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Initial Experimental Results of a 35 GHz Efficient Harmonic Amplifier

Jose E. Velazco, Peter H. Ceperley & Doug M. Menz, Microwave Technologies Inc., Fairfax, VA 22030, USA

INITIAL EXPERIMENTAL RESULTS OF A 35 GHz EFFICIENT HARMONIC AMPLIFIER

Jose E. Velazco, Peter H. Ceperley[1] and Doug M. Menz[1]

Microwave Technologies Incorporated, Fairfax, VA 22030
[1] George Mason University, Fairfax, VA 22030-4444

We present initial experimental results of a very compact, high efficiency harmonic amplifier (HARA) prototype [1]. In this experiment, a 6 kV 200 mA pencil electron beam is modulated by a short microwave resonator operating in circular polarization at 5.85 GHz. A 35 GHz output cavity operating at the 6th harmonic of the drive frequency is employed to efficiently extract energy from the modulated beam. This device is expected to deliver 600 watts of output power at 35 GHz with 50% efficiency. Initial experimental results of the beam-wave interactions in the output cavity of the HARA prototype will be presented. The fact that the HARA does not require a beam focusing system makes for a very compact and lightweight system which is well suited for applications where size, weight and efficiency are critical.

[1] J. E. Velazco and P. H. Ceperley, Proc.1997 Int. Conf. on IRMM, M4.6, 69, July, 1997.

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Improved Transition Probabilities for MnII

Rainer Kling and Ulf Greismann, National Institute of Standards and Technology, Gaithersburg, MD 20899, USA

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Rainer Kling and Ulf Griesmann

National Institute of Standards and Technology, Gaithersburg, Maryland 20899

Accurate transition probabilities are of fundamental importance for plasma diagnostics. However the knowledge of atomic data is still unsatisfactory for many elements. Especially for Mn II experimental *f*-values, determined from arc [1],[2] and spark [3] discharges, show big discrepancies with calculations.

Therefore we started a new project for an independent measurement of transition probabilities. Fourier Transform spectroscopy has shown to be advantageous for the evaluation of complex spectra. The high resolution, limited by the doppler width of the emission lines, helps avoiding blends whereas the simultaneous recording of all spectral contributions eliminates effects of source drifts. The signal-to-noise ratio for the strongest lines is in the order of 10000 which ensures a precise determination of line intensities. The efficiency of the instrument was calibrated using an argon miniarc and a tungsten strip lamp as radiance standards.

Resonance lines, which are affected by self absorption, have to be treated with great care. Self absorption is the biggest source of systematic errors when not thoroughly checked. The braching fractions are then brought to an absolute scale by means of lifetime measurements. The uncertainty of prensent lifetime experiments using laser-induced fluorescence (LIF) is in the range of 1%-3% [4]. Thus accurate absolute transition probabilities are obtained by this method provided that all branches of an upper level are included. The total uncertainty of the presented transition probabilities is below 10%.

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