Antenna coupled Kinetic Inductance Detectors for space based sub-mm astronomy

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To achieve background limited detection, future space missions in the far infrared and sub-mm radiation bands will require large arrays (>1000 pixels) of very sensitive detectors. A typical requirement for the noise equivalent power is 10^-19 W/Hz^0.5 for a Fourier Transform Spectrometer, which is 100 to 1000 times more sensitive than the state of the art such as on HERSCHEL. Such low NEP is a significant technical challenge, both to achieve for the detectors and to demonstrate in the laboratory. Kinetic inductance detectors can theoretically achieve this performance and have significant advantages over other types of detectors, for example are well adapted to frequency domain multiplexing. We present antenna coupled kinetic inductance detectors, showing the loaded optical NEP measured with a well controlled narrow band black body radiation source. We will also discuss the optimization route required to reach the requirements for future missions, including the optical testing requirements.