Reviewer #1 Evaluations:  
Science Category (Required): Science Category 2  
Presentation Category (Required): Presentation Category B  
Key Points (Required): Yes  
  
Reviewer #1 (Comments to Author (shown to authors):  
  
This is a review for the manuscript Shumko et al., submitted to GRL. This paper describes dual FIREBIRD cubesat observations of a single, bouncing microburst. The dual observations allow for a direct determination of the scale size and other properties of the microburst. Microbursts likely represent an important source of radiation belt electron loss during storm recovery phase, and this is an important result that can be used to (among other things) compare to the size of chorus wave packets which are likely responsible for the scattering that creates the microburst. It's also a great example of the utility of the kinds of useful measurements that can be made from small-scale and budget missions.  
  
Overall I find that this paper may be suitable for publication after some of my concerns are addressed.

*Thank you for your critique and feedback regarding this manuscript. We have made your recommended changes, and our responses are in blue italicized text. As before, we replied with “done” for simple fixes.*  
  
My only real issue occurs around L201: I find this measure of the longitude to be a bit at odds with how I naively think of uB extent, which is the physical extent of the region of precipitating electrons upon their first encounter with the atmosphere (or as measured at LEO). This extent is what's related to the physical extent of the source of the microburst (probably chorus). Seems you're calculating longitudinal extent based on all the observed bounces. In a way this makes sense since this is the extent over which each uB will cause precipitation loss (since a certain fraction of e- precipitate on each bounce). However, it's at odds with how most people will think of the uB extent. I think it would be good to clarify why you're defining the extent the way you do. Also, is this the reason why you're finding the uB to be the largest observed on FIREBIRD?

*Thank you for pointing this out, we have clarified our assumptions to estimate the minimum longitudinal scale size. Due to the energy dispersion signature, the drifted electrons that were observed in the subsequent decaying peaks were from the initial microburst. With our assumptions and observations, the minimum longitudinal scale size depends on the energy channels used. We calculated the minimum longitudinal scale sizes for the highest scattered energies since it gives the largest lower bound scale size. In the discussion section we point out that we can only place bounds on the scale sizes, and the energy dependence of the longitudinal scale size is an artifact of the technique we used to estimate their drift motion.*

L62-64: Some rewriting needed here. *This sentence was out of place, so we moved it into the next paragraph.*

L92: "were placed 632" *Done*

L94: Change "of events" to "of microbursts" *Done*

L94-95: Remove "that are either spatial or temporal". It's redundant with "resolve the space-time ambiguity" *Done*

L101: These are sampling periods, not rates. *Done*

L106: Careful with wording: the "mirror again" part doesn't produce a train. What you're trying to say is that subsequent mirrorings produce a train of decaying peaks. *We have clarified this sentence.*

L109: Confused about "HiRes". Does this refer to both the 18.75ms and the 12.5ms modes? Should you mention that these are called HiRes in L101? *Done. We first introduce the HiRes data at the end of the first paragraph in section 2.*

L128-129: Probably want to rewrite this since the first sentence is not true for all e-....just those in the DLC. *Thank you for pointing this out. We have clarified the sentence to refer to the electrons in the DLC.*

L157: This should be discussed more since it's a fairly involved figure. You don't have to go into as much detail as in the figure caption, but should probably mention that the different lines are different models, etc. Another option is to say in the first sentence of this paragraph: "...derived from four magnetic field models, the results of which are shown in Fig. 2." *We incorporated your suggestion in the first sentence and mentioned that Fig. 2 shows t\_b curves for the four models. We did not make any other changes in the text to avoid unnecessary redundancy since the following paragraphs describe Fig. 2 in greater detail.*

L163: a bit confusing. I think some readers won't know what you mean here. *Thank you for pointing this out, we have clarified this paragraph.*

L180-181: This spectra is similar to spectra show by Lee et al. [2005] from STSAT-1 and Datta et al. [1997] from sounding rocket measurements. *Done*

L185: Maybe try: "after applying time and position corrections detailed in the SI…" *Done*

L207: I understand what you're saying in this paragraph, which is:  
-Longitude extent determined by highest energy bin, which contains the electrons that drift the fastest  
-FU3 sees largest long size. Its largest energy bin extends from 555 to 771 keV.  
-The min and max long sizes from these two energies are 39 +/- 1 and 51 +/- 1 km.  
However, I found it quite confusing to read the first time through.

*We have clarified this paragraph to justify why we use FU3 to calculate the minimum longitudinal scale size, and we improved the grammar regarding the scale sizes calculated from the lower and upper edges of the fourth energy channel. As we mention above, the energy dependence of the minimum longitudinal scale size is entirely based on our energy channels, and we chose the highest observed energies to calculate the drift velocity. We believe this is appropriate because the energy dispersion signature implies that all of the electrons were scattered over a region at least of this size.*

L211: Since you're not actually comparing to the chorus packet size in this paragraph, I'd remove the sentence starting on L211. Otherwise, readers will wonder if this paragraph got cut off too early b/c this isn't further mentioned in this section. *We added a transition sentence that wraps up the paragraph, and refers to the more detailed discussion in the discussion section.*

L226: Is this true? If you calculated the longitudinal scale size using the lowest energy channel rather than the highest, I think the size would be much smaller based on the technique you've used. *Thank you for pointing this out. Our response to your L201 comment should address this comment as well.*

L250-253: This may read better if you discuss the "midnight" part by changing the last sentence to: "...in future studies, except perhaps near midnight where the magnetosphere is more stretched and difficult to model." *We clarified the sentence to point out that this method can be used to validate and improve magnetic field models near midnight.*

L273: red dotted *Done*

L274: blue dot-dash curve *Done*