Project Description and Methodology

**Determining Atmospheric Transparency and Image Quality Using Acquisition Images Obtained with the WiFeS Autoguiding Camera**

The WiFeS autoguider at the 2.3-metre telescope uses images to acquire targets. These images can be used to assess the atmospheric conditions at the time the targets were acquired. The aim of the project is to develop code to determine the transparency and image quality (or “seeing”) at the time the exposure was started.

## Methodology

### Download the acquisition images

Images will be obtained from the 2.3-metre archive. The supervisor will provide these data at the start of the internship.

Examples of acquisition images are stored in Sample Data

### Run an object finder on the images

I recommend trying a python version of the popular SExtractor software: <https://sep.readthedocs.io/en/v1.1.x/>

Here and later, you will need to make use of some important keywords.

FILTER

EXPTIME

MJD-OBS

AIRMASS

RA

DEC

TELPAN

CRPIX1

CRPIX2

CD1\_1

CD1\_2

CD2\_1

CD2\_2

### 

### Cross match the object catalogue with an external catalogue

The GAIA and UCAC catalogues can be used.

The cross-matching can be done using the astropy coordinate package.

<https://docs.astropy.org/en/stable/coordinates/index.html>

### Determine the image quality

Use the stars in the image, determine the image quality. The algorithm needs to be robust against outliers.

### Determine the ZP taking into account the exposure time and the filter

The ZP may need to correct for differences in the filter curve used in the acquisition image and the filter curves of the external catalogue