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Fabry Perot Etalons (FPE) offer a small, compact and cheap alternative to Fourier Transform and Grating spectrometers for high spectral resolution measurements. FPEs will be well suited for atmospheric absorption spectroscopy for a range of gases with fine spectral absorption signatures such as CO_2, CH4, H_2O or O_2 in the near-infrared and shortwave infrared spectral region.

Here we present a study for a Fabry Perot Etalon spectrometer operating within the Oxygen A-Band at 0.764 micron. The atmospheric concentration of molecular oxygen in the atmosphere is well known and thus observed differences to the expected absorption will provide information on atmospheric scattering by aerosols and clouds and thus on optical depth and vertical distribution.

We will describe the basic principles and main concepts of Fabry Perot instruments including tunable FPEs and FPEs coupled to a grating spectrometer and present the results of a study on key instrument parameters and their optimization to obtain the best measurement performance.

We have carried out simulations to study the capability of a space-based FPE to measure aerosol optical depth and vertical distribution and compare it to results inferred for existing (Greenhouse gas Observing SATellite (GOSAT)) and forthcoming satellite missions (Orbiting Carbon Observatory 2 (OCO-2)) observing high-resolution O_2 A band spectra.