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Doppler-shifted auroral *H<beta>* emission: a comparison between observations and calculations

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Abstract. Two sounding rockets equipped with photometers and particle detectors have been flown into proton auroras. The measured altitude dependence of the proton flux is compared with calculations based upon known energy-range relations for protons in air. Expressions suitable for numerical calculations of Doppler profiles at arbitrary angles to the geomagnetic field and at different heights within an aurora are developed. Profiles due to some typical proton spectra have been calculated and it is shown that altitude profiles at some wavelengths are more sensitive to the shape of the proton spectrum than are profiles at other wavelengths. Variations in the *H<beta>* Doppler profile versus height for several angles with the magnetic field is studied. Profiles, as generated by the actually measured protons in the energy range 1 keV to 1 MeV, have been calculated and are compared with direct optical measurements made by ground and rocket photometers. The rocket photometers took measurements at different wavelengths within the Doppler profile. The correspondence between calculations and measurements is generally good. The total *H<beta>* is calculated and fair agreement with the measured intensity is found.

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