Wavewatching
Observations on the nascent quantum computing industry & physics

Science Media in a Bubble – Ready to Implode?

Posted on September 12, 2013 by Henning Dekant

An ongoing theme of this blog is the media coverage that science receives. Unsurprisingly, given that most journalists have little STEM background, the public is often treated to heedless rewording of press releases e.g. this example from the QC realm. Also, sensationalist science news is hardly ever put into context - the story of the faster than light CERN neutrinos is a perfect example for the latter.

What is more surprising is when dedicated publication powerhouses such as Nature or Science are getting it wrong. Either by means of omission, such as when covering quantum computing but completely ignoring the adiabatic approach that D-Wave is following, or by short-circuiting the peer review process. The latter may have set back sonoluminescence research by decades.

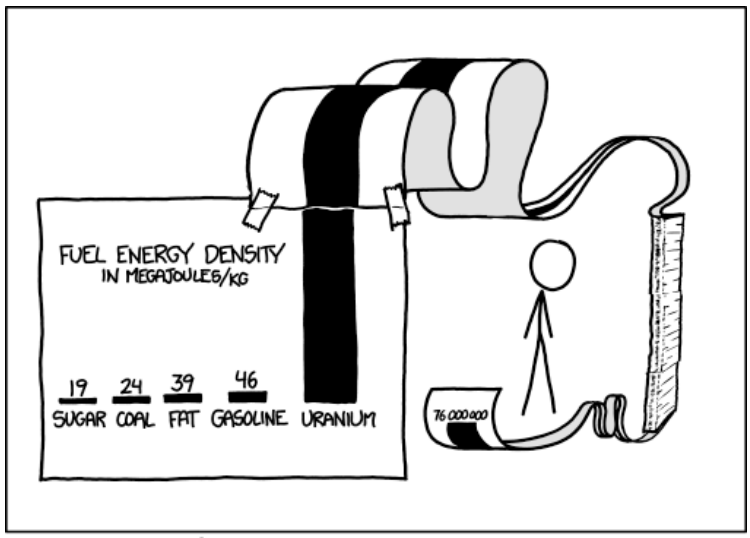
Sonoluminescence is the name for a peculiar effect where cavitation in a liquid can be stimulated by sound waves to the point where the small gaseous bubbles implode so rapidly that plasma forms that produces a telltale light signal. The following video is a nice demonstration of the effect (full screen mode recommended):

Since there is plasma involved, the idea that this could be used as yet another means to accomplish fusion was first patented as early as 1982.

In itself, the phenomenon is remarkable enough, and not well understood, giving ample justification for basic research of the effect. After all, it is quite extraordinary that sound waves suffice to create such extreme conditions in a liquid.

But it is still quite a stretch to get from there to the necessary conditions for a fusion reaction. The nuclear energy barrier is orders of magnitudes larger than the energies that are involved in the chemical domain, let

alone the typical energy density of sound waves. The following cartoon puts this nicely into perspective:



SCIENCE TIP: LOG SCALES ARE FOR QUITTERS WHO CAN'T FIND ENOUGH PAPER TO MAKE THEIR POINT *PROPERLY.*

That is why to me this approach to fusion always seemed rather far fetched, and not very practical. So when a Science article about ten years ago claimed fusion evidence, I was skeptical, and wasn't surprised that it was later contradicted by reports that portrayed the earlier results as ambiguous at best. I had no reason to question the Science reporting. I took the news at face value and paid little attention to this area of research until a recent report by Steven Krivit's. He brings investigative journalism to the domain of science reporting and the results are not pretty:

1. The rebuttal to the original peer reviewed article first appeared on the Science blog without going through the usual review process.
2. Contrary to what was reported, the scientists undermining the original research did not work independently on reproducing the results but only performed auxiliary measurements on the same experimental set-up.
3. The detector they used was known to not be ideally suited to the neutron spectrum that was to be measured, and was too large to be ideally placed.
4. The criticism relied on an ad-hoc coincidence criteria for the photon and neutron genesis that ignored the multi-bubble cavitation design of the original experiment.

The full investigative report is behind a pay-wall. It is rather devastating.

To add insult to injury, the Science journalist instrumental in causing this mess, the one who promoted the rebuttal without peer review, later went on to teach journalism.

A casual and cynical observer may wonder why Steven makes such a fuss about this. After all, American mainstream journalism outside the realm of science is also a rather poor and sordid affair. He-said-she-said reporting is equated with objectivity, and journalists are mostly reduced to being stenographers and water carriers of the political actors that they are supposed to cover (the few journalists who buck this trend I hold in the highest regard).

One may also argue that there wasn't all that much damage done, because the critics, even if they didn't work as advertised, may have gotten it right; The BBC, a couple of years later, sponsored an attempt at reproduction and

also came up empty.

But there is one rather big and important difference: Journals such as Science are not just media that report to the public at large. Rather, they are the gatekeepers for what is accepted as scientific research, and must therefore be held to a higher standard. Research that doesn't get published in peer reviewed journals may as well not exist (unless it is privately financed applied R&D, that can be immediately commercialized, and is therefore deliberately kept proprietary).

The more reputable a peer reviewed journal, the higher the impact (calculating the impact factor is a science in itself). But arguably, it is worse to get work published in a reputable journal just to have the results then demolished by the same outfit, especially if the deck is stacked against you.

To me, this story raises a lot of questions and drives home that investigative science journalism is sorely lacking and badly needed. Who else is there to guard the gatekeepers?
