is impressive. It has been enjoyable to work with you. I hope you can publish your report as soon as possible. Our results are still dependent on your report.”

He spoke with a standard American accent. He basically meant that your research was only to further validate our research.

However, Professor Lu Shenjian still had a good attitude, so he smiled.

Yan Xinjue pointed at the professor and whispered to Lu Zhou, “That’s Professor Brunos from the theoretical physics department of the University of Syracuse. He studies quantum chromodynamics.”

Lu Zhou was a little embarrassed to face Dean Lu. After all, he had high hopes for himself, and he had failed his expectations.

“Should we go over there?”

Yan Xinjue looked at his watch and said, “Yeah, it’s about to start.”

…

There were more and more people inside the venue and almost two-thirds of the seats were filled.

Lu Zhou sat next to Professor Lu Shenjian. He thought that the old man would say something about the loss, but the old man only told Lu Zhou to pay attention to the speech and to learn from others.

Lu Zhou could not help but groan. He did not know what to say.

Most of the audience already entered the venue. The atmosphere in the venue gradually calmed down.

The projector was turned on, and the PowerPoint presentation was projected onto a gray-white curtain.

Lu Zhou took a copy of the thesis from the staff. He did not want to let the old man down. He took out a pen from his pocket and patiently waited for the presentation to begin.

A thirty years old female PhD student stood on the podium. She was wearing a set of business attire.

The speaker's name was Kerella, and she was probably a student of professor Brunos.

It was not rare to see students present. After all, they needed to practice their presentation skills.

If Professor Lu Shenjian completed the report first, Lu Zhou would probably be the one to present.

Lu Zhou was sitting in the audience waiting for the report to begin. He suddenly thought, what if the reason they sent a beautiful lady to present was to cloud the judge's evaluation?

Then again, the judges were all old people, so they probably did not care about the young lady.

Wait a minute…

Are they all old?

Lu Zhou suddenly remembered about some physics gossip, and his expression was somewhat complex.

Standing in front of the curtain, Kerella had a calm expression on her face. She cleared her throat before saying, “Then, let’s begin…”

The PowerPoint began.

This speaker’s momentum was strong. Coupled with her bright appearance, she easily took control of the presentation. The simple and clear report style attracted the audience’s attention.

However, Lu Zhou’s attention was not on the PowerPoint, but the thesis in his hand.

He started reading from the last page of the thesis.

Although there were no problems with the conclusion, the data listed in the paper made his spider senses tingly.

I feel like…

Something is wrong?

Lu Zhou was suddenly alert, and his face became more and more serious…

…

On the stage…

After thirty minutes, the report came to an end.

Kerella pushed her glasses. She was expressionless when she asked her pre-prepared question.

“Do you have any other questions?”

No one in the audience planned on asking anything.

Most people including the two LHCb staff who were responsible for the acceptance of the report were staring at the thesis in their hands. They were all examining the thesis.

As Yan Xinjue said, the discovery of the pentaquark was already confirmed. The so-called final inspection work was just to produce more scientific research results and to give more funds to the member states.

The conclusion was 99.9% correct, could anything go wrong?

Almost certainly not.

The thought process for the presentation was completely correct at first glance, and nothing was wrong with it.

Kerella smirked. She was ready to walk down the stage when suddenly, someone in the audience raised their hand.

“I have a question.”

“Can you explain in detail, page four line 36?”