



Contribution ID : 64

Type : **Poster**

Modelling Variable Broad Absorption Line Quasar Outflows Using SimBAL

Wednesday, 28 October 2026 14:21 (1)

Active galactic nuclei (AGN) are supermassive black holes in the centers of massive galaxies with large inflows of gas and dust collisionally heating up and radiating away energy. Quasars are a type of AGN that outshine their host galaxies by several magnitudes, capable of releasing high velocity outflows (or winds) of material due to the intense radiation being emitted. When these outflows are directed along the observer's line of sight, their ultraviolet spectra will present with broad absorption lines (BALs). These types of objects are categorized as BAL quasars, and these BALs in their spectra have been observed to vary over time for select quasars. The origin of this variability is not yet fully understood, though spectral fitting algorithms such as SimBAL (Leighly et al., 2018) have proven successful in modelling the physical properties of quasar winds using a forward-modelling and Markov Chain Monte Carlo approach. This software package fits synthetic spectra to observed spectra for a given quasar, producing detailed physical and kinematical descriptions of these outflows. The fits of these spectra constrain the values of parameters including the density integrated along the line of sight (column density), the ionization of the outflows (ionization parameter), and the obscuration of the quasar's radiation from intervening clouds (covering fraction). My quasar of choice for modelling using SimBAL has three epochs of available data from the Sloan Digital Sky Survey, each separated by six years. The earliest epoch has the widest and deepest absorption lines for Carbon IV, Silicon IV, and Lyman Alpha, however for each later epoch the lines are becoming weaker and narrower. As of now, the leading candidates for the source of the BAL variability appear to be the column density and the ionization parameter. The relative impacts of each parameter on the differing absorption structure are yet to be determined, and that will be the next focus of my master's work.

Did you give a contributed talk at CASCA 2026?

No

If you are selected for a poster, would you be interested in giving a short flash talk on your work?

Yes

What is your career level?

MSc

Which keyword describes the area of focus of this talk?

Black holes

Primary author(s) : FRISELLA, Nicolas (Western University)

Presenter(s) : FRISELLA, Nicolas (Western University)

Session Classification : Black holes & Instrumentation