OH mid-infrared emission as a diagnostic of UV photodissociation of H_2O: Interstellar space as a unique laboratory

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Water is a fundamental molecule in the physics and chemistry of interstellar environments, and an essential ingredient for making newborn planetary systems habitable. Photodissociation is one of its main destruction routes in star- and planet-forming regions. Here we use detailed quantum chemical and laboratory information on the water photodissocation into state selective OH(*v,J*) levels as function of wavelength to model the mid- and far-infrared emission of OH in interstellar space. Photodissociation through the H_2O B electronic state at <145 nm results in highly-excited OH rotational lines with N_{up}=20-40 that emit strongly at mid-infrared wavelengths and that can thus be used as a unique probe of the local strength of the UV field. The model has been applied to analyze *Spitzer* Space Telescope OH observations of the HH 211 shock, and make predictions for upcoming *James Webb Space Telescope* observations.