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Crossing the Bridge

Some career transition tips to current
Physics graduates from an Ex

“If you are a physicist you can be everything”
Richard Feynman

Prologue

I graduated from University of Kansas in 2004 with a Ph.D. in Astrophysics. During my graduate studies I aimed only for an academic career and an occupation in the industry was beyond my interest. After spending eight long years as a postdoctoral researcher at various places across the globe, however, the interests, goals, and priorities of my life changed significantly. At some point during my independent research stints I realized that pursuing Astrophysics was getting more and more challenging. Astrophysics literally was the 'love of my life' and so it was difficult for me to acknowledge the reality. I continued pursuing the academic career but my passion for it was waning down. After two years of pondering and soul-searching I reached a mental state when I was able to make the most crucial decision in my life: compromise with the fact and leave academia. I re-examined my future goals in the beginning of 2013 and decided to pursue a profession in the industry.

I finally had some mental relief freeing myself from following a profession for what I lost both optimism and yearning. At the same time, however, I felt a tremendous pressure because of an uncertain future in front of me. During that time, it simply dawned on me that I was long standing by the side of a river and the time had come to go to the other side. I appreciated that to have a job in the industry I must cross an unfamiliar bridge. I contacted my friends from my graduate schools, who already had successfully crossed the bridge and had established careers in the industry, to discuss my career transition plan. They gave valuable advice and offered guidance, yet it took me one year of preparation to succeed.

From my experience I can tell with confidence that crossing the bridge was not difficult but was thorny! I needed concentrated efforts and a good amount of planning to prepare myself for that critical expedition. I had to navigate through a spell of my life which was full of false hopes, futile communications, humiliating interviews, sleepless nights, and peer pressures. The most interesting part of that stage was completing a M.S. degree, despite having a Ph.D. and eight years of independent research.

It is my conviction that any Physics graduate who wants to move from the academia to the industry should prepare for three inter-related situations for a successful transition. I use an allegory to name these situations. These are: finding oneself standing in front of the bridge, then walking on the bridge, and finally sitting on the other side of the bridge. In this memo I provide a list of tips gleaned from my experience that are appropriate for each situation. A unique combination of these observations and their appropriate utilizations helped me cross the bridge and got me land in Finance industry as a Data Scientist.

My objective here is to provide some realistic suggestions every Physics graduate should follow during their preparation regardless of their industry preference. I hope that you, a fellow Physicist, will find my recommendations useful for your career change.

I. Standing in front of the bridge

I assure you one thing up-front. It is that as a Physics graduate your market (industry) value is more than what you think about yourself. One likely reason that you don't know about it is because you didn't assess your strengths and weaknesses carefully in the past. Another reason of your unawareness is the lack of need in your mind to market yourself.

When you are certain that you want to make the transition from Physics to industry, you will feel like you are standing in front of a bridge. To cross it successfully, however, you must have smart plans and an attitude to work hard. Follow the suggestions given below to pass through the ordeal of preparations in this situation:

One: Plan well-ahead.

You should make a realistic plan about your future career. Ask yourself: Do I want to move to the industry right after my graduation? Or, Do I want to switch at some later time after having an experience of a postdoc?

You must have definite answers to these questions because the answers will open the doors of two different routes in front of you. It is a very critical issue for international students pursuing Physics in the US to have clear answers to these questions compare to their US peers. The international students will experience two distinct types of challenges depending on the route they choose to follow.

In retrospect, I must confess that I planned too late and that my plans had flaws. They lacked foresights in planning and proper assessment of available opportunities in the academia. After realizing the shortcomings of my plans, I steered the wheel of professional life sharply and developed new plans to put it into the right course. Since then I have been working relentlessly to refine and modify these plans. This memo is based on my wisdom that I achieved after recognizing the limitations of my old plans and the actions I undertook to avoid those pitfalls while working on new plans.

Two: Identify quantitative skills that you want to market.

Physicists typically belong two distinct groups. One with extensive laboratory background such as condensed matter physics and the other with heavy computational background such as astrophysics, high energy physics, or plasma physics. It is common to both groups to conduct research and derive insight either from data or from advanced mathematics. However, the members of these two groups develop significantly different technical skills. For example, the former group is great in leading experiment, data visualization, etc. whereas processing large amount of data or writing excellent code are the strengths of latter group. It is, therefore, important that you recognize the set of your skills that you want to market.

