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Abstract Title:

Photomixer Systems as Submillimeter Local Oscillators and Coherent Test Sources

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Presentation: Oral

Brief Biography:

John C. Pearson received his AB in physics from Harvard University and his MA and PhD in physics from Duke University. He has been employed at the Jet Propulsion Laboratory since 1995 as a member of the technical staff. He is currently the high frequency subsystem manager for the HIFI consortium. At JPL he serves as the project element manager and system engineer for the NASA contribution to HIFI.

Summary:

The development of widely tunable coherent frequency sources for application as local oscillators or simply as test equipment above 1 THz remains an impediment in receiver development and characterization. Photomixer sources have demonstrated sufficient power to pump SIS mixers to over 600 GHz [1] and 2.5 THz of bandwidth [2]. The first generation photomixer system solved the problem of frequency calibration, but failed to fully address the needed spectral purity required for heterodyne applications [3]. A number of improved laser technologies are greatly simplifying the implementation and improving the spectral purity of photomixer systems. The general requirements for photomixer local oscillators and laboratory test sources will be presented. The current state of photomixer device and system development will be compared to the general system requirements and the development prospects will be assessed.

[1] S. Verghese, E. K. Duerr, K. A. McIntosh, S. M. Duffy, S. D. Calawa, C. Y. E. Tong, R. Kimberk, and R. Blundell, "A photomixer local oscillator for a 630 GHz heterodyne receiver," *IEEE Microwave and Guided Wave Letters*, 9, pp 245-247, 1999.

[2] S. Matsuura, G. A. Blake, R. A. Wyss, J. C. Pearson, C. Kadow, A. W. Jackson, and A. C. Gossard, "A Traveling-Wave THz photomixer based on angle-tuned phase matching," *Appl. Phys. Lett.*, 74, pp. 2872-2874, 1999.

[3] S. Matsuura, P. Chen, G. A. Blake, J. C. Pearson, and H. M. Pickett, "A Tunable Cavity-Locked Diode Laser Source for Terahertz Photomixing," *IEEE Trans. Microwave Theory Tech.*, Vol. 48, pp. 380-387, 2000.

Key Words

Heterodyne, Receiver, Local Oscillator, Submillimeter, Frequency Synthesis, THz