

To: Physical Review Letters  
Re: LBK1086 Parrott

**Summary of Letter:**

The letter below was written about a month ago, but never sent, partly because I wasn't happy with its length. Recently I reread it with the intention of shortening it, but now it seems to include exactly what should be said. Apart from a personal statement at the end, I don't see how I could shorten it without omitting something important. Instead of shortening it, I decided to precede it with this brief summary.

In 2010, three authors whom I shall call collectively by their initials DAJ (for Dressel, Agarwal, and Jordan) published a paper in Phys. Rev. Lett. (PRL) which will also be called DAJ. The main mathematical claim of the paper was false. After the authors ignored suggestions that they submit an erratum, I submitted a "Comment" paper to PRL (LBK1096 Parrott) with a counterexample to the claim. The "Comment" was eventually rejected for reasons unconnected with the validity of the counterexample, but PRL did suggest to the authors that they publish an expanded proof of their claim elsewhere.

The counterexample was correct given the original hypotheses of DAJ, but authors Dressel and Jordan (DJ) added very strong additional hypotheses to invalidate it, hypotheses which were not even mentioned in DAJ. Then they published essentially identical attempted proofs of their claim under the stronger hypotheses in J. Phys. A (JPA) and Phys. Rev. A (PRA).

I submitted a "Comment" paper to JPA pointing out a major gap in the attempted proof. The authors acknowledged the gap and claimed to fill it in a Corrigendum published by JPA. The Corrigendum's attempted repair was invalidated by an incorrect matrix multiplication.

A few months later, the authors DJ also published essentially the same JPA proof in PRA, but the PRA version included the Corrigendum's attempted repair as a lemma (its Lemma 1). Again, the incorrect matrix multiplication invalidated the proof of Lemma 1 and of the main claim of DAJ.

I submitted "Comment" papers to both JPA and PRA pointing out the error in the JPA Corrigendum and in PRA's Lemma 1. PRA acknowledged the error and requested that the authors submit an Erratum, which is scheduled for imminent publication.

The Erratum acknowledges the error in PRA, but the original claim of DAJ in PRL remains uncorrected. I am writing to ask the editors of PRL to request the authors to retract the main claim of DAJ which they now admit they cannot prove.

## Main Letter:

In 2010, Physical Review Letters (PRL) published

J. Dressel, S. Agarwal, and A. N. Jordan, “Contextual values of observables in quantum measurements” Phys. Rev. Lett. **104** (2010) 240401,

which will be abbreviated DAJ below. Its sketch of a proof of its only non-trivial mathematical claim alleged results of supposedly routine power series manipulations which I had been unable to duplicate.

I wrote the authors about it in early 2011, and they sent me a more extensive proof, which was however wrong. I explained what seemed to me a serious error, but they did not reply. I wrote them several times over the next few months asking about various points in DAJ, but they did not reply. After it became clear that they were deliberately ignoring all queries, I submitted a “Comment” paper, LBK1086, to PRL.

This “Comment” was not well received by PRL. Initially, it referred to a counterexample to the main claim of DAJ which I had placed in the arXiv. PRL said that was unacceptable because the counterexample was not contained in the “Comment” itself (which PRL strictly limits to one page).

However, the question about DAJ’s claim did motivate PRL to suggest to the authors that they publish an expanded proof elsewhere. They placed a proof in the arXiv, which turned out to be wrong. PRL accepted this lengthy arXiv proof as valid, though it had refused to accept my arXiv counterexample.

Dressel and Jordan (called DJ below) published their arXiv proof in Journal of Physics A (JPA), and a few months later in Physical Review A (PRA). I submitted a “Comment” paper to JPA pointing out a serious gap in the attempted proof. After holding it for almost a year, JPA reported that they were unable to find a referee to rule on the validity of the proof, and they rejected the “Comment” without giving any substantive reason. No error was alleged. The rejection letter, formatted exactly as I received it including typos, was:

Concerning the long comment (manuscript code 417459): the comment does not touch on the claim (which Dr Parrott seems now to accept), but on a detailed step of the proof which he finds not general enough (although it is correct at least in many cases). The authors admit that the proof, as written, was using some implicit results that were not explicitly worked out. They propose to add a Lemma to their paper, in the form of an erratum, which will make everything explicit. For our journal, this course is the most satisfactory. In this erratum, Drs Dressel and Jordan will have to acknowledge that this

correction

was prompted by Dr Parrott's criticism by quoting the arXiv version <http://arxiv.org/abs/1202.5604>. If other scientists are keen in following the controversy, they can pick up from there.