Traditionally a condensed matter physics graduate prepares for job in companies such as Intel or HP where the tasks primarily involves conducting lab research. However, there is no reason to assume that graduates coming from this quantitative background will not be able market them in the industry which requires extensive programming or application of multitude of statistical techniques on large amount of data. It all depends on the accurate assessment of an individual's strengths and weaknesses, future career plans, and preparation.

Three: Decide which industry you want to join.

This is an important part of your preparation. The preference of the industry should match your future goals and ambitions in life.

Ask yourself: Do I want a job in the industry which will involve laboratory? Do I love to program? Do I want to be a software engineer writing lots of code in a company such as Apple? Do I want to be a Quantitative Analyst (Quant) working in a company like Goldman, JPMorgan, Citibank? Do I want to be a Data Scientist to work in these companies along with Quants? Keep in mind that Data Scientist is a broadly defined job category and you can find this title holders not only in Investment Banking but also in Tech (Google, Amazon, IBM), Retail (Costco, Walmart), Pharmaceutical (Pfizer, Loreal), Healthcare or Life Insurance (Aetna, BCBS, NYLIC, GLIC)? Does the size of the company matter to me?

I chose to be a Data Scientist in Finance since it best matched my background, skills, and current market need. However, I know a group of astrophysicists who chose to be Quants. Keep in mind that, although there is a large overlap in roles and responsibilities between Data Scientists and Quants in their daily jobs (these job categories may look similar from outside!), there are fundamental differences in culture, mindset, job expectation, work-life balance between these groups. I have no doubt in my mind for Physics majors who can easily fit in either of these groups. However, you must choose one with utmost clarity. This will help you see, understand, and evaluate challenges and opportunities waiting in front.

Four: Prepare for the industry you want to land in.

As a Physics graduate you are already familiar with a variety of statistics, tools and technologies. However, during your preparation you should put your efforts to develop technical skills that are aligned with market demands. You must take the necessary steps to make yourself prepare for the preferred job type in the preferred industry.

Remember that there is a minor overlap in technical skills among major coming from Physics, Engineering or a Finance. You have a unique advantage for being a Physics major. It is that you have a body of knowledge that is transferable and highly adaptable. You should exploit the advantage of this uniqueness while preparing to narrow the skill-gaps with IT professionals coming from Engineering or quantitative analysts coming from Finance.

You should take online courses to advance in technical skills and know-hows that are relevant to your preferred job category or the industry. Use MOOC extensively for that purpose. Whether you want to be a Data Scientist or a Quant I encourage you not to get enrolled in any on-campus programs. Based on my own experience there are three reasons that I can share with you: First, in-class programs are significantly more expansive compare to online courses; Second, the MOOC courses are tailored to teach participants solving real life problems; and Third, enrolling for a traditional program, such as a MS degree, despite having a Ph.D. in Physics to boost career transition is simply a waste of time.

Five: Write a well-formatted résumé.

There is no single format of résumé because one format doesn't fit all. Résumé varies from one type of job to another and changes with the years of job experience one has. Therefore, you should be prepared to fine-tune your résumé appropriate for each job description. This is a very tedious task, but you must learn to do it.

Writing a well-formatted résumé is an art. Finding the keywords in a job specification and combining these with a slew of action-words to undermine your skills and experience is no simple task. It needs a lot of practice. Reading successful résumé and understanding the reasons behind their successes can add value to your efforts. You will develop the best form of your résumé through many trials of editing and revising. Look for the assistance of your dedicated friends to critic your résumé and to provide honest feedbacks. Pay close attention to their criticisms and find ways to incorporate their comments for improvement. Be blatant and ask for help repeatedly until the résumé reaches to a satisfactory level.

At this stage in your career I suggest that you maintain a short résumé because of your no prior industry experience. For example, if you are preparing to be a Data Scientist your résumé should not be more than two pages long which must contain the following parts sequentially: 1) name, immigration status (if you are not a US citizen), email, phone number; 2) a short profile summary; 3) Data Science skills with concrete examples where and how you have developed these skills and applied to solve business problems; 4) technical skills such as programming, distributed computing, data processing, data visualization etc. with specific examples; 5) prior research or work experience highlighting the roles of Data Science skills in solving Physics problems; 6) education, and finally 7) leadership skills or extra-curricular activities such as writing blogs, non-technical papers etc. If you are active in various Data Science competitions or activities, you can include these in part seven as well.

