The UCLA-UIUC Non-Mirror of the ORNL Bubble Fusion Experiment

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Editor, New Energy Times

2007[1] UCLA-UIUC Failure to Replicate 2002 [2] ORNL Experiment and Results

1. UCLA-UIUC Claims
2. Configuration Discrepancies
3. Process Discrepancies
4. Results Discrepancies
5. UCLA-UIUC Interpretation Discrepancies

1. Camara, C.G., Hopkins, S.D., Suslick, K.S. and Putterman, S.J., "Upper Bound for Neutron Emission from Sonoluminescing Bubbles in Deuterated Acetone," Physical Review Letters, Vol. 98, p. 064301

2. Taleyarkhan, R.P., West, C.D., Cho, J.S., Lahey, Jr., R.T., Nigmatulin, R.I., Block, R.C., "Evidence for Nuclear Emissions During Acoustic Cavitation," Supplement #1, Supplement #2, Science Vol. 295, p. 1868 (March 8, 2002)

UCLA-UIUC Claims - Putterman

1. " …'**identical**' parts …" [1]
2. "…observed **no nuclear fusion**…" [1]
3. "**found**" alternate explanation…"**not…nuclear fusion**." [1]
4. After challege from Taleyarkhan, Naranjo got **last word** [1]

1. PuttermanSuslickDARPA2PhaseReport.pdf

UCLA-UIUC Claims - Putterman

1. " …'**identical**' parts …"
   Wrong: Parts Not Identical

2. "…observed **no nuclear fusion**…"
   Wrong and Misleading: Cannot Observe Fusion. Can Only Observe Tritium Or Neutrons

3. "**found**" alternate explanation…"**not…nuclear fusion**."
   Wrong: Naranjo Did Not "Find" - He Speculated and ORNL Group Proved Him Wrong [1]

4. After challege from Taleyarkhan, Naranjo got **last word**
   Wrong: The Journal Refused To Publish Naranjo [2]

1. Taleyarkhan, R.P., Block, R.C., Lahey, Jr., R.T., Nigmatulin, R.I., and Xu, Y., Reply to [Naranjo] 'Comment on 'Nuclear Emissions During Self-Nucleated Acoustic Cavitation,"Physical Review Letters, Vol. 97, p. 149404, (Oct. 6, 2006)

2. NaranjoCommentUnpublishable-May20-2007.jpg

UCLA-UIUC Claims - Suslick

1. "…an exact a duplicate of Taleyarkhan's reactor was built." [1]

[1] NaranjoCommentUnpublishable-May20-2007.jpg

UCLA-UIUC Claims - Suslick

1. "…an exact a duplicate of Taleyarkhan's reactor was built." **Not Exact, Not A Duplicate**

UCLA-UIUC Published Claims

1. “Shapira and Saltmarsh, Tsoukalas et al., and Saglime have also reported null results.”[1, 2]

1. Camara, C.G., Hopkins, S.D., Suslick, K.S. and Putterman, S.J., "Upper Bound for Neutron Emission from Sonoluminescing Bubbles in Deuterated Acetone," Physical Review Letters, Vol. 98, p. 064301

2. Tsoukalas et al. cited but paper had not yet published, implies collusion

UCLA-UIUC Published Claims

1. “Shapira and Saltmarsh, Tsoukalas et al., and Saglime have also reported null results.”

- Shapira and Saltmarsh **did not** perform a replication, they **measured neutrons (but not tritium)** during a Taleyarkhan group experiment. And they measured **positive** signs of fusion with neutrons. [1]
- Tsoukalas et al. performed an **independent** replication. They measured **positive** signs of fusion with tritium.[2]

1. Investigation under way
2. Investigation under way

Configuration Discrepancies – Top Reflector (1)

UCLA-UIUC Cell [1]

ORNL Cell

Fixed

Free

Absence of top reflector at the liquid acetone free boundary will kill any possibility of a positive result
(See Appendix A)

1. Camara, C.G., Hopkins, S.D., Suslick, K.S. and Putterman, S.J., "Upper Bound for Neutron Emission from Sonoluminescing Bubbles in Deuterated Acetone," Physical Review Letters, Vol. 98, p. 064301

