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Notch Filter Possibilities for ITER Stray Gyrotron Radiation[1]

PAUL WOSKOV, MIT PSFC — ITER will have multi megawatt gyrotron systems at 170, 120, and potentially at 60 GHz for ECH, current drive, NTM control, start up, and CTS diagnostics. The ITER environment will therefore have significant background levels of stay radiation at these frequencies that can pose a problem to a number of diagnostic systems. Several, narrowband reject filter approaches have been examined. These include fundamental mode waveguide (wg) filters, quasi-optical interference filters, and molecular absorption gases. Fundamental wg stop band filters are available for 60 and 120 GHz, but have limited pass bands and may not be readily extended to 170 GHz. An overmoded corrugated wg interference filter with $>$ 30 db rejection over a 40 MHz band, a free spectral range of 6.7 GHz, and minimum insertion loss of 0.6 dB has been tested over the 100-145 GHz range and could be used to over 170 GHz. The OCS molecule as a series of 12 GHz spaced rotational lines with peaks at 60.8, 121.6, and 170.3 GHz with absorptions of 0.4, 3.2, 8.0 dB/m, respectively that could be used at low pressure with slight gyrotron adjustment. The H_2S molecule has absorption at 168.8 GHz that at atmospheric pressure would rejection by 8.6 dB/m at 170 GHz with insertion loss $<$ 0.01 dB/m below 156 GHz. The relative merits of these notch filter approaches will be presented.

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