The key point is to keep your résumé legible so that it could be easily assessed within a few minutes. You should relegate everything else to your professional and technical profiles (discussed below) for further consultations. The format is similar for a data analyst or a Business Intelligence analyst.

Six: Create a unique professional profile.

You must have a cool on-line presence. You should consider your electronic profile as an advertisement of 'you as a brand' to the public. In these days it is essential that you create and maintain a distinctive profile to promote your brand. I suggest that you use a platform like LinkedIn for this purpose since it is the largest social media for professionals.

Your profile should contain detailed information of your education, honors and rewards, past research experience, past work experience, technical skills etc. that are either omitted or narrowed down in the résumé because of the page constraint. The profile page is the place where you should add the list of publications to further underscore your strengths. A great profile comes with a great profile photo. Avoid using selfie or cut-and-paste picture for the profile. Instead use a photo taken by a professional. This may cost you an extra \$20 but the picture will convey a strong message about your professional mindset to those who will visit the profile for the first time. Never underestimate the importance of first impression.

A LinkedIn profile increases your visibility to other professionals, especially to the recruiters, as a potential job candidate. It is important to have a good understanding of the link between industry recruiting process and a great on-line profile. Corporate hiring, especially in large fortune 500 companies, is a multi-step process. First, LinkedIn member profiles are extensively searched by third party recruiters to find the best candidates matching a job description. Next, if you are the best match then the recruiters contact you to get your résumé. Finally, these recruiters modify, polish, and reformat your résumé before they send it to company's internal staffing agents. Although there are exceptions to this scenario, however, it is a general picture of hiring in large organizations.

Remember that it is easier for recruiters to screen out a person with a well-maintained profile. The frequency of submission of your résumé goes up with the number of contacts you have with the recruiters. This subsequently results in getting more job interviews and ultimately job offers. Therefore, just a mere presence in LinkedIn is not a guarantee of job interviews. A poorly maintained profile will be missed by the automated search by recruiters. Therefore, it is imperative that you work on your profile regularly to keep it synched with your new skills and knowledge, and keep it tailored as much as possible to your desired job categories.

Seven: Create a hub to display your badges.

Create an account in a collaboration platform like [GitHub](#). This medium is mostly used by software developers, but it can also be used by you, the Physics graduates, to show off your past and current accomplishments, especially your technical skills. This is how it is going to work:

Find out all physics, mathematics, and programming projects that you ever completed in the past that can be shared publicly. Collect them and group them into appropriate categories such as neutrino physics, plasma physics, linear algebra, tensor analysis, C++, MATLAB, Python, R or whatever names are appropriate. Finally upload each of these projects as separate folders in your account. Don't be concerned too much about the intellectual merit of a project you

completed. If it can be shared with anyone just upload it anyway. Document the goal, motivation, data extraction, processing, and manipulation techniques, algorithms, software, outcomes, inferences etc. for each project in simple terms so that when people read these documents they can get a rough idea about the projects. The folders in your account are evidences of your skills and competencies. Metaphorically speaking your documents are comparable to the badges on the uniform of a soldier where each one is a proof of abilities, skills and hard works.

A well-maintained GitHub account facilitate a recruiter's job and reduces the time wasted in unwarranted communications. What once required lengthy communications to explain to a recruiter, with a GitHub account it now can be viewed, checked, and understood simply by few clicks. Be proud to present a 360-degree view of your competencies through GitHub and be loud in advertising about its advantages during the interviews. I personally maintain an [account](#) which contain my programming projects completed over the years. I encourage you to visit the page so that you can get an idea how you would design one such profile for yourself.

A well-designed personal website can also accommodate most of the things that are mentioned above. If you maintain one such personal page than that it is not necessary to have a GitHub account. However, keep in mind that the personal site may lack some excellent features (such as sharing, forking etc.) that are atypical of collaboration platform. Your personal webpage and the LinkedIn profile should be linked together for easy navigation from one site to the other.