Configuration Discrepancies – Top Reflector (2)

UCLA-UIUC Cell

ORNL Cell

Reflector Surface is above and out of liquid

Reflector surface is within liquid

Required to attain acoustic wave intensification

1. Camara, C.G., Hopkins, S.D., Suslick, K.S. and Putterman, S.J., "Upper Bound for Neutron Emission from Sonoluminescing Bubbles in Deuterated Acetone," Physical Review Letters, Vol. 98, p. 064301

Configuration Discrepancies – Bottom Reflector

UCLA-UIUC Cell

ORNL Cell

Impacts energy concentration behavior of resonant acoustic system

Slides via

Outer Tube

RTV Epoxy joins

stem to main body

of test cell

1. Camara, C.G., Hopkins, S.D., Suslick, K.S. and Putterman, S.J., "Upper Bound for Neutron Emission from Sonoluminescing Bubbles in Deuterated Acetone," Physical Review Letters, Vol. 98, p. 064301

Configuration Discrepancies – Reflector Wire

UCLA-UIUC Cell

ORNL Cell

Wire in stem

Permits reflector freedom of motion to self - adjust to properly amplify acoustic wave energy

1. Camara, C.G., Hopkins, S.D., Suslick, K.S. and Putterman, S.J., "Upper Bound for Neutron Emission from Sonoluminescing Bubbles in Deuterated Acetone," Physical Review Letters, Vol. 98, p. 064301

Process Discrepancies - Gas

UCLA-UIUC Cell

Removed Gas

Then Re-Added [1]

ORNL Cell

Removed

Gas

Adding gas to the experiment will enhance SL light flash. But gas will impede supercompression and therefore kill any possibility of a positive result. [2]

1. Camara, C.G., Hopkins, S.D., Suslick, K.S. and Putterman, S.J., "Upper Bound for Neutron Emission from Sonoluminescing Bubbles in Deuterated Acetone," Physical Review Letters, Vol. 98, p. 064301

2. Richard T. Lahey, Jr.

Process Discrepancies - Tritium

UCLA-UIUC Cell

No evidence of search for Tritium [1]

ORNL Cell

Searched for tritium

Searching for fusion signs by only looking for neutrons is like trying to play basketball with only one hand

1. Camara, C.G., Hopkins, S.D., Suslick, K.S. and Putterman, S.J., "Upper Bound for Neutron Emission from Sonoluminescing Bubbles in Deuterated Acetone," Physical Review Letters, Vol. 98, p. 064301

Results Discrepancies – Bubble Cluster Shape

UCLA-UIUC Cell

Streamer [1]

(Elongated Bubble Cluster)

ORNL Cell

Spherical [2]

(Round Bubble Cluster)

Fusion signs will never occur if bubble shape is elongated (streamers)[3]

1. Neutron Seed (UCLA-UIUC).avi
2. SoundofNeut.mov
3. Xu, Y., and Butt, A., "Confirmatory Experiments for Nuclear Emissions During Acoustic Cavitation," Nuclear Engineering and Design, Vol. 235, p. 1317

Results Discrepancies – Bubble Cluster Rate

UCLA-UIUC Cell

0.1 / second [1]

ORNL Cell

30 / second [2]

Rate Difference: 1:300

ORNL Conditions not achieved

1. Neutron Seed (UCLA-UIUC).avi
2. SoundofNeut.mov

Results Discrepancies – Bubble Cluster Duration

UCLA-UIUC Cell

5 Seconds [1]

ORNL Cell

0.005 Seconds [2]

Duration Difference: 1000:1

ORNL Conditions not achieved

1. Neutron Seed (UCLA-UIUC).avi
2. SoundofNeut.mov

Results Discrepancies – Bubble Size

UCLA-UIUC Cell

10-50 Micron

ORNL Cell

5,000 Micron

Size Difference: 1: 100 Million

Large size required to provide stored energy for use during supercompression implosion

Source: Neutron Seed (UCLA-UIUC).avi

Results Discrepancies – Bubble Quantity

UCLA-UIUC Cell

100,000's in Cluster

ORNL Cell

100's in Cluster

Qty Difference: 1000:1

ORNL Conditions not achieved

Source: Neutron Seed (UCLA-UIUC).avi

Textbook Definition of Detection of D-D Fusion

The D-D fusion reaction can have one of two outcomes that occur with almost equal probability.

