FREQUENCY SELECTIVE BOLOMETERS

Abstract Submission Form

2006 National Radio Science Meeting

Abstract: wilson29697

Date Received: September 19, 2005

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In recent years, substantial effort has been made to increase detector count in arrays and more efficiently use the available telescope field of view. This has resulted in a wide array of upcoming large focal plane instruments which will be operating in the mm and submm windows. In comparison, much less effort has been focused on technologies that increase the efficiency with which we use the available telescope bandwidth. Recognizing that many scientific observations in the mm and submm windows will benefit from an ability to measure continuum spectral energy distributions in sources, we have developed a detector technology tailored to allow compact, high-efficiency, multi-band photometers in a single pixel.

Frequency Selective Bolometers (FSBs) utilize a lossy frequency selective surface as the detector absorbing element. This allows the detectors to have both high in-band efficiency and near unity out of band transmission. Consequently, several FSBs may be stacked in a linear fashion to form a multi-band photometer in a single pixel. We describe recent results in modeling and measuring FSB absorption spectra as well as measurements of absolute absorption efficiencies of FSBs being built for the SPEED photometer. Overall we demonstrate good agreement between our electromagnetic models of lossy frequency selective surfaces which now allows design and iteration to take place in software rather than in hardware.

FSBs are not without their challenges. We also highlight some of the technical hurdles we have faced while coupling the optical portions of the FSB with transition-edge superconducting thermistors. We conclude by examining potential future opportunities with FSB arrays and polarization sensitive FSBs.

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4. I - Invited Paper, Program chair: Simon Radford

5. No special instructions