To the Purdue Bubble Fusion Review
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This file contains three sections. Each section begins with a question then some information and then further questions, referring to:
PRL v96 p 034301
NED v 235 p 1317 out in May 2005
NED v 2235 p 1041 which is the introduction to that issue of the journal
Nureth 11 paper 548 out in October 2005
Professor Taleyarkhan's 29th September 2005 slideshow at Wayne State University
http://www.physics.wayne.edu//seminars/Colloquium_talks/Taleyarkhan.pdf
The Purdue press release of July 05 on Adam Butt and Yiban Xu's work
http://www.purdue.edu/UNS/html4ever/2005/050712.Xu.fusion.html
A story apparently triggered by the press release at:
http://www.heise.de/tp/r4/artikel/20/20542/1.html

1. **How did errors in tritium reporting come about?**

NED Here is how the tritium results are described in the text:

> symbols. It is seen that a statistically significant increase (~4–5S.D.) of tritium is only observed for tests with neutron-seeded cavitation of C_3D_6O. For neutron-

Here are the data. It appears that the effect is 4.1/1.1 = 3-4 SD, not 4-5 SD. Experts say the chance of the two green triangles appearing on zero (zoom in on pdf to see) for a background of 40 counts is surprisingly low at 1/900 while the variability in the positive tritium is also surprisingly low.

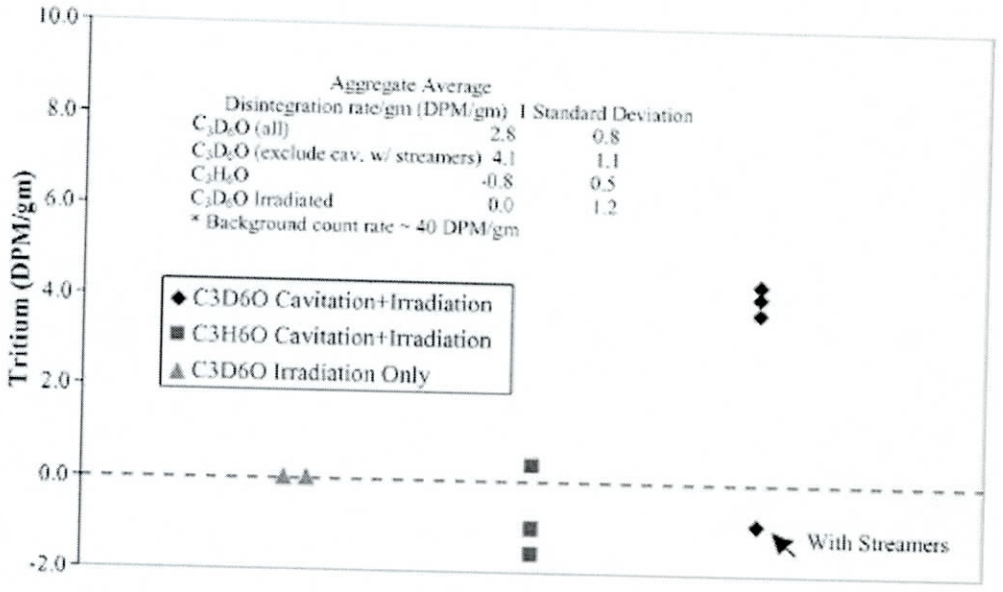


Fig. 2. Results of tritium counting.

Nureth 11

Here is how the data are described in the text. There is a new range for significance

Beckman LS6500™ liquid scintillation counter. Results of tritium activity changes are displayed in Figure 9. It is seen that a statistically significant increase (~ 4 to 6 SD) of tritium is only observed for tests with neutron-seeded cavitation of C_3D_6O. Null results are obtained for all other control

Here are the data. There are changes in the count rate for green triangles, improving the 1/900 problem in NED. The green triangles have moved slightly. The 1SD for the C3D6O excluding streamers has gone down, improving significance from under 4SD (i.e. 4.1 / 1.1) in the NED paper, to over 4 SD here (i.e. 4.1/1.0).

