CO_2/MWSB GENERATION WITH HIGH-J, SEQUENCE, AND HOT BAND CO_2 LASER LINES AND BROAD-BAND SCAN CAPABILITY

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A broadband tunable CO_2-laser/microwave sideband spectrometer is now in operation at UNBSJ with the following noteworthy features: (i) The source coverage has been significantly improved as we have obtained useful sideband power for regular CO_2 lines up to very high J (J_{max} = 56) as well as hot and sequence band CO_2 laser lines, giving continuous coverage over significant spectral regions; (ii) The whole system has now been automated with sophisticated computer-controlled sweep and data capture in which the HP-MW synthesizer and Fabry-Perot etalon filter are scanned simultaneously to give wide-band continuous sweep over the full 7-18 GHz range for either sideband; (iii) Balanced detection of sample and reference has greatly improved the S/N ratio through compensation for background variations. Tests on the dense methanol spectrum in our room temperature multipass static cell around 10 μm have shown excellent resolution and S/N ratio using the hot and sequence band CO_2 lines. Use of the source in the first tests of our supersonic slit-jet cooled molecular beam with OCS have shown significantly reduced line width compared to room-temperature static-cell values.