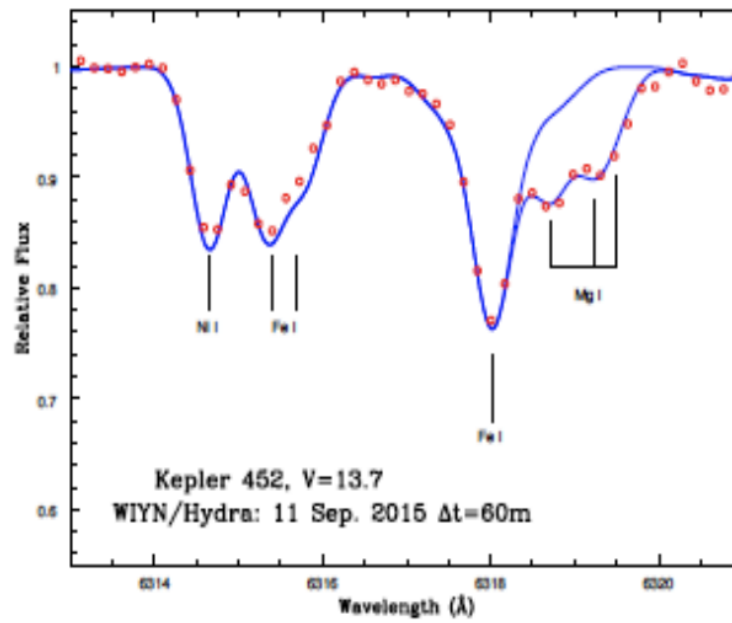


**Scientific Justification** *Be sure to include overall significance to astronomy. For standard proposals limit text to one page with figures, captions and references on no more than two additional pages.*

\*\* in general I don't know how to sort what goes where \*\*

1. want to constrain size of BLR
2. one of the less expensive ways to do so (compared to spectroscopy) is photometric measurements
3. as continuum of accretion disk varies in luminosity, lines in BLR vary as that change in intensity travels out to them
4. light travel time gives estimation of distance to BLR
5. monitor several targets over several months in order to reduce error bars in distance estimation
6. ?? number of reasonable targets ?? (should decide if it should be a little case study on a few objects and what benefit that might provide over something like a large scale survey of hundreds+ of objects)
7. targets from SDSS V RM campaign
8. further unravel BH accretion mechanisms
9. calculate BH mass from velocity of BLR
10. questions to be answered
  - (a) resolution necessary (want to separate increases in light curves from continuum and BLR)
  - (b) magnitudes of targets (find some sort of database that has magnitudes for quasars in several bands)
  - (c) size of telescope necessary for what I want to do
  - (d) what constitutes good photometry (need time resolution to separate blips in light curves from each other, enough time to observe a blip in continuum and wait for light travel time to BLR, good enough s/n that the error bars couldn't be confused for noise i.e. want a distinguishable signal, want frequent observations to catch several points along the increase and decrease of a light curve)
  - (e) who has good filters (filter the light for around redshifted hbeta, filter for continuum but where is a good spot for that)
  - (f) redshifting the lines to pick filters (hbeta and redshift calculation for the redshift range of my targets)
  - (g) targets (maybe grab them from SDSS V RM paper for inspiration? should I come up with my own?)
  - (h) s/n calculations (need to know gain on detector, read noise, dark current, sky background, flux from source)
  - (i) exposure time calculations (will come from s/n calculations with respect to rate of incoming flux, flux will decide how long exposures need to be in order to get a certain number of counts that will provide an adequate s/n, might just use exposure times from someone like brad peterson too?)
  - (j) what targets are available from the telescope that I pick (could do a calculation of sky location with my latitude of wherever I'm observing)
  - (k) light travel time through torus (because that will confine how often I need to observe because that's the outer limit of the BLR)



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Figure 1: This is an example of embedded PDF figure, leaving it in here from example format from NOIR lab just in case I decide to put figures in for myself eventually

**Experimental Design** Describe your overall observational program. How will these observations contribute toward the accomplishment of the goals outlined in the science justification?

1. observe HBeta and continuum
  - (a) prominent broad line (justify why this line over others)
2. long term status
  - (a) distance to BLR is on the order of a few light-months
  - (b) in order to get repeated measurements of a signal traveling out, we would need to have several light travel times (several months) in order to see these
  - (c) maybe an approach of long term status for the continuum with a sort-of urgency qualifier for observing hbeta frequently after we see an increase in the light curve for the continuum would be helpful (figure out if this is possible or even necessary)
3. B G V filters?
  - (a) cover wide range above and below HBeta (is this necessary?)
4. brad peterson looked every 4 days over 8 months – TOO GREEDY FOR GEMINI!
5. filters
  - (a) one filter for line
  - (b) one filter for continuum
  - (c) maybe 2 adjacent filters for continuum because the line measurement will need the continuum subtracted from it
  - (d) probably move more (or all) of my calculations from the questions that still need to be answered above (s/n, exposure time, filters and redshifts, sampling frequency, etc.) down here and leave scientific justification to more general ideas about the subfield of agn and where there are still gaps in our knowledge