

**From:** [Miller, Carl A. \(Fed\)](#)  
**To:** [Jordan, Stephen P. \(Fed\)](#)  
**Subject:** Re: WERB  
**Date:** Wednesday, December 14, 2016 12:32:23 PM

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Hi Stephen –  
Thanks, I read the abstract – looks interesting.  
-Carl

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Carl A. Miller  
Mathematician, Computer Security Division  
National Institute of Standards and Technology  
Gaithersburg, MD

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**From:** "Jordan, Stephen P (Fed)" <stephen.jordan@nist.gov>  
**Date:** Tuesday, December 13, 2016 at 8:51 PM  
**To:** "Miller, Carl A. (Fed)" <carl.miller@nist.gov>  
**Subject:** Re: WERB

Nevermind, I see what you meant about eq. 44. I forgot to write the dx. Thanks again.  
Incidentally, you might be interested in a recent paper about fundamental limits to communication:

<https://arxiv.org/abs/1611.05821>

I believe it is extremely far from being relevant to present-day technologies, however.  
Best regards,  
Stephen

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**From:** Stephen Jordan <stephen.jordan@nist.gov>  
**Sent:** Tuesday, December 13, 2016 6:22 PM  
**To:** Miller, Carl A. (Fed)  
**Subject:** Re: WERB

Thanks, Carl. I have not figured out how to achieve a compressed clock and spatial locality both in the same construction.

Regarding eq. 44, what do you mean by a "d" term? I notice now that I forgot a factor of  $i$ . Hidden inside of eq. 44 there are really two terms, one coming from the edges and one coming from the vertices. They are both identical so I just added them together without explicitly including an extra line in the eqnarray. Or perhaps I have made a mistake which I am not noticing.

-Stephen

On 12/13/2016 04:44 PM, Miller, Carl A. (Fed) wrote:

Hi Stephen –

I read your paper, and I quite liked it – the style made it easy to read despite not having a complete background. The take-away that I get from the paper is this: despite some physical principles that would seem to limit the speed of computation, one can do quantum computation arbitrarily fast **\*if\*** one can place qubits arbitrarily close together. The most important technical content seems to be the choice of the Hamiltonians that carry out these ultra-fast computations.

I just have superficial comments, which I've included below. I'll ask Cathy Graham about signing off, and let me know if I can do anything else.

The paper makes me think that it might be interesting to chat some time about the real physical limits on quantum cryptography – I'm inclined to take certain mathematical assumptions for granted, but more knowledge of the underlying physics might open up more avenues of research (or close some off ☺).

Talk to you later!

-Carl

Comments:

Pp. 4: "with a total of  $3G$  gates and  $U'_1 = \dots U'_G$  [...]". I think I know what is meant here by the ellipses, but it seems a little awkward -- maybe it could be written differently?

Pp. 5 (and elsewhere): I'm used to seeing "gaussian" capitalized, but maybe that's not the convention here.

Pp. 6: "can be completely accomodated by padding" --> "can be completely accommodated by padding". (Occurs elsewhere.)

Pp. 8: Eqn. (31): Inconsistent use of the tensor product symbol? (A similar expression occurs further up the page.)

Pp. 10: Eqn. (44): Is there no "d" term?

Section 6: Does locality matter here? (Just curious.)

Pp. 12: "associating a register logarithmically many qubits" --> "associating a register of logarithmically many qubits"?

Ref. [9]: Capitalize "Lorentz"?

Ref. [26]: Date is repeated.

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**From:** "Jordan, Stephen P (Fed)" <[stephen.jordan@nist.gov](mailto:stephen.jordan@nist.gov)>

**Date:** Friday, December 9, 2016 at 3:06 PM

**To:** "Miller, Carl A. (Fed)" <[carl.miller@nist.gov](mailto:carl.miller@nist.gov)>

**Subject:** Re: WERB

Sounds good, thanks!

-Stephen

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**From:** Miller, Carl A. (Fed)

**Sent:** Friday, December 9, 2016 3:05 PM

**To:** Jordan, Stephen P (Fed)

**Subject:** Re: WERB

Ok, I'll put together some comments on the updated draft. (I assume the expectations for comments are pretty open-ended.) Talk to you later!

-Carl

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**From:** "Jordan, Stephen P (Fed)" <[stephen.jordan@nist.gov](mailto:stephen.jordan@nist.gov)>

**Date:** Friday, December 9, 2016 at 11:07 AM

**To:** "Miller, Carl A. (Fed)" <[carl.miller@nist.gov](mailto:carl.miller@nist.gov)>

**Subject:** Re: WERB

No problem. You can just email me your comments or even tell them to me in person. Then there will be a form to sign, which depending on division is done either online or on an actual piece of paper. As to the mechanics of signing, you can ask Cathy Graham and she will know what to do.

Best regards,

Stephen

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**From:** Miller, Carl A. (Fed)

**Sent:** Friday, December 9, 2016 11:03 AM

**To:** Jordan, Stephen P (Fed)

**Subject:** Re: WERB

Hi Stephen –

I'm sorry, I'm new to this process and didn't know whether to expect further instructions. 😊 I can take care of this by Tuesday next week. Should I just send you my comments or enter them online? Apologies if this causes any delay.

-Carl

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Carl A. Miller

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On 12/8/16, 5:50 PM, "Stephen Jordan" <[stephen.jordan@nist.gov](mailto:stephen.jordan@nist.gov)> wrote:

Hi Carl,

I was wondering whether you have had a chance to look over my manuscript

for WERB. I'm thinking I might try to post to the arxiv next week. I have attached the current draft, which incorporates some improvements prompted by Manny's comments.

Best regards,

Stephen