Interview on July 8, 2005, with Rusi Taleyarkhan, cell phone is 418-0756, and Yiban (pronounced EE-Bahn) Xu, cell is 418-0755, (lab is 420-7537, but that rings in Rusi's lab), use the cell phone number.

Just coming out in press this week or next. The May-June issue.

He tried to put in key points of what exactly was done, what does it mean, these are very similar in scope to what was done earlier. This was not as extensive because it was more limited. A scooping effort that the university itself funded. Even before I had joined Purdue the university had shown a lot of commitment to sonofusion which was one of the reasons that attracted me to Purdue.

So, we had focused two main things. A charter that Lefteri had for the group. Around January (this year or last?), Yiban finished his Ph.D., so he had just finished and was looking for something to do. Studying under Professor Ishii ... he was given this assignment. The main purpose of this effort was to conduct confirmatory experiments to see if fusion could be introduced.

All the nuances about light and timing that we had to do is not focus in this work. Not necessary ... just trying to figure out whether fusion could be introduced. There are two key signatures that one has to look for. One of them is neutrons of the correct energy and the other one is tritium. They got the neutrons with 11 standard deviations. Anything more than 3 standard deviations (means the findings are very good). And I guess 5 standard deviations for tritium.

200,000 to 300,000 neutrons per second is that they produced in their experiment, whereas in the earlier experiment with the ? neutron generator and all those things was about 400,000 to500,000. so this was not as efficient a system but that's a totally different subject. The important finding is that fusion conditions can be introduced using a carbon copy apparatus. That's why they had problems with that BBC work that was done. It was not carbon copy. they tried to do something ...

lefteri got in touch with me while I was in oak ridge and discussed it ... since this is ? patent that the u.s. government has filed on behalf of the nation, there has to be a nondisclosure agreement signed and Lefteri signed off so we offered that information to Purdue and ... conducted the experiments, obtained data, analyzed and presented it for publication. Work started about two years ago. Authors are Xu and Adam Butt, from aero and astro. He got in touch with us early last year saying he was interested in using sonofusion as a power source for

spacecraft. High energy density fuel cells. One coffed cup full of this material is equivalent to all the fuel carried by the space shuttle. A fusion engine for spacecraft.

We used isotopic neutron source. At oak ridge had a very expensive accelerator based source for timing of neutrons and all that ... to make a fundamental discovery claim.

This is confirmation of the basic phenomenon of fusion.

The neutrons used to seed the bubbles have to come from someplace. Either you can spend a lot of money and get a pulse source that we had ... gives it in a timed fashion so you can know exactly when it started ... it makes for a nice scientific study. But ... implosion stage of those bubbles that have been nucleated with neutrons you get neutrons out, you get tritium out. So that's the key signature that we've got to look for the basic aspect of whether or not this process works.

Purdue did not have access to the pulse neutron generator setup that the national laboratory has ... so, used a isotope source, a plutonium beryllium source, a californium source, that emit neutrons. They can be used to nucleate bubbles to form bubbles. The material is in ... you start the bubbles at the nanometer level, they grow huge, they implode and when they implode they create conditions like in the interior of stars, to produce thermonuclear fusion.

They did part of their work in the pharmacy building.

Prof. Revankar teamed up with Xu and Butt to oversee the data and there is another paper coming out in ?, in France, in October.

Paper in France will elaborate more on the thermal hydraulic aspects, whereas this is more for nuclear science engineering. It talks about the fact that the ? of the experiments using carbon copy apparatus, used neutrons to nuclear, deuterated acetone and they did the control experiments. The control experiments didn't show anything. You just change one parameter, the heavy hydrogen to normal hydrogen, normal acetone.

The controls were null results.

What you are seeing here is cavitation on and off. Blue is on and red if off . cavitation on with the deuterated ... you see signal indicating the neutrons coming out are 2.5 mev neutrons.

The bubbles have to spherical and implode, just like a bomb. If they are

dissipating everywhere, then there is nothing.

So, this confirms you can get thermonuclear fusion with neutron-seeded cavitation when the liquid is deuterated. If its not deuterated its impossible to get fusion.

Tritium produced.

They also showed that even if you get cavitation with fusion, unless it's a deuterated liquid, you do not get fusion.

High speed pictures in paper.

Late Wednesday he goes on travel.

(now walking around in the lab)

working in homeland security. Detection devices. Very simple handheld cavitation ...

a lot of paraffin blocks used to shield neutrons.

Here is a very simple low cost tension metastable fluid based neutron gamma alpha special nuclear material detection system. Someone trying to smuggle in heu, highly enriched uranium for bombs ... it detects ... need to be able separate the neutrons from the gammas.

Nuclear materials that give off neutrons ... need to have a means to separate neutrons from gammas in a simple way. Current systems cost tens of thousands of dollars. Come up with one that ... centrifugal force ... a couple of hundred of dollars. Working on commercializing that.

com

Also, the physics, the mechanisms for placing fluids in a tension state, just like stretching a rubber band, storing energy ... can do the same thing with fluids ... compared to black powder and ... best explosive today is hmx, high melting explosive, like C4, this has three times the energy content of that explosive ... potential to provide energy at will ... using it to launch a projectile. A new type of weapon. Have demonstrated a system.

Using this mechanism to come up with a next generation combustion engine. instead of using injectors like they use in a diesel engine, use acoustic power to cause atomization.

Sound turns fuel into a vapor.

His work is funded by darpa. But Xu's research not initially ... now Xu works in Rusi's lab.

A high pressure chamber to pressurize items. A ship's propeller , they cavitate and Russians know exactly where U.S. subs are, found a way to cause healing of interfaces to prevent premature cavitation, so I guess you could take systems with very high intensity ... this allows you to pressurize objects inside it.

This is part of metastable fluid technology development where we come up with a metastable based detector system. One thing you have to do is prevent cavitation from taking place. See what happens to a ship's propeller. Its just eaten up. The same thing can happen with fuels inside detection systems. We want want to prevent spurious nucleation and cavitation ... (only) cavitate when you've got a strike from a nuclear based particle.

Also, creating a simple x-ray machine. Now x-rays produced with a very high voltage source that throws ions, they hit a target and decelerate, giving off x-rays. That's the way people have done it for the past 150 years, ever since Roentgen came out and saw the famous hand ... this is a trd, thermoluminescent? dosemeter, give it to radiological environment, management services group ... send it to a lab, take off the plastic, count the number of tracks to find out how much dosing you've got.

For the homeland security demonstration we are helping out quantify what happens when a radiological bomb, 3,000 pounds of explosives with about 3,000-4,000 Curies of radioactive cesium 137, the stuff people use for radiators for cancer therapy ... put it in a truck and blow it up. What happens to the environment? How do the police react? How do the first responders react? Who gets dosed up? Who dies? Who does not die? Who gets contaminated? How are buildings decontaminated? How soon can they be put back into operation? What are the psychological impacts?

That exercise has not been done so I think Purdue is offering it to the nation for the first time.

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