Eight: Be consistent with information flow

Keep information content in your résumé and in your on-line profiles, including both LinkedIn and GitHub, consistent with one other. You should work diligently in these communication outlets to avoid confusion among profile visitors regarding your education, experience, and skills.

Nine: Increase on-line visibility

Share your experience, opinions, and thoughts with people around the world via web to separate yourself from other job seekers. For example, write blogs to demonstrate your writing and presentation skills. Communication skill is the key to become a successful consultant in the industry and blogging will help you prepare for that career. On-line blogs provide instantaneous and simultaneous access to the public and there is a complete freedom in choosing the topics. Writing blogs, therefore, have enormous potential to reach out to the world touting whatever talent you want to market.

Write technical blogs if you want to pursue the career of a Data Scientist, Data Analyst, or Quant. You should share your experience while developing various practical skills. For example, share an experience of learning a Python programming technique that helped you reducing data processing time significantly. Next write a different blog comparing data

processing methodologies in R, Python, and SAS for the same dataset and share their pros and cons. Your creativity is the only limit in choosing what you want to blog. You will receive great feedbacks and pointers for other topics whenever you write something useful for others.

You should use LinkedIn, GitHub, or your personal website to write your blogs. There are, of course, many blog-hosting websites where you can sign up and contribute (Medium, WordPress, Wix to name a few). For Data Analyst jobs you will also find it useful reading blogs by other technical writers and follow websites of tech companies because these jobs will expect you to know the latest technological developments and the market trends.

Ten: Develop soft-skills.

I never heard about soft-skills when I was a Physics graduate student. Academic environments, especially Physics, rarely talk about soft-skills, let alone developing the expertise.

What are soft-skills? Unlike your programming skills in C++, Python, or IDL or your technical skills in Laser Interferometer and Beam Splitter, all of which belong to the list of hard skills, soft-skills are a group of personality traits that characterize your relationships in a group. These skills can include social manners, communication abilities, language skills, personal habits, cognitive or emotional empathy, time management, teamwork, and leadership traits. In short, soft-skills are personal attributes that enable you to interact effectively and harmoniously with other people irrespective of their cultural, educational or professional background.

You might wonder thinking that you have been working in a collaboration of twenty Physicists for the past six years and you know it already that you have mastered the art to become a good colleague, a great student, and an effective thought leader in your team. So why do you even need to pay attention to an issue such as soft-skills? That's a fair objection to my point. However, I encourage you to pay close attention to the environment where you made those achievements. My guess is, most likely it is an atmosphere like this: you spent your time with your peers where all of you think, talk, and look almost similar. Your peers might also be in the same age group, although there might be some cultural differences.

Now, think about a situation where you are working with a group of twenty people who you never met before. The people are coming from diverse educational backgrounds such as Psychology, Organizational Psychology, Literature, Business Administration, Marketing, Finance, Electrical Engineering etc. and the age of the group members ranges from 25 to 55. How quickly can you develop a conducive and productive working relationship with all of them? The fact of the matter is, if you are a true master of soft-skills, you will shine like a diamond in both of those environments.

Acquiring various kinds of soft-skills requires a lot of time and conscious efforts. Therefore, even if you have a certain level of confidence about your soft-skills, I recommend that you become aware of the settings where you developed your skills. Think, observe, and practice on how you

would transfer or modify or accommodate these in a completely different situation. Industrial research suggest that the soft-skills are the key to make career progression in corporate environments. This finding simply means that in the industry it is not “how much subject matter expertise you have” or “how many degrees you have” that count but how you deal with the people around you is what drives your success.

Be proactive in developing soft-skills. These aptitudes are of vital importance to succeed in both personal and professional lives.

Eleven: Connect with people.

Attend networking events both on-campus and off-campus. Introduce yourself to people from all sorts of backgrounds and don't just focus on recruiters and hiring managers. Develop a habit of maintaining a normal communication with them regardless of your current need or situation.

A few decades ago research in Social Network studies found that most people find jobs through their social ties who they are weakly connected to. What the finding of this research means is that you are more likely to find a job with the help of “a friend of a friend” than to those who you spend most of your time with. In other words, you are benefited and rewarded from having wide and diverse network. The key point, however, is to keep a harmonious relationship with people around you regardless whether you are a student, job seeker or a working professional.