I include this because it seems the easiest way to introduce what happened next.

As you can see, the authors appear to acknowledge a gap in the proof published by JPA, but they think that they can prove a lemma which will fill the gap, which they will submit as an erratum. They did submit the Lemma to JPA as a "Corrigendum". The proof of the Lemma was incorrect due to an incorrect matrix multiplication, but this was not realized for many months.

Before the above developments in 2011, DJ had submitted to PRA a long paper containing the JPA proof,

J. Dressel and A. N. Jordan, "Contextual value approach to the generalized measurement of observables", *Phys. Rev. A* **85** (2012) 022123.

The initial submission presumably contained the same gap as in the JPA paper because a later arXiv posting contained the gap. After the submission, JPA furnished the authors a review copy of my "Comment" pointing out the gap. This apparently motivated the authors to include the Corrigendum's Lemma (now called Lemma 1) in the final version of the PRA paper.

In early February, 2013, I realized that the identical proofs of the JPA Corrigendum and of PRA's Lemma 1 were incorrect due to an incorrect matrix multiplication. I then submitted yet another "Comment" to JPA, this time concerning the Corrigendum's error. I did not attempt to contact the authors because they have forbidden me to communicate with them, and have stated that they will delete any email unread.

With the JPA submission, I offered to withdraw the Comment if the authors would retract the main claim of DAJ (called the "General theorem" in JPA and simply "Theorem" in PRA) from all journals in which it had been claimed, including PRL, JPA, and PRA. When I had received no response after a month, I submitted another "Comment" to PRA pointing out the error in Lemma 1 (which also invalidated the proof of the Theorem).

PRA decided that the "Comment" could be published, but that it would be better to ask the authors to submit an erratum, which they agreed to do and which is scheduled for imminent publication. The bottom line is that the authors publicly admit that the proofs of JPA's "General theorem", and PRA's "Theorem" (the only theorem in the PRA article) are wrong. Since these claimed theorems were intended to prove the main claim of DAJ, it follows that the DAJ claim remains unproved, even under the stronger hypotheses which DJ had added to the original claim.

For reference, the original claim of DAJ was:

“ We introduce contextual values as a generalization of the eigenvalues of an observable that takes into account both the system observable and a general measurement procedure. This technique leads to a natural definition of a general conditioned average that *converges uniquely to the quantum weak value in the minimal disturbance limit.*[emphasis mine]

The claim is italicized. It is the only mathematically nontrivial claim in DAJ.

According to ethical standards published on PRL’s website, since the authors admit that they cannot prove the claim, they should promptly retract it in a PRL erratum. However, in view of their past behavior, I will be surprised if they do so unless PRL so urges them.

Finally, I come to the point of this letter. I want to avoid submission of another Comment to PRL. It seems clear that the most graceful way to resolve the matter would be for PRL to urge the authors of DAJ to submit an erratum.

Is PRL willing to do so? If not or if the authors refuse, is PRL willing to consider another Comment, given the tectonic change in the situation since the last one was submitted?

My interest in this matter is twofold. First, I hope that an erratum may save others the very considerable time I have wasted in trying to penetrate DAJ. Second, I hope to obtain more information about the standards of PRL.

To explain this second objective, I will have to outline my personal experiences with PRL, JPA, and PRA. I think that this is important background material, but it is not strictly relevant to the requests above, so an editor already impatient with the length of this letter can stop reading at this point.

When I initially wrote DAJ inquiring about proofs for its claims, I could never have imagined the consequences. I could never have imagined that an innocent attempt to obtain more explanation than given in DAJ could result in hundreds of hours composing multiple “Comment” submissions and hundreds of pages of correspondence.

My initial experiences with the PRL “Comment” gave me the impressions that:

- (a) PRL had minimal interest in correcting published errors, and
- (b) PRL was actively enabling DAJ’s unprofessional refusal to justify published claims.

My later experiences with JPA and (to a lesser extent) PRA extended these impressions to the latter journals.

The JPA experience was particularly revealing. It held my first “Comment” (pointing out the gap in DJ’s attempted proof of DAJ’s main claim) for almost a year, only to reject it on the sole basis that rejection was the “most satisfactory” “course” for JPA. A second “Comment” pointing out the incorrect matrix multiplication that invalidated DJ’s JPA Corrigendum was held for six months. Then JPA informed me that it had decided not to consider the content of the “Comment” because its substance had already appeared in the arXiv!

