GENERATION AND CONTROL OF SUBMILLIMETER RADIATION WITH LOCKED DBR DIODE LASERS

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The ability of low temperature grown GaAs photomixers to radiate the difference frequency of two near infrared lasers has provided an important new means of generating submillimeter radiation[a]. A scheme to lock 850 nm DBR diode lasers and generate a precisely known difference frequency in a photomixer is presented as a potential solution to the problems of generation and control of THz frequency radiation. This approach uses two output lasers, a metrology laser and a 10,000 finesse cavity with a 3 GHz free spectral range. The metrology laser and one of the output lasers are locked to different orders of the cavity using electrical feed back based on the Pound, Drever, Hall method[b,c]. The cavity is temperature stabilized so that the frequency of the metrology laser coincides with a lamb dip in Cs. The second output laser is frequency offset locked to the metrology laser with a synthesizer and a standard phase locked loop. The result is a completely tunable, precisely known difference frequency which can be used to generate THz radiation in the low temperature grown GaAs photomixer.

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[c] R. W. P. Drever, J. L. Hall, F. V. Kowalski, J. Hough, G. M. Ford, A. J. Munley and E. Ward, *Appl. Phys.* **B 31**, 97 (1983).