Dear Editor,

We again would like to thank both yourself and the reviewer for the time spent considering our manuscript and the comments that have been made.

In response to the reviewer's first comment, regarding the comparison between the sensitivity (or potential thereof) of the Silicon Cold Electron Bolometer and other detectors: we have made a number of minor revisions to the text to add clarity. Firstly, we have removed the words 'or better than' from the first page of the manuscript. We have also removed the sentence beginning 'Comparable to other cryogenic detectors (such as transistion edge sensors, kinetic inductance detectors and hot electron bolometers' as we felt it could have been confusing (as pointed out by the reviewer) and was somewhat repeating what had already been said at the start of the introduction. When discussing the comparison between the phonon noise in the Silicon Cold Electron Bolometer and the Hot Electron Bolometer (as reported by Karasik and Cantor, Appl. Phys. Lett. **98**, 193503 (2011)) we have rephrased the end of this sentence (on page four of the manuscript) to 'this compares well to the 'dark' noise equivalent power estimations for hot electron bolometer type devices operating at comparable phonon temperatures, which share a common noise limit in these circumstances.'. Finally, with regards to sentence 'Furthermore if the area of the absorber and the phonon temperature were both to be lowered by a factor of two (both are viable), this limit would become 3×10^{-19} W $\mathrm{Hz}^{-1/2}$': our intention here was not to make a highly competitive statement as to the performance of the device, we wished to show what results could be achieved in the next stage of this detector's development. To make this clearer we have now replaced the above sentence with the following 'The current proof of concept detector has a very large absorbing element, if this was reduced by a factor of 10 (which is still larger than the absorbing element of the comparable hot electron bolometer [ref: Karasik and Cantor (2011)] and still possible with standard photolithography) the phonon noise limit would be reduced to 2.6×10^{-18} W $\mathrm{Hz}^{-1/2}$ for the same operating temperature.', the reference is intended to give context to the size of the absorber.

The reviewer raises a good point that further study of the strained silicon material is required to determine whether this type of detector is capable of operating at frequencies of 1 THz and beyond. We have started preliminary investigations in to what range of frequencies the current strained silicon material may be of use for a detector. Our preliminary results are shown below in Figure 1 of this letter. This measurement was performed using a Fourier transform spectrometer and well calibrated detector to measure the transmission spectrum of the material. Figure 1 shows that for frequencies below approximately 5 THz the material shows promise for use as a bolometric absorber, after this the increasing transmission of the material may restrict its use as a detector.

With regards to the reviewer's second point, concerning the sentence 'Here we present optical measurements of a Strained Silicon Cold Electron Bolometer designed to absorb millimetre-wave radiation, these measurement have been taken with the detector looking out of a window in the cryostat at a number of sources including a Fourier transform spectrometer.'. We have reworded the final clause of this sentence such that it now reads 'these measurement have been taken with the detector looking out of a window in the cryostat which allowed for a number of sources, including a Fourier transform spectrometer, to be observed.'. We hope this change makes the advantages of this experimental configuration clear. In response to the reviewers concern that this configuration may have saturated the detector, we would like to reassure him/her that this was not the case as can be seen from the red and green current-voltage curves shown in Figure 4 of the manuscript. One of the key reasons for looking out of the cryostat was to allow the spectral response of the detector to be measured. It also allowed for better calibration of the incident power by using a blackbody source in the Rayleigh-Jeans limit where the power is linear with temperature. We fully agree with the reviewer that for detectors designed to operate at lower levels of background power, such as those required for the future of space missions in the terahertz regime, testing with either a cold blackbody source or through heavily attenuating windows is indeed required. Finally we would say that testing using a cold blackbody source operating in the Wien tail can, in itself, prove challenging (as discussed by Morozov *et al.*, AIP Conference Proceedings, **1185**, 48-51 (2009)). As the reviewer rightly points out this detector is at a very early stage of development and as such we felt it most important to prove the concept of the detector as thoroughly as possible (i.e. including spectral response measurements alongside the noise and response measurements).

