

IAF SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Advances in Space-based Communication Systems and Services, Part 3 (4)

Author: Prof. Philip Mauskopf
Arizona State University, United States, mauskopf@asu.edu

HIGH SENSITIVITY CRYOGENICALLY COOLED ULTRAFAST DETECTORS FOR OPTICAL AND
NEAR-INFRARED COMMUNICATIONS RECEIVERS

Abstract

We describe the design and performance of high speed superconducting nanowire detectors operated in linear mode with photon number resolving sensitivity and 10s of GHz bandwidth. Superconducting nanowire detectors operated in geiger mode have single photon sensitivity with a maximum count rate of 10s of MHz. These devices are biased close to the critical current and generate a voltage pulse when an incident photon causes a section of the nanowire to quench and become resistive. The maximum count rate is limited by the recovery time of the nanowire which is on order of nanoseconds. We describe the operation of a parallel array of superconducting nanowires biased with a current well below threshold which exhibits a linear response to incident optical power with a recovery time of a few picoseconds and correspondingly high bandwidth. We present the theory and initial measurements of these devices.