Dozens of surveys have been made in the past several decades to assess the influence and importance of people's network. The reports of these surveys are overwhelming. It is a common outcome among these reports that a significant fraction of working professionals (70% - 80%) find jobs through their networks. Whenever opportunity comes connect with people. Your social links will help you grow personally and professionally in both horizontal and vertical directions.

II. Walking on the bridge

There is no doubt that your plans and dedicated efforts will pay off at some point in time. The recruiters will eventually find you from the pool of applicants and get you involved in job interviews. When this will happen, you will feel like walking on the bridge instead of standing in front of it. This circumstance, therefore, requires substantially different types of preparation compare to the training you went through when standing in front of the bridge.

It is helpful to know the job interview process in the industry. A typical interview contains two different steps. The first step is usually a thirty minutes telephone interview with the hiring manager. In this initial screening step if you communicate convincingly and your expertise are really needed for the manager's team you will be invited for the second step. This is a face-to-face interview procedure that involves the manager and the team members. This second stage is a lengthy process that normally spans three to six hours. Occasionally you might be asked by some companies to give presentations during this time.

To sail right through the current situation, I suggest you do the following:

One: Study the company.

Learn as much as you can about the company and the industry it belongs to. During the first few minutes of a typical interview you will be hit by a question such as this “Why do you want to work for our company?” A well-prepared response will make a great first impression about you. A well-prepared answer is like summarizing the company Wikipedia page in five sentences to show off not only your preparation but also to surprise the interviewer.

Two: Research on hiring manager.

If you know the name of the hiring manager prior to your first-round interviews do research about them. Use LinkedIn as the starting point and use Google generously to collect information about them. Devote some time and efforts to get their backgrounds, personalities, interests etc. It is always good to have a perception of the people you will be talking to during the interview (and may be working with them later).

When you are invited for the second-round, do a similar thing on the members of the hiring team to learn about their educational backgrounds, technical skills, and networks. Knowing your audience better will help you present and communicate better during the interview. Put a sincere effort to this even if it seems like an over-preparation.

Three: Study common interview questions.

You will encounter both behavioral and technical questions during the interview. The nature of these questions differs widely depending on several factors such as the industry, the type and reputation of the company, the size of the company etc. People share their interview experience

in various employer review websites such as Glassdoor, Indeed, Vault and many others. When you are preparing for the interview for a certain company visit these sites to learn people's interview experience with the company. Study interview questions, especially behavioral interview questions, that were asked by managers to evaluate previous job seekers. Better responses to these questions create better impression about you and beat the competition out.

Four: Ask well-thought-out questions.

During both rounds of interview there will be a time where you will be invited to ask questions. Prepare 10-15 questions targeting both the managers and the team members who will be interviewing you. Your list should contain questions regarding roles and responsibilities of group members, technology used to perform daily tasks, lines of businesses represented by stakeholders, need for the to-be filled position within the team, need of your expertise to the team, team dynamics, and corporate work-life balance. If you are interviewed for a Data Scientist position you should also ask questions regarding technology infrastructure, data maintenance, data usage, and data quality issues of the company. Hiring managers like to engage in conversations when the questions relates to their daily jobs.

Five: Be enthusiastic during the interview.

Express enthusiasm and excitement while conversing with the managers over the phone. Show genuine interests about the activities of the team they are leading and ask questions. Keep in mind that the phone interview is an event that brings two persons talking to each other who never met before. Also note that getting a complete picture of another person while talking over the phone is always challenging because this is not a natural way of communication among humans. In this situation the zeal in your voice might be the deciding factor for the managers to go for the next round.

Keep the same attitude when you are set for the second-round interview. Engage with the team members with the same fervor. You will be surprised by the outcome of your intensity and positivity.

Six: Thank the managers.

Follow-up with the managers with thank-you notes for sharing their valuable time. Thank them also to provide opportunities to know about their teams. Courtesy counts and it will take you a long way.

III. Sitting on the other side of the bridge

After a successful interview you will be offered a position and asked to join the company within a few weeks. If the offer matches with your expectation in compensation, job tier, and preferred location etc. you should accept it and celebrate your achievement. You have crossed the bridge!