1. Production of Helium-3 and **2.45-MeV neutrons**
2. Production of **Tritium** and protons.

Interpretation Discrepancies:

UCLA/UIUC Assertion of Confirmation of Fusion

Neutron and Sonoluminescence Flashes Timed Within One Billionth of a Second

=

Confirmation of Fusion [1,2]

(See Appendix B for Quotes)

1. Putterman, BBC Horizon

2. PuttermanSuslickDARPA2PhaseReport.pdf

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UCLA/UIUC Assertion of Confirmation of Fusion

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Confirmation of Fusion [1,2]

Demand for **timing coincidence** assures that even if UCLA-UIUC found positive signal for neutrons or tritium, they could still claim a "negative" result because

such timing coincidence may be possible in SBSL, but is "impossible" in MBSL

(See Appendix C)

1. Putterman, BBC Horizon

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Interpretation Discrepancies:

Timing Coincidence Irrelevant, Smokescreen, “Red Herring”

(2002) ORNL, Saltmarsh/Shapira:

“**no evidence for real coincidences between SL and neutron events**”[1]

1. Taleyarkhan, R.P., West, C.D., Cho, J.S., Lahey, Jr., R.T., Nigmatulin, R.I., Block, R.C., "Evidence for Nuclear Emissions During Acoustic Cavitation," Supplement #1, Supplement #2, Science Vol. 295, p. 1868 (March 8, 2002)

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“**no evidence for real coincidences between SL and neutron events”**[1]

At best, timing coincidence would be **secondary data**

-Regardless-

It does **not invalidate** neutron signals in MBSL [A1]

It has **no bearing** on tritium measurments

1. Taleyarkhan, R.P., West, C.D., Cho, J.S., Lahey, Jr., R.T., Nigmatulin, R.I., Block, R.C., "Evidence for Nuclear Emissions During Acoustic Cavitation," Supplement #1, Supplement #2, Science Vol. 295, p. 1868 (March 8, 2002)

Interpretation Discrepancies:

Meaningful Critique – Neutron Signal

Q1. Is it possible to tell if the measured neutron signals are coming from the experiment and not the apparatus?

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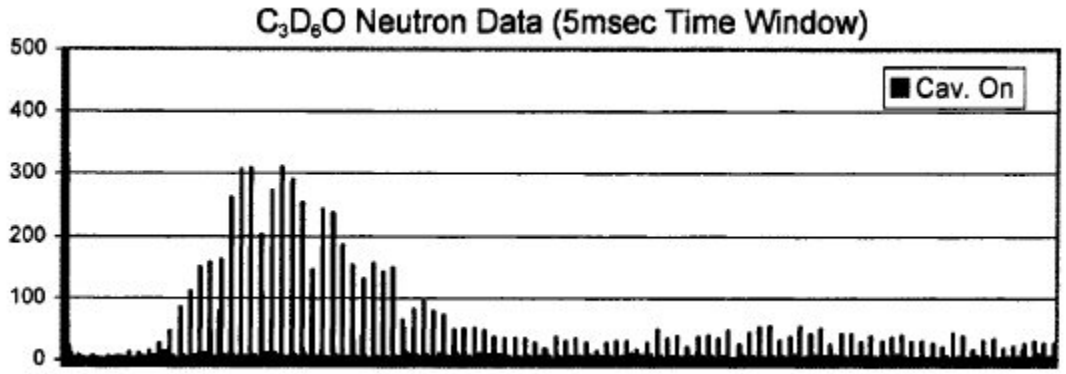
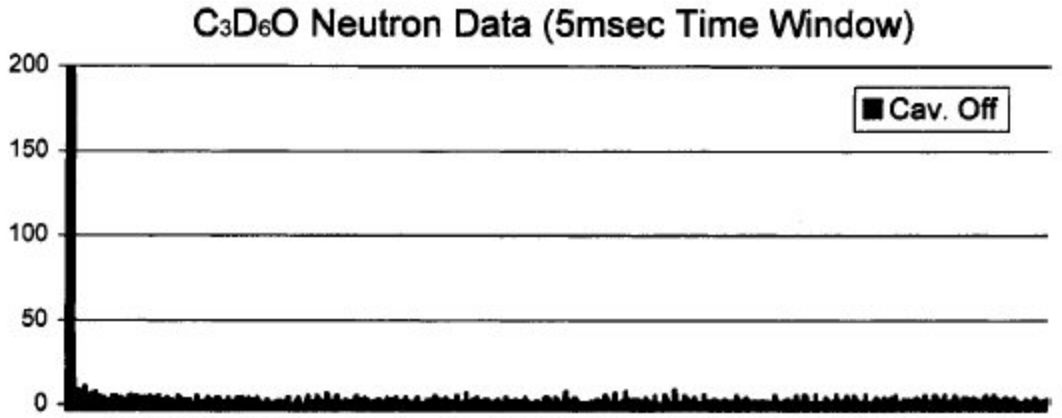
A1. Is it possible to see a difference between these graphs?



