

PHOTODETECTION IN LISA

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LISA will feature quadrant photoreceivers to produce electrical signals from the interfered optical beams. Due to the 2.5 million km distance between the spacecraft and their relative motion, the optical AC signal to be detected has an amplitude of nanowatts, with a frequency in the MHz range. This requires photoreceivers with an input current noise density of a few pA/sqrt(Hz) up to 25 MHz. In addition, the significant number of photoreceivers in a single spacecraft imposes tight constraints on the power consumption per device. Previous research at the AEI identified as most promising a hybrid circuit using discrete GHz heterojunction bipolar transistors, which can outperform the classic OpAmp-only topology. We present the development and experimental characterization of a quadrant photoreceiver based on this hybrid topology which aims at being compliant with all LISA constraints. That includes not only performance but also size and electrical layout.