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Microcalorimeter X-ray detectors for solar physics

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Cryogenic microcalorimeters offer an unparalleled combination of spectral resolution and bandwidth. They have achieved < 3 eV resolution at 5.9 keV, and can achieve this performance simultaneously over the range of 0.25-10 keV. The challenges of providing the low ($<$0.1 K) operating temperatures have already been met: microcalorimeters have flown on sounding rocket flights to study the soft X-ray background of the interstellar medium, and will soon be launched on the ASTRO-E II satellite. Because they are multiplexable and fabricated using standard photolithographic techniques, microcalorimeters may be formed into large arrays. Since each pixel of such an array detects the arrival time of each photon (to within <10 μs), we are now in a position to build an instrument offering simultaneous spatial, temporal and energy resolution. Such an instrument, deployed to observe the Sun, would bring a new wealth of information about solar processes.

Current performance of microcalorimeters will be presented. Technical improvements required to optimize microcalorimeters for solar physics will also be discussed.