Superconducting Detectors for Millimetron Space Mission

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Abstract - Millimetron is an astrophysics space observatory which is being developed by the Russian Space Agency. It has an unfoldable 10 m diameter cryogenic mirror which in combination with anti-Solar Lagrangian orbit LII will allow it to reach sensitivity limited only by galactic and extragalactic background in the 100-6000 GHz frequency range. This also puts extreme demands on the sensitivity of Millimetron instruments, which is limited by detectors. Superconducting detectors both coherent and incoherent are the only choice thus Millimetron will have a cryogenic (0.1. to 4 K) instrument package. In this presentation we review typical detector sensitivity requirements for cryogenic space mission and discuss progress in major available superconducting detector technologies: transition edge sensors, microwave kinetic inductance detectors, cold electron bolometers and superconductor-insulator-superconductor (SIS), hot electron bolometers (HEB) and kinetic inductance parametric amplifiers. Possibility of integrating several key components on one superconducting chip is also discussed. We present layout of main Millimetron instruments which should allow one to achieve these demanding sensitivities.