First Results from Thermal Kinetic Inductance Detectors: Highly Multiplexible Bolometric MKIDs for X-ray Spectroscopy

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A Thermal Kinetic Inductance Detector (TKID) modifies the principle of microwave kinetic inductance detectors (MKIDs) by suspending the superconducting inductor and a thick X-ray absorber on a freestanding membrane. TKIDs operate as bolometers and have the potential to achieve time and energy resolutions that can compete with transition edge sensors while at the same time being highly multiplexible, promising a feasible way to kilo- or even mega-pixel detector arrays. Their unique combination of high spatial and energy resolution makes TKIDs ideal for X-ray astronomy and many other applications. Here we present our first working TiNx TKID prototype and explain the pulse fitting procedures necessary to increase energy resolution. Even though optimizing its sensitivity and thermal design is a work in progress, we have already been able to achieve an energy resolution of 75 eV at 5.9 keV. As particularly its thermal design still has to be improved, our TKID prototype still exhibits distinct saturation effects. Eliminating them by optimizing the design or modifying the TKID readout should in principle allow us to resolve less than 10 eV at 5.9 keV.