A Collaboration Doomed to Failure

[The following interview was conducted on May 25, 2007.]

Steven Krivit: Can you help me sort out what happened at UCLA when you went there, particularly with this matter regarding the design drawings?

Richard Lahey: Well, let me give you a little background first. I've been involved with Rusi ever since day one on this stuff, and the test section that he used at Oak Ridge and which he's been using ever since is a design which is a modification of one that Colin West used a long time ago for a completely different purpose. He used it to try to measure neutrons.

Colin worked at Oak Ridge, and he helped us out to make an acoustic chamber that allows you to compress bubbles in a spherical way, bubble clusters, so that you can get to the kind of conditions that are necessary for sonofusion.

The problem is -- and unfortunately it's easy to look back and see it; at the time we weren't aware of it -- that each one of these test sections is hand-crafted. There isn't anything like machine drawings made of them that specifies the glass thickness and the tolerance and the gap thicknesses, etc.

The way Rusi and Colin worked is they had built different test sections, and so they got one that worked, but there were lots more, 30 or 40, that didn't work.

SK: What does the term test section mean?

RL: That's the acoustic chamber. That's where the experiment is run, the container for the deuterated acetone, a glass tube about 100mm tall and about 60mm in diameter.

The only thing that I've ever seen as far as drawings is a sketch that Rusi made of the conceptual design. When we got it here at RPI, we had to sign a nondisclosure agreement with Oak Ridge because Oak Ridge views it as their proprietary information. It's my guess, but I'm not sure, that that is what Putterman got from Rusi.

[Taleyarkhan confirms this.]

It's my understanding that engineering drawings do not exist, that Rusi's design is a hand-drawn sketch.

[Taleyarkhan confirms this.]

To get it to work, it's not like you can just build the test section and it will work. There is a fair amount of art in there, and you have to get lucky to make it work. It's very frustrating for others because none of that was ever published. Even Oak Ridge wouldn't allow the details of it to be published, so people had to imagine what one of these test sections would look like. Unfortunately, it is very sensitive to the design because, when we got it, I had one of my Ph.D. students do a very detailed analysis of the test section, to figure out the optimum gaps, the effect of different glass thickness. It's very sensitive to that kind of stuff; you can get either a really good test section or a really bad test section, but if you look at them, they might appear the same.

So we said, well, we can't use the optimal design of Oak Ridge because we can't release that design to others, so let's come up with a different design that is optimized to work, and make machine drawings that people can take to a shop, build them and get the same results every time.

So we did that, came up with a design and made 3D computer drawings, and we wrote a paper on it.

Then I visited UCLA - they had invited me to give a talk on sonofusion - Putterman did not attend the lecture, but his students did.[6]

Before the lecture, I went over to visit Putterman's lab and talk with him and his students. When I looked at his test section, it was absolutely clear that it was not going to make it. It wouldn't work for sonofusion. It would work fine for sonoluminescence, where you don't have to get it to these high compressions. In that work, you drive it at one atmosphere, but in sonofusion, we're talking about 15 atmospheres.

I told him, “It's just not going to work,” and in fact, it didn't. As I understand it, he then got the sketches from Rusi and tried to go on, based on that design which he said didn't work.

[Taleyarkhan confirms this. Putterman declined to comment.]

I had offered at the time to give him the information. I did send him the paper, and it had all the detailed analysis in it, how to design the test section so it's going to work. I offered to send him the design drawings of the one we built at RPI, but he never responded to my offer.

He probably figured that, after he got the information from Rusi about the Oak Ridge design, he didn't need my drawings.

Other people have taken me up, though; I've given our drawings to a professor in the U.K. who is running experiments right now.

Honestly, I can understand how other people can become very frustrated and say that this is not real. Very few people have the tenacity or the funding even to build one of these things. It takes a long time: You make one and find out, crap, that didn't work; let's try it again.

SK: What do you mean by long time?

RL: Several months.

SK: And what about the glassblowing? Does that require someone with specialized skill?

RL: Yes, you have to have people who are very good at it, and at Oak Ridge, they certainly do. Still, no matter how careful the glassblower is, each test section will come out differently. It's very sensitive.

