

## EDP1-5

### **Theory for the Response of a Superconducting Kinetic Inductance Detector to an Electromagnetic Wave Packet**

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We construct a theory for the response of a superconducting kinetic inductance detector to an electromagnetic (EM) wave packet with a small spatiotemporal extension on the basis of our previous theory for the operation principle of CB-KID [1]. An EM wave packet incident on the superconducting nanowire induces an AC quasi-particle current in the small region where the EM wave packet is irradiated. It is shown that this quasi-particle current generates voltage pulses inductively, which propagate towards both ends of the superconducting nanowire. In the current-biased case the kinetic inductance of the detector is also varied by a hot spot originating from the damping of the quasi-particle current. As a result, a pair of voltage pulses with opposite polarities are generated. The possibility to detect single-photons in this detector is also discussed.

Keywords: kinetic inductance detector, superconducting nanowire