***Title*: Superconducting Flux-Flow Oscillators for THz Integrated Receiver**

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The concept of a fully Superconducting Integrated Receiver (SIR) has been developed and experimentally proven in a tight collaboration between the Institute of Radio Engineering and Electronics (IREE-Moscow) and the SRON Netherlands Institute for Space Research. A single-chip submm wave receiver includes a planar antenna integrated with a SIS mixer, pumped by an internal superconducting FFO as local oscillator (LO). A DSB noise temperature below 100 K has been demonstrated around 500 GHz. The frequency resolution of a heterodyne spectrometer is one of the major parameters for a practical application. In order to obtain the required resolution (of at least one part per million) the local oscillator must be phase-locked to an external reference. Recently a possibility of FFO phase locking has been experimentally proven for the first time for ANY type of Josephson oscillator.

To ensure phase-locked operation of an SIR a free-running FFO linewidth well below 10 MHz is required. A comprehensive experimental study of the FFO linewidth and other main parameters has been carried out in order to achieve this goal. Essential dependence of the FFO linewidth on its width, length and idle region dimension has been found. A free-running linewidth between 10 and 2 MHz has been measured in the frequency range 500 – 700 GHz. As a result the spectral ratio of the phased-locked FFO varies from 30 to 90 % correspondingly. Successful tests of the phase-locked SIR enabled the development of a 500-650 GHz integrated receiver for the Terahertz Limb Sounder (TELIS) intended for atmosphere study and scheduled to fly on a balloon in 2006. TELIS is a collaborative European project to develop a three-channel heterodyne balloon-based spectrometer for measuring a variety of atmospheric constituents of the stratosphere. The FFO performance required for successful TELIS operation will be discussed. It is important to ensure that tuning of a phase-locked (PL) SIR can be performed remotely without human intervention. For this purpose a number of approaches for the PL SIR automatic computer control have been developed. Preliminary measurements demonstrated that this goal could be achieved.

To extend an operational frequency of SIR above 0.7 THz, the gap frequency of Nb, an NbN-based flux-flow-type Josephson oscillator has been developed and preliminary tested. First results for linewidth measurements of NbN based junctions will be presented. The details of the techniques for fabrication of the superconducting integrated circuits with sub-micron tunnel junctions will be discussed as well.

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