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Atmospheric calibration at Vera Rubin Observatory

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Preliminary
Next generation of large cosmological survey with a huge (10^9-10^10) statistics of sources (Galaxy, Clusters and Supernova) requires sub-percent photometric accuracy or better to improve systematic errors at similar level of the statistical errors on cosmological parameters.
Ground observatories are very sensitive to atmospheric conditions due to the fluctuations on clouds aerosols and water vapor transmission. Vera Rubin Observatory has built an auxiliary Telescope (AT, diameter 1.2 m, f =18, scale at focal plane
105 microns /arcsec), to monitor Spectra from a subset of so called calibration star (or standard candles) which Spectral Energy Distribution has been measured by HST or Gaia on satellites.
The calibration spectra will be routinely measured by setting a disperser (grating or hologram) in the converging beam of the AT, at 200 mm from the focal plane. A moderate spectroscopic resolution R~200-300 is sufficient to measure the parameters of interest.
After reviewing the photometric requirements induced by cosmology, we will introduce the key photometric and spectroscopic quantities that are required to be monitored. Then we will show how the AT will be able to estimate these quantities from its spectroscopic measurements.
The AT measurements are based on the atmospheric transmission model which depends on some varying components such as clouds, aerosols and precipitable water vapor.
The relevant atmospheric components can be estimated by using standard methods (MLE, MAP, ML-linear regression, gaussian processes⋯).
Preliminary results of these methods applied to both a toy-atmospheric model and to 2019- observations at Pic du Midi will be presented.

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