Several astronomers have recently performed searches using the Hubble Space Telescope for absorption at vacuum ultraviolet wavelengths by \( \text{H}_2\text{O} \) in translucent interstellar clouds. Both quantitative interpretation of these observations and photochemical modelling of \( \text{H}_2\text{O} \) in such clouds require accurate photoabsorption cross section data. We have studied absorption by \( \text{H}_2\text{O} \) at the Photon Factory of KEK in Japan. A 6.65-m, normal incidence, vacuum spectrometer equipped with a focal plane scanner and entrance and exit slits of \( 10 \pm 2 \mu\text{m} \) was used to provide high spectral resolution. The reciprocal dispersion was 0.24 and 0.30 Å/mm in the fifth and fourth orders, respectively, of a 1200 l/mm grating blazed at 5500 Å. A zero-dispersion predisperser was used in the first order to eliminate higher order radiation. The absorption cross sections were measured at room temperature and on water vapor cooled in a supersonic jet expansion to temperatures close to those of interstellar molecules. High resolution cross sections and band oscillator strengths will be presented and compared with calculations based on the model Hamiltonian of Gilbert et al.\(^a\).

This work was supported by the NASA Upper Atmospheric Research Program under Grant No. NAGS-484 to the Smithsonian Astrophysical Observatory and by the NASA UVGA R & A Program under Grant NAGW-1596 to Harvard University. The measurements were made with the approval of the Photon Factory Advisory Committee (Proposal 93G-136). K. Y. and K. P. H. thank the staff of the Photon Factory for their hospitality.