When we did it at Oak Ridge, we were just happy if we could get results that were repeatable for us and that agreed with our analysis. We weren't thinking about everybody and his brother wanting to reproduce it. And that's a problem, because now, when people want to reproduce it, it's a very touchy thing.

Even Rusi will tell you, when he builds a test section, he never knows if it's going to work. He may have to build one and then build another until he finally gets one working, and that's not the way these folks like to work, I can appreciate it.

We went through that here at RPI, and it was very frustrating. Frankly, that's why we decided we're not going to work with that design, anymore. We decided to design one that's optimized and robust. Then, if we get good results, we can publish the design drawings at the same time as the data, and anybody who wants to replicate it would be welcome to do so.

SK: I can see that this sort of thing requires a significant amount of teamwork and collaboration between originator and replicator.

RL: In the UCLA case, where they attempted a replication for DARPA, that was the case. We were claiming we had good solid evidence and lots of published papers showing that it works, and they were without the required knowledge of the test section, trying different things and not getting anything.

As I understand it, the agreement that they reached was that Rusi would

supply the information on the test section to Putterman, and he would try to get it to work.

What I told Rusi to do - and I wished the hell he had listened to me - is don't do that. Just build one, keep building them until you get one that works, then hand-carry it out to him and show him how to set it up and use it, because, otherwise, chances are it may not work.

I wish we had done that, because the obvious temptation is for somebody to say, "I didn't get the results, so it can't be real." It's a tough situation. You know the saying, "Lots of people can build a violin, but only a few can build a Stradivarius?"

SK: Yes, I understand.

RL: So a lot of this has gotten very nasty for all the wrong reasons, in my view. Now Congress is involved. It's just a mess.

There's two real undercurrents. One is our competitors, the Putterman group. They really got cross-wired, in particular with Rusi. They just can't stand each other's company, and that's too bad. That's not science.

The more fundamental thing: Right from the start, the fusion community just hates this technology because they got burned big time with cold fusion. They're viewing this as "Oh, my God, it's going to happen again, and Congress is going to transfer the funding into this stuff." So they did their best; they did a pretty good job at trashing it.

Back to UCLA: Honestly I don't think these folks knew what they were getting into. They're so used to sonoluminescence, where almost anything works. Even if you look at some of the stuff they did in their experiment, they were trying to enhance it to get brighter light flashes. They're doing all the wrong things, like putting noncondensable gas in there to do that, and that's exactly what kills sonofusion. Anytime you have that stuff in there, that's what gives you what Rusi calls the comets, and there's no way you're ever going to get sonofusion.

SK: Would they have known that?

RL: If they read our paper, they would have known it. That's something that we pointed out very clearly.

SK: About the gas?

RL: Yes! That was the key difference between sonoluminescence and sonofusion and how you run the experiments, and we documented that in

a number of places. We wrote a book on the differences between sonoluminescence and sonofusion results and experiments and provided answers to many of the criticisms that have been raised concerning sonofusion.[7]

So it wasn't only the test section; it was also the test technique. Unfortunately, they apparently didn't learn by their mistakes, I guess they just decided it didn't work. A lot of money was thrown down the drain.

The sad thing is that they are viewed as the gurus, and if they can't make it work, then it must not be real. I can tell you that it is very easy to run a bad experiment but really hard to run a good one. No great trick is required to run a bad experiment.

SK: So what work are you doing with this now?

RL: We have a sonofusion experiment under way, and I'm working with the Germans. They're funding this stuff. The well is pretty much poisoned here in the U.S. in terms of funding, but it's not the case in Europe. They think this is interesting stuff, and they're moving ahead.

SK: You were Rusi's mentor if I recall, right?

RL: Yes, and I have a very high regard for him, but I feel very sorry for the treatment he's gotten. His career has been hurt bad. I sort of interested him in this technology a long time ago. I wish the heck I had not done that, because he's in the center of a storm right now, and I don't know how to extricate him from it. Even Congress is involved now. Hopefully, if they take his testimony, some rational picture will appear.