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Title:2D array of cold-electron nanobolometers with double polarised cross-dipole antennas
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Abstract:A novel concept of the two-dimensional (2D) array of cold-electron nanobolometers (CEB) with double polarised cross-dipole antennas is proposed for ultrasensitive multimode measurements. This concept provides a unique opportunity to simultaneously measure both components of an RF signal and to avoid complicated combinations of two schemes for each polarisation. The optimal concept of the CEB includes a superconductor-insulator-normal tunnel junction and an SN Andreev contact, which provides better performance. This concept allows for better matching with the junction gate field-effect transistor (JFET) readout, suppresses charging noise related to the Coulomb blockade due to the small area of tunnel junctions and decreases the volume of a normal absorber for further improvement of the noise performance. The reliability of a 2D array is considerably increased due to the parallel and series connections of many CEBs. Estimations of the CEB noise with JFET readout give an opportunity to realise a noise equivalent power (NEP) that is less than photon noise, specifically, NEP = 4 10⁻¹⁹ W/Hz^{1/2} at 7 THz for an optical power load of 0.02 fW. © 2012 Kuzmin.
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