Characterization of the atmospheric transmission at LSST site
CTIO 0.9m + Ronchi + CBP

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An auxiliary telescope equipped with a spectrograph for real-time monitoring of the atmospheric transmission.
LSST Photometric Calibration Strategy Aux.Tel. + CBP

CBP purpose: Bring best laboratory radiometric calibration to the telescope

Radiometric Standard $\sim 2\%$

Collimated Beam Projector $T_{tel}(r, \lambda, t)$
CTIO 0.9m - Dispersed image and spectrum footprint

Camera: 2kx2k

0th order light

Standard Star

m+1,2 footprint
spectrum from constant aperture

H₂O

H\(\alpha\)

O₂(a)(b)

H₂O
Standard Star SED

HD14943

CALSPEC Standard

wavelength (nm)

Calspec SED

1e-8
Forward model: Atmospheric Transmittance

CTIO - fiducial atmospheric transmission

pwv00.0_aero0.00_alpha1.3
Forward model: Telescope (CCD + mirror)

CTIO 0.9m - CBP calibration

Preliminary result from October 2017 run
Forward model: $\text{SED} \ast \text{T\_atmo} \ast \text{Tel}$. Convolved with seeing

HD14943 - forward model

$\text{SED} \ast \text{T\_atmo} \ast \text{Tel}$, convolved with seeing

wavelength (nm)
Forward model compared with observation

![Graph of HD14943_1 showing flux (norm@max) vs wavelength (nm) with blue and black lines representing observed and forward modeling results.](image-url)
Looking at the extraction in greater detail

Sigma from Gaussian fit
How to separate signal from background?

Spectrum profile

Amplitude (norm)

Spectrum spatial profile (pixel)
Flux estimator bias

![Graph showing flux estimator bias with different aperture types: constant aperture, Gaussian fit, and adaptive aperture. The graph plots flux (ADU) against wavelength (nm). The inset graph shows the ratio with a 10% variation.](image-url)
Flux estimator bias

HD14943 NONE+RONCHI400

Ratio

aper_flux / psf_flux

10%
How to separate signal from background?

CTIO .9m - HD14943

Signal

Background

ADU

Pixel
Compare residuals from modeling[(Gauss+ Moffat) - cst] as a function of:
- Dispersers (Ronchi, blazed Ronchi, hologram) with and without mask,
- Fields,
- Position of footprint on the focal plan.