

## Preface

I have been asked to act as an adjudicator of sorts between the authors and Referee B. The original recommendation of Referee A was for some revision of a fundamentally interesting manuscript, which the authors clearly responded to satisfactorily. Referee B finds it difficult to determine the newness of the manuscript, and makes many critiques of the article. The authors then consider that B's comments were not made in good faith, and present arguments accordingly, with – to my knowledge – no change in the manuscript.

To resolve what currently is an impasse between the authors and B, I consider the following questions:

- What is the relevance of the article?
- Are the methods valid?
- Are the remaining critiques of B reasonable or in bad faith?

I then make some recommendations on how to proceed from here.

Throughout, I do not comment on the precise details of the article or accuracy of specific critiques, but focus on the refereeing process itself.

### What is the relevance of the article?

The stated aim of this manuscript, from p2, is

*“to present a fully analytic time-domain model valid for all viewing angles, provided that  $\eta < 1$ .”*

Referee B however states:

*“The theoretical results are basically the same as those presented in ref [31], only that they are now given in the time domain and the form factor is evaluated with simple approximations of the shower model, a gaussian for the depth development and an exponential decay for the lateral distribution.”*

These two statements are mutually consistent– on page 2, the authors note that semi-analytical treatments exist which allow a given model of shower development – taken from Monte Carlo – to be produce an implied field strength.

A major criticism from Referee B therefore is that one could trivially take ref 31, insert one's own analytic treatment, and proceed – and I agree with Referee B that the theoretical aspects of this are not sufficient to warrant a new paper.

However, further down, referee B states

*“It is true that simple models for radio pulses could be of much use at different levels in such experiments, as the authors state.”*

Referee A acknowledges this in their remarks, and considers this relevant, stating:

*“The manuscript derives a fully analytic model of Askaryan radiation in*

*ice in the time domain. This manuscript will make an excellent addition to the literature on modeling Askaryan signals in ice"*

Thus when Referee B asks:

*"perhaps the new contribution is to give an explicit expression in the time domain for the radio pulse away from the Cherenkov cone."*

I think the answer is clearly "Yes".

Therefore, I think all parties concerned – A, B, authors and myself – can agree that if the evidence is there that this paper presents an accurate analytical calculation of Askaryan pulses, it is worthwhile publishing.

### **Validity of methods**

This brings in the question of physical accuracy – are the methods valid in reaching this conclusion?

On this, Referee B states:

*"There is a phenomenological part of the article that compares these analytical results in the time domain to an alternative calculation. This, I believe, is new and maybe the authors are intending to justify the approximations made in the new analytical expression by making a detailed comparison of the result with a reference calculation."*

I.e. clearly an analytic treatment needs to prove its relevance by comparison to more accurate methods.

I do not see anything in B's report that questions the accuracy of the comparison. Their comments, which begin:

*"The authors discuss in much detail the behavior of the results obtained in the time domain, relating them to shower properties..."*

can be dealt with via small changes, and does not affect the publishability of the paper.

Furthermore, A considers this a worthwhile addition that addresses their original question on accuracy. Thus I conclude that, at its core, the article absolutely is publishable in PRD. However, it does not mean that the article should necessarily be published in its current form. This is addressed in the next section.

### **Are the remaining critiques of B reasonable or in bad faith?**

In their reply to B, the authors state:

*"What we did receive from Referee B that is unprofessional..."*

This is a significant comment that should be addressed regardless of other concerns.

Going into particulars, the authors object that

*"Telling authors that major rewriting of the article is required for it to be published in any journal" comes across as an attempt to block the paper on any grounds one can find, and not something done in good faith*

To assess this comment requires more context.

Referee B makes two broad categories of comments on the paper which do not affect its fundamental suitability for publication, but do imply major changes. These are on the topics of notation, and general length/writing style. It is in that context that B makes the above remark, concluding:

*“There are many other issues of the paper that I am not willing to spend more time in writing because the condition for me to accept this article for publication is that the authors should rewrite it according to all these recommendations and concerns”*

to which the authors respond:

*“there are real questions about whether this report was done in good faith.” and “Although we welcome any additional responses from Referee B, we would like a more professional response.”*

Let me first state that, given this history of the article, I somewhat sympathise with the emotions of the authors – they thought they had an article close to acceptance, then they are asked to perform a major revision.

However – I do not think the report of Referee B was made in bad faith. Without delving into details such as the relevance of the LPM effect for the article, B clearly does go into detail regarding their comments, and their recommendations regarding improving notation and shortening the article appear to be genuine suggestions to make the article a better contribution to science.

I also don't think that the recommendations from B are contradicted by A – in my experience, many referees will not consider questions on the appropriate length of an article. Indeed, A suggests moving much of the material to the appendices, and while they are satisfied with the outcome, there is a clear shared sentiment.

Given that general agreement from all parties is that the mathematical derivations are not new, I am also surprised that the article is as long as it is. In that context, the general sentiment of B's comments – to reduce the length of the article, and clarify precisely what is and is not new - is valid, although the authors should feel free to argue regarding the specifics.

So to answer the question: no, I do not think that B's report is made in bad faith. I think the comments are made in good faith with a genuine intent to improve the paper, and should be regarded as such. This is not to say that they are phrased as well as they might be – and indeed, are probably overly critical – but they should not be dismissed.

### **Where from here?**

The authors have replied to B's comments both in general and the specific. However, I think that their replies may have been coloured by their interpretation of B's report being in bad faith. While they should feel free to argue for/against changes in the manuscript, I do not see any attempt to take B's comments into consideration.

I do believe that some effort should be made along the following lines:

- Re-examine the manuscript in case there are instances where the clarity on what us/is not new can be improved
- Shorted the article to necessary information, keeping in mind the fundamental goal is to provide and validate a fully analytic treatment, but not a new method of deriving fields from cascade parameters
- Simplify notation

Nonetheless, I also doubt that future dialogue between the authors and B would be fruitful. I do not wish to suggest that I or anybody else act as a third referee in this instance.

My suggestion on how to proceed therefore is that the authors reconsider B's comments. After all, they are aimed to improve readability. I then suggest that the Editor checks that such an effort has been made, and makes a determination to publish accordingly. I suggest an editorial role here since readability and clarify will strongly affect the impact of the article (as measured by e.g. citations) and in this both the authors and the Editor have a mutual interest.

I do not suggest a further round of refereeing.