

## Remembering Tihiro

I was fortunate to know Tihiro Ohkawa for forty years as a mentor and a friend. His influence and impact on my scientific career would be hard to overestimate. Others have covered Tihiro's many accomplishments. What follows is a brief personal account of my time with Tihiro.

I came to GA in 1974 straight out of graduate school where my graduate work had been in high energy physics. When I interviewed at GA Tihiro was on travel and I did not meet him, but everyone I did meet talked about him. I didn't have any doubts about who was running the show. Fortunately for me, he liked to hire people trained in areas outside of plasma physics.

Within a few months of my joining GA there was a visit from Bob Price who at that time monitored fusion theory for the AEC. At the start of a meeting with Price, Teruro Tamano was going around the table introducing new staff and when he got to me he said, "Bob was formerly in high energy physics, but now he's a plasma physicist." At this point, Tihiro, sitting at the opposite end of the table said in a loud and justifiably incredulous voice, "He IS???" My introduction to Tihiro's sense of humor.

I believe the first physics problem that I worked on with Tihiro (and Ming Chu) was a study of axisymmetric stability. Tihiro had intuition for the problem from accelerator physics that I struggled to understand. It was by no means the last time I struggled to understand his insight on a problem. We eventually published a paper on the topic. Over the next few years I had many stimulating discussions with him usually in the areas of transport or stability. His abilities to generate novel ideas, to find analogies with seemingly unrelated problems, and to zero in on the core issue of a problem were all exceptional.

In the early 1980s I decided to leave GA to join a startup company. When Tihiro heard I was leaving he called me up and the first words he said were, "Do you want to come talk about it?" When I got to his office, he offered what I took to be fatherly advice. He thought I was making a mistake, but he didn't try to talk me out of it. Rather he took the point of view, well if this is what you are going to do, here is what you should be thinking about.

A few years passed and I came back to GA. By then Tihiro had become Vice Chairman of the company and was also the head of a small research group called The Institute for the Development of Advanced Technology. I joined that group in 1989 and what a ride it was. Tihiro was a whirlwind of ideas and no longer constrained to plasma physics. Despite his many other duties in the company he still managed to produce multiple internal reports (GA-Ds) per week! Topics that I worked on with Tihiro (and often Y.R. Lin-Liu) included superfluids, superconductivity, low frequency communications, MRI, DNA sequencing, information theory and the occasional plasma physics/fusion problem. And there were many other projects I wasn't involved with. I have no idea how Tihiro was able to do all of this. One small component may have been that he could compartmentalize activities to a remarkable degree. From time to time when I was in his office someone would pop their head in and ask a question or seek resolution on some issue. It didn't matter if they were there for one minute or forty-five, as soon as they left Tihiro was able to pick up our discussion right where he left off.

Fast forwarding a few more years, in 1998 Tihiro and John Gilleland formed Archimedes Technology as a means to develop some of Tihiro's ideas of using plasma to process nuclear waste. I joined the effort in the fall of that year. Tihiro had no managerial responsibilities at the company so he was free to calculate and invent. He came into the office two days a week and on most of those days we discussed physics for several hours. Once again, his output of ideas and inventions was remarkable. Although they weren't called GA-Ds at Archimedes, the internal reports kept right on flowing.

Following the shutdown of Archimedes, Tihiro, Richard Freeman, and I continued to meet to have lunch once a week for many years. Discussion topics were all over the map including politics, sports, the stock market, and history or maybe a recent Scientific American article or a recent fusion result. And although sometimes it didn't happen until we were standing by our cars in the parking lot preparing to leave, sooner or later discussions always led back to physics and Tihiro's latest idea that he was working on. I miss those lunches. I miss Tihiro.

Robert Miller