Leaving academia behind and starting a job in the industry is a life-changing event. The beginning of any major change in life is challenging and, therefore, you will encounter some obvious challenges right after you enter this phase in life.

To proceed easily through those challenges, you should do the following:

One: Welcome the new work-life.

There is a significant difference between the work-life in industry than in the academia. Routine prevails in corporate work-life. You do your work each day from 9 am to 5 pm and follow this routine five days a week. Occasionally the work-days will get longer, and the work-week will stretch beyond its five days mark. Embrace the new work-life style as quickly as you can.

Two: Embrace the new work-style.

Corporate work-style usually is very fast-paced. Employees are involved with multiple responsibilities where each of task with its own deadlines, deliverables, and business partners.

In the academia you solved one problem at a time and went deep into your research. In the industry, however, as an employee with multiple responsibilities on the shoulder you will find it challenging to take deep dive to find the best solution. Finding a reasonable solution and delivering it quickly is much more effective in getting things done in the current environment than spending long time to find the best solution. There are, of course, exceptions to the scenario that I just mentioned.

Three: Accept the vagueness.

Quite often you will receive requests from business partners to finish tasks that will come with vague instructions and ambiguous business goals. Coping with this can be frustrating in the early days of your first job. However, you should accept the status quo as is and find an effective way to deal with it. You should actively engage with the business partners, ask questions for clarification, and maintain a steady communication until the instructions become clear to finish the task.

Recognize the scope of the opacity as a wonderful opportunity to exploit your soft-skills. Connect, talk, and engage to remove obscurity. Simplify, produce, and share to become indispensable to your colleagues.

Four: Learn fast.

Each company has its own way of getting things done. Some companies use cutting-edge, high-tech, and innovative tools and products to boost the productivity of employees. Some are still far behind relying on conventional technologies. If you join a company as a Data Analyst, Data Scientist, or as a Quant, make your-self familiar with landscape of tools, products, and technologies used by other analysts as quickly as possible. Be prepared to learn the essential technologies that your missed during your preparation.

Five: Prove your worth.

The main rule of survival in the industry is to prove constantly the value of your role to the company you are working for. Your overall performance which includes the capabilities to get things done in time, your engagement with the team, your communication style with business partners and many other factors will be evaluated quietly but critically during the first few months, typically the first three months. You should work intensely yet smartly during this time. Remain alert about your own productivity and willingness to collaborate with others. Use your knowledge and mastery in hard and soft-skills to become an invaluable asset to the company.

Six: Remain humble.

Be proud of yourself for crossing the bridge successfully. Be confident to make the transition happen exactly the way you wanted but don't let this accomplishment take your humility away.

Don't pull the plug of communications with your friends and colleagues in the academia who are either still struggling to make it or still uncertain about their next moves. Remember that "Life is a marathon, not a sprint" and the success in this long run hinges on interdependence. Therefore, stretch your hands whenever they are needed by the others. In the new work-environment, you will find people with less academic talent who are working either at or above your rung. Don't let your talent cloud your judgement about people around you. Keep in mind that to succeed and eventually to move up in the rungs of job hierarchy in the company you will need their support. Use prudence to deal with people around you and apply your soft-skills in building great working relationships.

Seven: Be happy with the reward.

At the end of the month when you will look at the reward you will find spending those long hours for preparation was worth doing. This is the time to feel a bit secured financially and to be happy.

Epilogue

I do recognize the standing ground of Physics students who want to switch professions because I was in their positions not so long ago. I had to struggle finding my way to move forward to join the industry and my success followed from lots of trials and errors. For you as fellow Physicists, however, I think changing your profession should not only be easier but also be more systematic because you could learn from the knowledge of other Physicists who have already travelled along the road that you are contemplating on. Motivated by that thought I share my experience so that you know how to prepare for your career transition.

I know it well that the long and difficult days of your preparation will wear you out. You will feel hopeless occasionally. Your dreams, plans, and hopes will try to elude you. In those moments have faith in you, stay focused, remain positive, and don't give up. Keep reminding yourself of what Richard Feynman once said about you. Internalize his wisdom as your own mantra and the rest will follow.

I sincerely hope that a blend of my suggestions and your own observations will help you develop a powerful strategy to pass all three circumstances effortlessly and that crossing the bridge will be a memorable event in your life.

Good luck.

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