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P4.3013 Rotational and vibrational temperatures of the OH A2Sigma state for several different plasma sources

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The resonant transition A^2Σ ⟶ X^2Π of the hydroxyl molecule OH is studied in detail in the wavelength range 280-330 nm. Emission from an atmospheric glow discharge, an RF micro jet plasma, a microwave torch as well as a plasmoid are considered. The parent molecule to the OH molecule is water vapor for each of the plasma sources. Water, in turn, is either the main gaseous constituent, an intentional admixture to the discharge gas or an impurity to the discharge. For comparison the spectrum of a low pressure ICP discharge in a gas mixture of 85 % H_2 and 15 % O_2 is studied. Analysis of the spectra is performed by using the LIFBASE Spectroscopy Tool [1].
The determined population temperatures strongly depend on the specific discharge under observation: virtually thermal equilibrium between vibrational and rotational populations could be observed, as well as two-temperature rotational populations, and spectra which are strongly affected by quenching processes. The relevance of these aspects for spectra fitting is discussed. Where possible, comparison of the obtained temperatures to rotational and vibrational temperatures of the hydrogen [2, 3] or nitrogen molecule [2] in view of the gas temperature is performed [4].

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