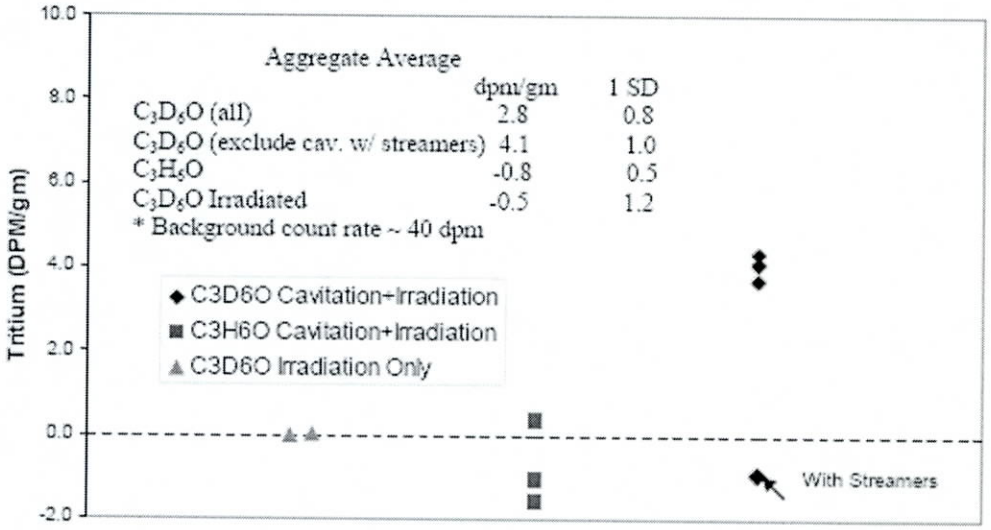
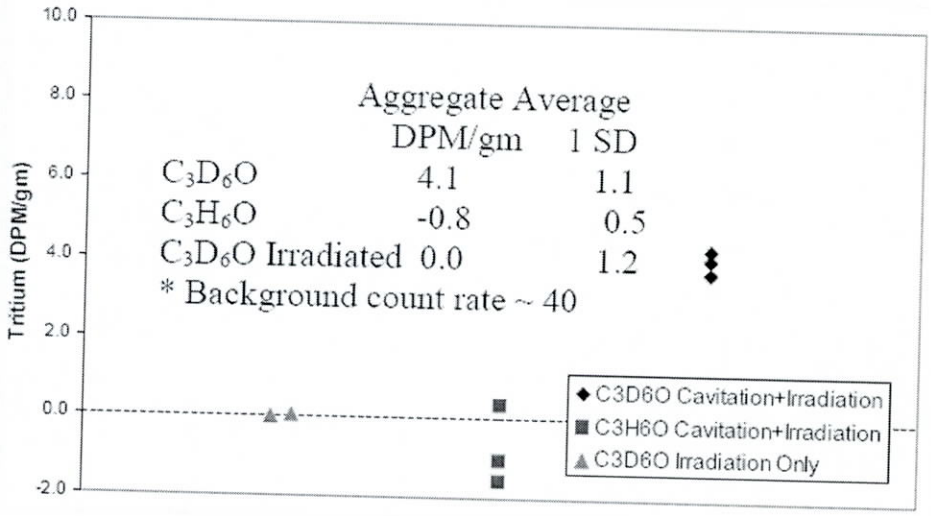


Figure 9: Results of tritium emission counting

Taleyarkhan slideshow

Here are the data again. The experimental run "with streamers" is now blocked off and information about it has been removed from the text box. According to NED the streamers study post-dated the move to the new lab ie the basis on which these data are dropped was established after the data were taken. The green triangles are similar to Nureth 11 ie moved, but the figures for the green triangles and blue diamonds fit with NED not Nureth-11. The heise.de article quotes Taleyarkhan crediting Xu with noticing the streamers in July 2005 ie implies he knew about them.