The JPA rejection letter is so revealing that it is worth quoting in full. A cover letter stated that its author is an unnamed member of JPA's Editorial Board.

“ I have looked at the proposed Comment along with the extra material provided by the author. My view is that it is not necessary for J Phys A to consider this Comment in detail. The author has already made claims about errors in the paper by Dressel and Jordan and their Corrigendum in a series of versions of the comment posted on the arXiv. It is for the readers interested in this area of activity to read this material and make their own decision. If the author can make sufficient progress on the validity (or not) of the "general theorem" then the best course of action would be to write a regular paper on this contentious issue, which would be more than welcome for further consideration.”

The pretext given for the rejection is so flimsy that it can hardly even be considered a “pretext”. If that were the real reason, JPA could and should have informed me immediately after submission instead of holding the submission for six months. At this point, the issue of the correctness of the Corrigendum and consequently of the attempted proof of DAJ's claim has been reduced to whether or not two  $2 \times 2$  matrices have been correctly multiplied, and yet it is impossible to obtain a published correction of even such an elementary and unequivocal error.

But there is another astonishing aspect. The “General theorem” (GT) mentioned is what DJ calls in JPA the main claim of DAJ (see above for its statement). The Board member freely admits that the GT cannot be regarded as proved. Yet it appears in JPA as an established result, and JPA refuses to issue a correction! This is in direct violation of editorial ethics spelled out on JPA's website.

DAJ's main claim also appears in PRL as an established result. Will PRL issue a correction?

My experience with PRA was somewhat better, but far from reassuring. Initially, my “Comment” pointing out the incorrect matrix multiplication was rejected due to mathematically incompetent referee reports which claimed that the Comment was mathematically invalid (among various other spurious pretexts for rejection). The editor refused to send it to a mathematically competent referee. (Almost any mathematician would have been able to tell her that there was no error in the Comment's simple mathematics.)

I had suggested that an easy way to determine the validity of the Comment's criticism of DJ's proof (i.e., that it relied fundamentally on an incorrect matrix multiplication) would be to simply ask the authors. I doubted that they would

dare lie about something so simple and unequivocal. However, Dressel and Jordan reverted to “stonewall” tactics which they have used successfully before—they flatly refused PRA’s request to state their views of the Comment’s criticism. As a result, the Comment had to go to referee, thus avoidably wasting the time of two referees and a Board member. So far as I can tell, PRA treated this refusal to cooperate as perfectly normal and proper.

On appeal, the rejection was overruled by a member of the Editorial Board, who confirmed after three months of deliberations that DJ had in fact incorrectly multiplied the matrices, and that this error invalidated their attempted proof of Lemma 1. Then PRA invited the authors to submit an erratum, which would obviate the Comment. The authors agreed, and their Erratum is scheduled for imminent publication. (For verification and further information, PRL can contact editor Jihane Mimih of PRA.)

I think it is fine that the authors have admitted their error in an Erratum. I don’t give a fig that the Comment will not be published. I am retired, and publication confers no professional advantage. But if a non-retired person had spent hundreds of hours trying to get correction of a simple error into the literature, it would be understandable why he might be annoyed at this result.

In effect, PRA rewarded DJ’s refusal to cooperate by offering them the opportunity to submit an erratum which makes it appear as if they are ethical authors who corrected their error as soon as it was discovered. (Actually, it took six months, during which Dressel quietly corrected the same error in his Ph.D. dissertation while ignoring the JPA and PRA errors.)

To conclude, having carried the matter this far, with the end finally in sight, I have a personal interest in learning if PRL will correct a publication which it knows to be not only misleading, but actually wrong. The main claim of DAJ has not been proved. This should be noted in PRL, both to prevent other researchers from relying on it and so as not to restrain others from working on it. This time, there can be no question about the error, which reduces to a multiplication of  $2 \times 2$  matrices.

We all make “best guesses” at the future based on past experience. Given my past experience with trying to get PRL, PRA, and JPA to correct errors, if I had to bet at even odds on what PRL will do, I would bet that it will find some pretext to avoid dealing with the matter. But I could be wrong, and that is why I have taken the time to write this letter.

Sincerely,

Stephen Parrott