# TITLE HERE

AUTHOR HERE

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**Abstract**

Nunc semper quam et leo interdum vulputate eu quis magna. Sed nec arcu at orci egestas convallis. Aenean quam velit, aliquam vitae viverra in, elementum vel elit. Nunc suscipit aliquet sapien a suscipit. Cras nulla ipsum, posuere eu fringilla sit amet, dapibus ultricies nulla. Nullam eu augue id purus mollis dignissim sed et libero. Phasellus eget justo sed neque pellentesque egestas nec id arcu. Donec facilisis pulvinar sapien et fringilla. Suspendisse vestibulum rhoncus sapien id laoreet. Morbi et orci vitae tortor imperdiet imperdiet. In hac habitasse platea dictumst. Vivamus vel neque id mi ultrices tristique. Integer quam libero, ornare vel gravida in, feugiat a ante. Nam dapibus, tellus vitae pellentesque cursus, dui nisl egestas augue, non fermentum nisl est nec nisi. Vestibulum nec mi justo, eget dapibus velit.

## 1 Section Heading

Weymann et al. (1991): http://adsabs.harvard.edu/abs/1991ApJ...373...23W

From Zhang et al. (2010; http://arxiv.org/abs/1004.0299): "About 15% of quasars show broad absorption lines (BALs) of high ionization ions such as N V , C IV , Si IV , Ly$\alpha$ , [O VI] , up to a velocity of $v \sim 0.1c$.

BALs are detected occasionally (another 15%) also in low ionization species such as Mg II , Al III .

## 2 Why are there different elements in BLRs...

## 3 Nic's notes...

Are they, NLRs vs. BLRs, a spectrum or two distinct things... ???

# 4 1904

# 5 1944

# 6 1970s

# 7 1980s

# 8 1990s

# 9 ∼late 90s

# 10 2000s

**?** and the "funnell" model...
The rest of the RvbM papers..

Velocity lag stuff...
Kelly Denny et al.

Radial temp variations... e.g. Shakura & Sunyaev (1973) but!!! the $\mu$-lensing suggests it might be flatter... and then Omer Blaes kinda gave up saying it was too hard...!!!

# 11 2010s

**?**

# 12 2020s

Permitted lines are broad H$\beta$ is $10^{-7}$ secs, radidateive scales....
"Forbidden" lines are narrow... [OIII] is 50 secs...
(semi-forbidden...)
Why is a doublet a "doublet"??

## 12.1 Emission Line Ratios....

(See also Emission lines note...) Hot new star, tonnes of [O III] ...
Stromgren spheres...
Given a Temp and density... $\rightarrow$ recombination rate...
Kishimoto et al. (2008)

## 13 General Reading

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## References

Kishimoto M., Antonucci R., Blaes O., Lawrence A., Boisson C., Albrecht M., Leipski C., 2008, Nat, 454, 492

Shakura N. I., Sunyaev R. A., 1973, Astron. & Astrophys., 24, 337