

## Chapter 5

# Conclusion

The measurements presented here form a comprehensive characterization of the resonator bolometer array and point towards several avenues of further research. Design changes have been proposed which would improve the device performance. For example, depositing the capacitor directly onto the silicon substrate instead of on a layer of silicon nitride should substantially reduce the TLS noise. Additionally, other superconducting microresonator detector projects have begun to engineer the resonances at much lower frequencies in order to eliminate the need for an analog mixer. Removing this analog component not only reduces complexity but significantly reduces cost and removes a potential source of electronic noise from the system. Finally, investigations into increased optical coupling will help ready this device for science applications.

One of the initial uses envisioned for this technology is in climate monitoring of the Earth from a satellite in low-earth orbit. For this application, the loading conditions measured in the laboratory and presented here are similar. Under these conditions the device has been shown to be photon-noise limited with sufficient dynamic range and is therefore nearly an ideal device. To increase the mapping speed, the optical efficiency of the detector needs to be improved and we are actively working on this aspect of the device.