A research group from Penn State has noticed strange behaviors with a quasar called J1011+5442.[1] After an observation in 2003, more recent observations in 2013 and 2015 have revealed that the quasar's spectrum has changed significantly. This is behavior is highly unusual for a quasar, which is supposed to be a very bright, energetic blackhole accreting at the center of a galaxy. The quasar showed a 5100 $\mathring{A}$ monochromatic luminosity decrease of >9.8 and broad $H\alpha$ luminosity decrease by a factor of 55 over a period of <9.7 years.

Figure 1: Spectrum of J1011+5442 in 2003 and 2015

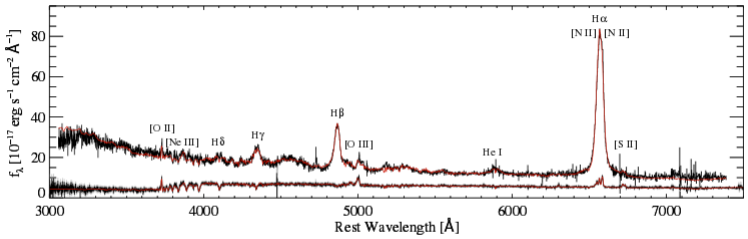

Figure 2. The spectral fits for the bright-state (MJD 52652) and dim-state (MJD 57073) spectra. The data are shown in black and the best-fitting total model is shown in red. See Section 2 for a description of the spectral decomposition and Figure 3 to see the flux uncertainties.

The group proposes three possible mechanisms for these results. First, there could have been a large cloud that moved between Earth and the quasar that absorbed the high energy flux. This could be the case, as we see greatly reduced UV flux from the object in Figure 1. However, the calculated time required for a cold cloud to migrate that distance would be at least 30 years, which is far more than the 10 year timespan we observe. Second, it could be a large tidal disruption event during the first observation. This is also unlikely, as the luminosity spike lasted closer to six years instead of the average few-month timespan. Finally, and most likely, is we observed the 'turning off' of a quasar's AGN. If this is the case, it would be a very remarkable event that we observed.

References

[1] Jessie C. Runnoe, Sabrina Cales, John J. Ruan, Michael Eracleous, Scott F. Anderson, Yue Shen, Paul Green, Eric Morganson, Stephanie LaMassa, Jenny E. Greene, Tom Dwelly, Donald P. Schneider, Andrea Merloni, and Antonis Georgakakis. Now you see it, now you dont: The disappearing central engine of the quasar j1011+5442. *Submitted to Astro-PH*, 2015.