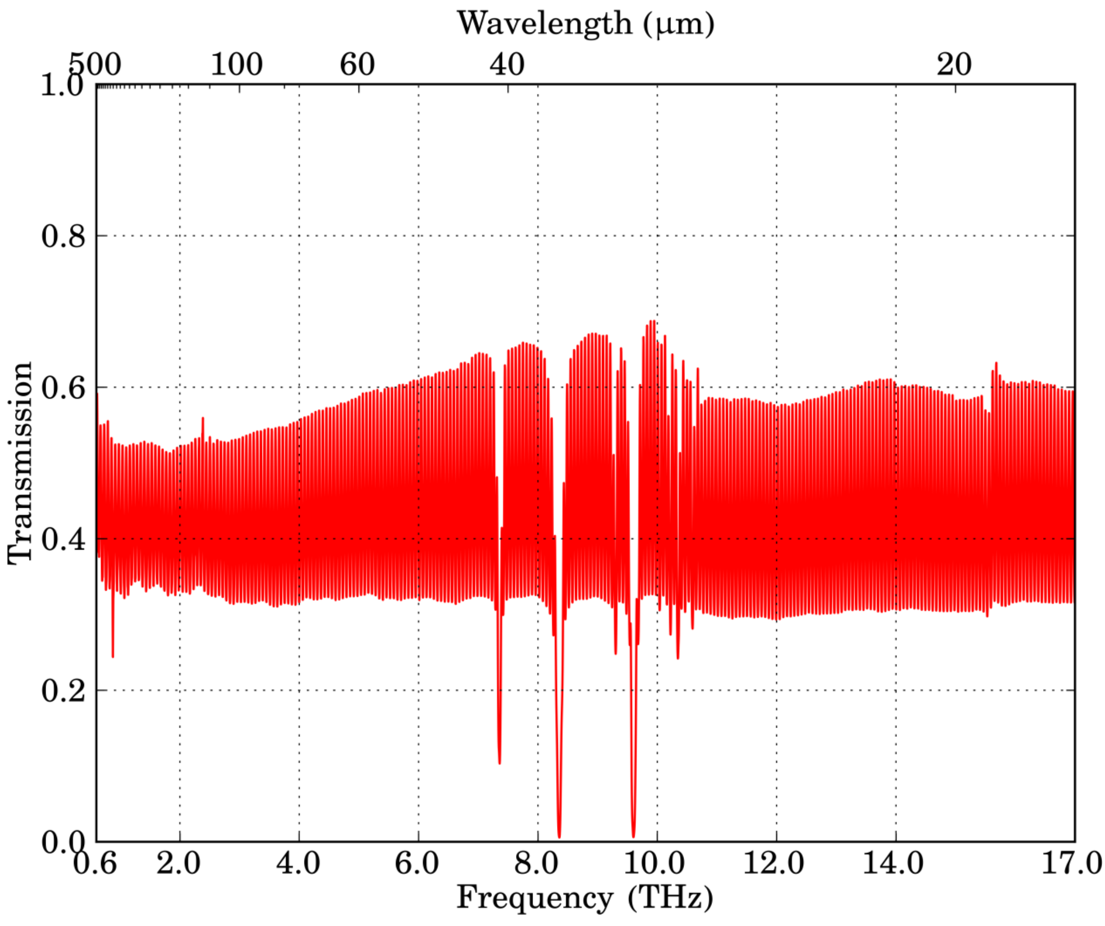

Figure 1: Measurement of transmission of radiation through strained silicon with increasing frequency. The absorption lines seen between **6** and **10 THz** are a feature of the silicon substrate.

We have again uploaded an additional PDF file (ReviewerComparisonRevision.pdf) for the benefit of both the reviewer and the editor. This document highlights the changes that have been made to the manuscript since the last revision.

Once again we are very grateful for the time spent by both the reviewer and editor in considering this work and for the constructive comments and suggestions which have been made.

Yours Faithfully,
Tom Brien