Annual Report: Portrait Amir Nakar

1. **What did you study before you started your doctoral thesis?**

I did my B.Sc in Agriculture and M.Sc in Biochemistry. In my M.Sc we developed a method for quickly detecting water contaminations with spectroscopy. As a biologist, that was my first introduction into the world of “Photonics”.

1. **Why did you decide to write your doctoral thesis?**

I think Raman spectroscopy can really solve enormous problems in medicine. If you can give doctors information about diseases at light-speed, they can act quickly and save lives. At least that was my dream… today I see it’s more complicated than that.

1. **What is/was the topic of your doctoral thesis?**

Using Raman spectroscopy for healthcare, specifically to detect enteric bacteria and antibiotic resistance.

1. **What findings/results did you obtain?**

We could quickly identify the different bacteria, both from lab-grown samples and from clinical samples. In a follow up study, we managed to also separate bacteria that are resistant to antibiotic treatment from sensitive ones. Not perfectly, but very well.

Maybe my biggest contribution to the field is that we compared different approaches to measuring the bacteria, different lasers and preparation methods – so in the future the right method could be applied.

1. **What is/was the intention behind your research?**

Antibiotic resistance is a huge problem. The more we use antibiotics, the less they work. Right now, when a patient checks into a hospital, it takes 48 hours to tell what’s causing the infection. So physicians just use the strongest antibiotics they have. But, if there was some way of knowing which drug is actually needed, within minutes, then we could reduce unnecessary prescriptions, and that way reduce antibiotic resistance. To do that, we are measuring how different bacteria scatter light, and learning if these scattering patterns can be used to quickly say “This is the bacteria that’s causing the infection, and this is the drug that will kill it”.

1. **What was the best thing during your time at the institute or during your PhD? For example, is there anything that you are particularly proud of, very grateful for, or that has had a great impact on you?**

When my daughter was born. I feel everything you said: proud, grateful and it had a great impact on me. Having a family puts things in perspective. My daughter doesn’t care if my experiment failed or worked, she just wants me to read her stories. It really helped me focus and keep going: in the good and the bad, I always had someone there waiting for me.

1. **What are your plans after your doctorate?**

I am joining MeMed, a Med-Tech company in Israel. I’ll be working in the Scientific Affairs department – designing experiments and building international collaborations. MeMed are trying to solve the same problem I tackled in my PhD, reduce antibiotic resistance with better diagnostics. But the technology is completely different.

1. **How and why did you come to the IPHT and Jena?**

When I finished my M.Sc, I noticed all the best research on using spectroscopy in medicine is coming from here. I knew they have the best devices, the best collaborations and a very wide perspective on science. So, I came here to try and use the best tools to fulfill my dream.

1. **What is/was so special for you to work at the institute and what made it inspiring for you?**

I always loved that people here have a “wide” perspective. Usually scientists tend to stay in their own fields, narrow down their problems. At IPHT everyone “thinks big”. They put together microbiologists, chemists, physicists, engineers and data scientists. It’s amazing to work together on the same projects and this makes the finished product much more whole and unique.

1. **What do you like/did you like most about Jena and Germany?**

The work-life balance. How people respect your free time, respect your weekends and encourage you to take vacations. They even encourage you to take parental leave (Elternzeit) which is unheard-of for dads. Most of my friends who do PhDs around the world don’t have that.

1. **Where do you see the biggest differences between Germany and Israel?**

I think that Germans need to know all the facts before they start doing anything. This makes projects run smoothly, but slowly. Israelis will start a project with 10% of the information and the rest will “just work out, don’t worry!”. This mindset helps move things faster, although the end result is never perfect. The best experience was bringing the Israeli mindset when working with German colleagues and seeing their shocked faces.

1. **Are you also interested in topics in your free time that you encountered at work or during your doctoral thesis?**

I actually really like coding. Before I came to IPHT, I wanted to learn how to code, but only here I really had to learn for my work. Now, I actually also do some coding “on the side”. Some people like Sudoku, some like crosswords, I like to make data visualizations

1. **Do you have/Did you have other scientific activities besides your PhD?**

Nothing official, but I like to follow science. I follow a lot of really brilliant people on Twitter, I also started translating the NASA Perseverance twitter account to Hebrew. And I keep in touch with a lot of fellow scientists around the world through Facebook, Twitter and LinkedIn.

1. **You have a twitter account and tweet regularly about research. You also write posts for the blog "Little big science". Where does your passion for science communication come from?**

I like communication in general, I just happen to be a scientist. I really enjoy the challenge of simplifying complex ideas so that anyone can (hopefully!) understand. I also really love language, reading and writing, so I just channel all that into SciComm.

1. **You worked as a doctoral student representative at the institute and stand up for the interests of doctoral students.** 
   1. **How did you get this task and why it was so important for you to stand up for these issues?**
   2. **What were your tasks in this context?**
   3. **Is there anything that was particularly fun?**
   4. **Did you achieve anything special for the doctoral students during this time that you are proud of?**

Big question, let’s break it down:

1. I started going to the meetings because I was curious to see what the council actually does. When I saw an opportunity to make a difference from the inside, I joined. I think the IPHT is really special in that it gives the PhD students a lot of room to grow, you just have to take it. Everything I ended up organizing or “standing up for” was really things I wanted for myself. I wanted to talk to alumni, so I organized alumni meetings. I wanted to join a writing marathon so I organized one. Only in my last year, as head of the council I helped others push their own ideas, but those were usually great ideas anyway, even if not specifically relevant for me.
2. I always say the council does four things: social events, career dev., representation and problem solving. As the head of the council, I had to set up meetings, make sure events are being created, represent the students in institute management meetings and most importantly – help students with special problems (like a conflict with their professor).
3. It was great! First, because I got to do really fun stuff like play beach volleyball or go night-hiking to watch a meteor shower. But the best part was when students with real problems, real conflict, came to me for help – and I actually could help. That was the highlight of my time as representative.
4. The credit goes to Tino Fremberg, but I helped a lot: we conducted a survey among students about the quality of supervision in the institute. That’s not special. The special part was that we presented the results to all the supervisors, gave recommendations on how the supervision could improve and had a good discussion about it. This was incredible. It meant we could really improve the institute from the bottom up, from students’ feedback all they up to the director, not the other way round. I think that achievement will stay around – but really, credit goes to Tino who came up with the idea.
5. **What generally excites and fascinates you about what you do?**

It’s literally about saving lives. That’s the bottom line. If what we do here works, then less people will die from infections. Isn’t that exciting?

1. **Which (academic) personality has particularly influenced/inspired you on your way and why?**

I went to university because of Douglas Adams (who’s not a scientist) and Richard Dawkins (who is). It was their writing on evolution, biology and the logic of nature that’s brought me into academia. Dawkins taught me how to look at life from a different perspective, Adams taught me “Don’t Panic”. I use both those skills every day.