

and disadvantages (restricted object sample, fewer consistency checks, required position angle of slit, and differential atmospheric refraction) with respect to differential imaging monitoring.

5.2 : Filters

To achieve sufficient signal-to-noise on faint ($V \sim 19$) QSOs, we have chosen a filter with a fairly wide bandpass which tends to avoid strong night-sky (background) emission lines and which covers a fairly sensitive wavelength range for the CCD used. The night-sky from Mt. Hamilton features strong city-light emission lines of mercury (Hg I $\lambda\lambda 4046, 4358, 5460, 5769$, and 5790) and low and high pressure sodium (Na I $\lambda\lambda 4981, 5686, 5891$, and 6158) emanating from San Jose (approximately 20 km east of Lick Observatory). Also present are strong atmospheric lines from oxygen ([O I] $\lambda\lambda 5577, 6300, 6363$) and OH which creates a forest of lines which are strong at around 7250 \AA and higher (optical) wavelengths. The strongest night-sky line is Na I $\lambda 5891$, with both narrow and (self-absorbed) broad components. The night-sky brightness on a clear, moonless night at Lick observatory is roughly 20.5 magnitudes per square arcsecond in the V band (~ 5550). Considering a typical seeing of about 2 arcseconds and the smallest aperture used for photometry (\sim twice the seeing disk), the night-sky at Lick will contribute roughly the same amount of light as an 18th magnitude stellar object.

A special night-sky blocking red filter (hereafter referred to as R_s) available at the Lick 1 meter consists of an RG610 filter defining the blue edge and an interference filter and KG filters defining the red edge. It has a bandpass of $6100\text{-}7450 \text{ \AA}$ (measured at 50% peak transmission) with a fairly high ($\sim 90\%$) peak transmission. This filter avoids the strong Na $\lambda 5891$ night-sky line and most of the strong OH lines and has a fairly wide bandpass. R_s was used for all the QSOs observed at the Lick 1 meter.

Also used for observations of some of the brighter QSOs was our own “V2” filter (2mm of GG495 + 2mm BG39) with a bandpass of $5000\text{-}5900 \text{ \AA}$ and peak transmission of $\sim 80\%$. This filter is equivalent to a “standard” V band filter and although it overlaps