Abstract Submitted
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Time-correlated single-photon counting technique to measure lifetime of the Na_2 $6\,^1\Sigma_g^+(7,31)$ state[1] DINESH WAGLE, Miami University, MICHAEL SAARANEN, Miami Univ, EMMA MCLAUGHLIN, AMELIA PALADINO, SETH ASHMAN, Providence College, BURCIN BAYRAM, Miami University — We report on the lifetime measurement of the $6\,^1\Sigma_g^+(7,31)$ state of sodium molecules using a time-resolved spectroscopic technique [1]. The $6\,^1\Sigma_g^+(7,31)$ state was populated by double-resonance excitation via the intermediate $A\,^1\Sigma_u^+(8,30)$ state. This was accomplished by two synchronized pulsed lasers pumped by a Nd:YAG laser operating at the second harmonics. The molecular fluorescence emitted from the final state was collected and the lifetime was measured from the v=6 doublet using a time-correlated single-photon counting technique, as a function of argon pressure. From this, the radiative lifetime was extracted by extrapolating the plot to collision-free zero pressure. We compared our results with the calculated radiative lifetimes in the range of v=0-200 with J=1 and J=31. The results also reveal the importance of the bound-free transitions and the rotational quantum number dependence on the lifetime calculations. The measured and calculated radiative lifetimes are found to be 39.56 ($\pm$ 2.23) ns and 42.8 ns, respectively. Ref.[1] Saaranen *et al.*, JCP **149**, 204302 (2018).

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