ROTATIONAL TEMPERATURE MEASUREMENTS OF AN OPTICALLY PUMPED, VIBRATIONALLY EXCITED CARBON MONOXIDE-ARGON PLASMA USING SINGLE PHOTON LASER INDUCED FLUORESCENCE OF THE $(v'' = 20)X^1\Sigma^+ \leftarrow (v' = 2)D^1\Sigma^+$ BAND

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A tunable, injection-locked ArF excimer laser has been used to obtain single photon laser induced fluorescence spectra from a highly vibrationally excited (up to v" ≈ 40), nonequilibrium CO/Ar plasma. The combination of broadband emission and rotationally resolved narrowband scanning excitation spectra has been used to determine that the fluorescence signal is due to the resonant excitation between the v" = 20 level of the $X^1\Sigma^+$ state and the v' = 2 level of the $D'^1\Sigma^+$ [a,b]. This spectroscopic data suggests that with appropriate care to avoid extraneous multi-photon chemical processes[c], the D'→X fluorescence may be used as a rotational temperature diagnostic as long as the CO v"=20 vibrational state is sufficiently populated.

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[b] G.L. Wolk and J.W. Rich, *J. Chem. Phys.* **79**, p. 12, 1983.
[c] G. Meijer, A.M. Wodtke, *et al.*, *J. Chem. Phys.* **89**, p. 2588, 1988.