PNG Neutron Pulses
Same in Both.
Variable is Cavitation



Taleyarkhan et al., *Science* (2002)
Taleyarkhan et al., *PRE* (2004)

Interpretation Discrepancies:

Meaningful Critique – Neutron Signal

Q1. Is it possible to tell if the measured neutron signals are coming from the experiment and not the apparatus?

A2. The statistical significance shown in the previous two graphs = 20-30+ standard deviation.

This translates to at least 99.99999999999999999 percent confidence.

Taleyarkhan et al., *Science* (2002)
Taleyarkhan et al., *PRE* (2004)

Interpretation Discrepancies:

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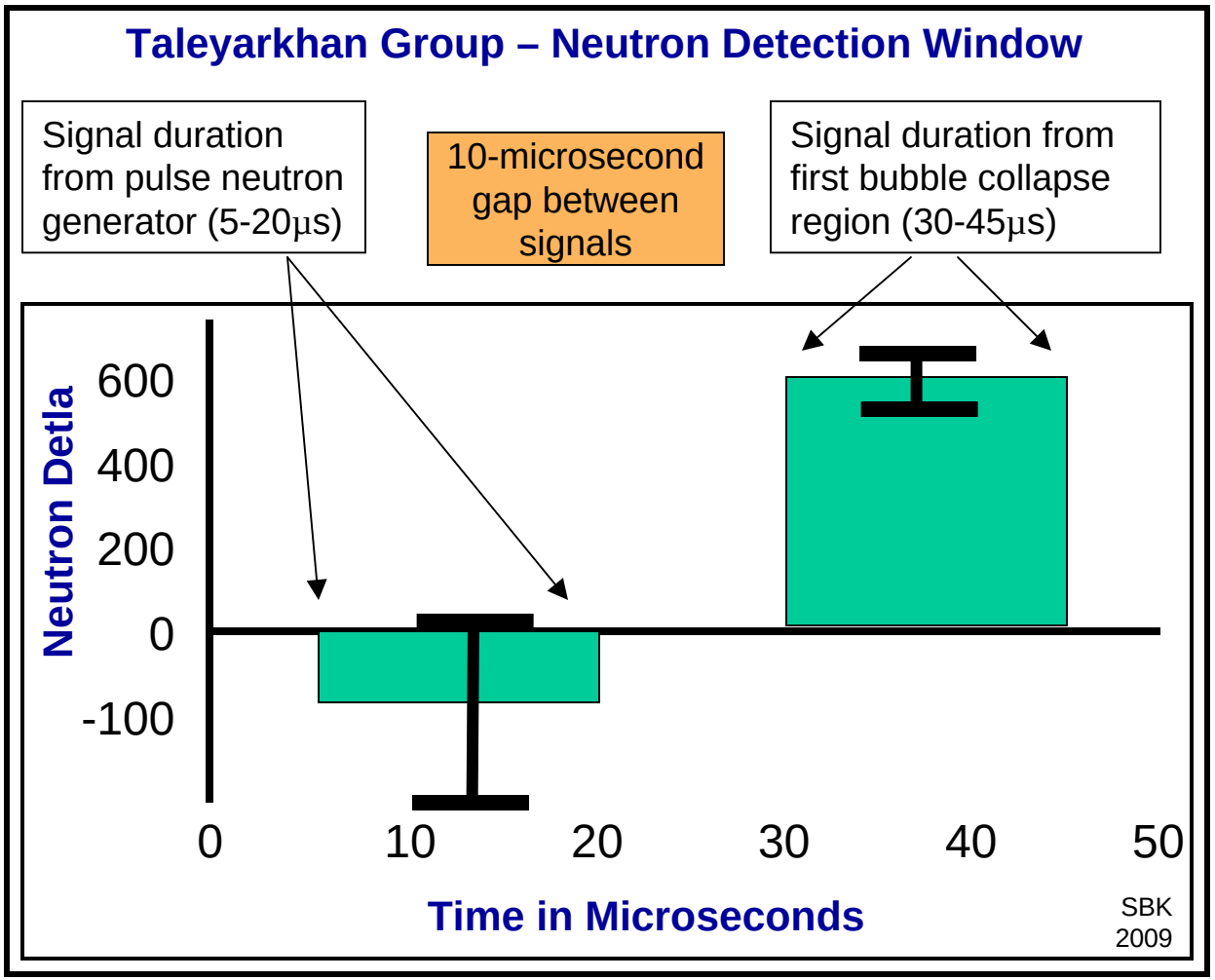