Questions:
Were data selected to give low variability and better results?
Does Xu have raw data and samples for all 9 runs as he informed me by email?
Who blocked off the negative experimental run in the slideshow?
Was the dropping of these data acceptable considering NED implies that the streamers study was completed after these data were taken?
By email Xu disowns the 1.1 in NED and the -0.5 in Nureth 11, blaming both on the same kind of typo– analysis conflation. After the NED paper was published, he corrected one error in time for Nureth 11, but introduced a new one by the same mechanism. How did this happen twice, also to the same green datapoints that were moved by a computer bug, and apparently with a corresponding change in the text as well?
What is Taleyarkhan's role in the errors? If he had a role, what about emails in which Xu takes sole responsibility?

2. How independent of Taleyarkhan is the NED and Nureth-11 work?

NED

4. Neutron emission measurements

Upon acquisition of neutron detection equipment tests were also initiated for monitoring changes in neutron activity with and without cavitation using the same closed freezer compartment and acoustic drive train. However, a short while after completing the experiments for tritium monitoring the experiment location had to be shifted to a new building off-campus where the 1 Ci Pu–Be isotope neutron source could not be relocated. Instead, a 0.5 mCi Cf-252 isotope neutron source was available for use. Also, a new test cell (which could produce a relatively lower approximately <10 bubble clusters per second) had to be constructed due to mechanical breakage that developed in the first test cell. A liquid scintillation

According to the paper, the tritium data were taken in the communal lab, while the neutron data were taken in the new building off-campus, ie Taleyarkhan's lab. The neutron data constitute three graphs in figure 5 of the NED paper, while the tritium data is only one graph, so it appears that much of the work was done in Taleyarkhan's lab.

According to the Purdue press release :
"Xu and Butt now work in Taleyarkhan's lab, but all of the research on which the new paper is based was conducted before they joined the lab, and the research began at Purdue before Taleyarkhan had become a Purdue faculty member. The two researchers used an identical "carbon copy" of the original test chamber designed by Taleyarkhan, and they worked under the sponsorship and direction of Lefteri Tsoukalas, head of the School of Nuclear Engineering."

Questions.
Where were neutron data taken?
Who owns the Californium source referred to in these papers?
Why were the neutron data and the reference to the Cf source (compare the apparatus shown for NED and Nureth-11) dropped from the Nureth 11 paper?
Did Professor Taleyarkhan write, edit or co-edit these papers?
Did Professor Taleyarkhan know that the neutron data were taken in his lab or that his Californium source was in use?
Is this work independent of Professor Taleyarkhan? Is there evidence that he knew it wasn't when he claimed it was and if so, considering the claim appears in his PRL, is this misconduct?

3. What are the circumstances of the paper's publication?

The editor of the journal, Guenther Lohnert emailed me that he reviewed the paper himself. According to the Purdue press release, the results were "peer reviewed"

Professor Taleyarkhan is co-editor of this issue of the journal, which came out on the occasion of Professor Lahey's 65th birthday. The essay at NED v235 p 1041 ends with the following statement signed by Professor Taleyarkhan. .

This publication in general represents the esteem that the technical community holds for Professor Richard (Dick) T. Lahey Jr. It includes papers from keynote lectures delivered during the course of a Special (embedded) Symposium held in Pisa, Italy on 25 September 2004, which was dedicated specifically to honoring Dr. Lahey, along with selected archival quality papers from the Third International Symposium on Two-phase Flow Modeling and Experimentation, Pisa, Italy (20–24 September 2004).

We wish Dick Lahey health and happiness in the years beyond his 65th birthday and look forward to his future revolutionary contributions to mankind.

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The other signatory, Paolo di Marco, said in an interview that all the other papers are from the conferences and are invited or peer reviewed by organizers but that the Xu and Butt paper, the last one, did not go through these channels but was, he thinks, dropped in by Taleyarkhan. But, Guenther Lohnert, the editor of the journal who reviewed the paper, denies Taleyarkhan actually made the submission.

Questions:
Did Professor Taleyarkhan exploit his position as a co-editor to get a paper confirming his results into a journal bypassing acceptance criteria that other papers in the journal or issue went through?