UCLA/UIUC Assessment

1. UCLA/UIUC alleged that they had performed a mirror experiment and they implied that they had mirrored the ORNL process. They failed to mirror ***critical aspects*** of the ORNL apparatus and process.
2. UCLA/UIUC sought the weakest possible confirmatory measurement (timing) and failed to seek the strongest possible measurement (tritium) as confirmation of fusion.
3. UCLA/UIUC misrepresented that timing coincidence equals confirmation of fusion.
4. UCLA/UIUC misrepresented that their failure to obtain positive results negate findings and results of the ORNL experiment.
5. UCLA/UIUC misrepresented that their expertise in continuous, gas SBSL qualified them as experts in nuclear particle-controlled degassed MBSL.
6. UCLA/UIUC misrepresentations caused DARPA to terminate research that could lead to U.S. energy security and independence.

Appendix A

"Think of how a ball would bounce back if it recoils (reflects) back after hitting a solid wall versus encountering nothing but air and escapes the playing field; the reflected ball would possess a different force profile when it bounced downwards and tried to compress something there. By not using a reflector the bounced-back wave if any, would be significantly less in force intensity for aiding in the compression of imploding bubbles." – Rusi Taleyarkhan

Appendix B - Quotes from Putterman Group

"the search for fusion from collapsing bubbles is facilitated by gating on individual flashes of light"

"In none of the cases where 2 PMT's recorded an SL event was that event coincident with a neutron within a 1 microsecond window"

"We propose that claims of new routes to fusion should be backed up with coincidence data of the type presented in this figure.[1]"

1. PuttermanSuslickDARPA2PhaseReport.pdf

Appendix C – Quotes from Taleyarkhan Group

Timing coincidence "may" happen but is "impossible" to guarantee as a figure of merit for two reasons: (1) SL flashes from interior bubbles may or may not sufficiently get out together with neutrons; (2) neutrons themselves can collide and get reduced in energy and therefore, their speed of motion can get significantly reduced.

In a SBSL system there is a single bubble giving off light, and if bubble fusion, then with the (at-source) 2.45 MeV neutrons one may draw some inferences on coincidences (albeit, still with uncertainty in timing since the 2.45 MeV neutron has first to get out of the acetone liquid and glass wall which it simply can not do without colliding with atoms and losing energy to varying extents; now for a cluster of few hundred bubbles this process is exponentially more difficult to characterize in terms of coincidences since the bubbles within the interior of the cluster - the ones undergoing supercompression will give off neutrons which can race out of the cluster and acetone with decreasing energy but any light photons from these fusing bubbles will in most cases not get out without being diffused and only in some isolated cases may one get a stray photon in nanosecond coincidence with an uncollided neutron.