

Looking for signs of supermassive black hole growth in ultra-compact UV-luminous galaxies using mid-infrared spectroscopy



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Abstract

The formation of supermassive black holes and their co-evolution with the host galaxy is poorly understood in the early Universe. How is the growth of the stellar bulge related to the growth of the SMBH? Looking at the coexistence of star formation activity and SMBHs in high redshift galaxies is critical to address this question.

To approach this, we use the mid-infrared spectra of 25 galaxies that share properties with star-forming galaxies at $z > 2$. We use the mid-infrared slope and the prominence of polycyclic aromatic hydrocarbons emission features to quantify the contribution of the underlying power sources and identify signs of SMBHs.

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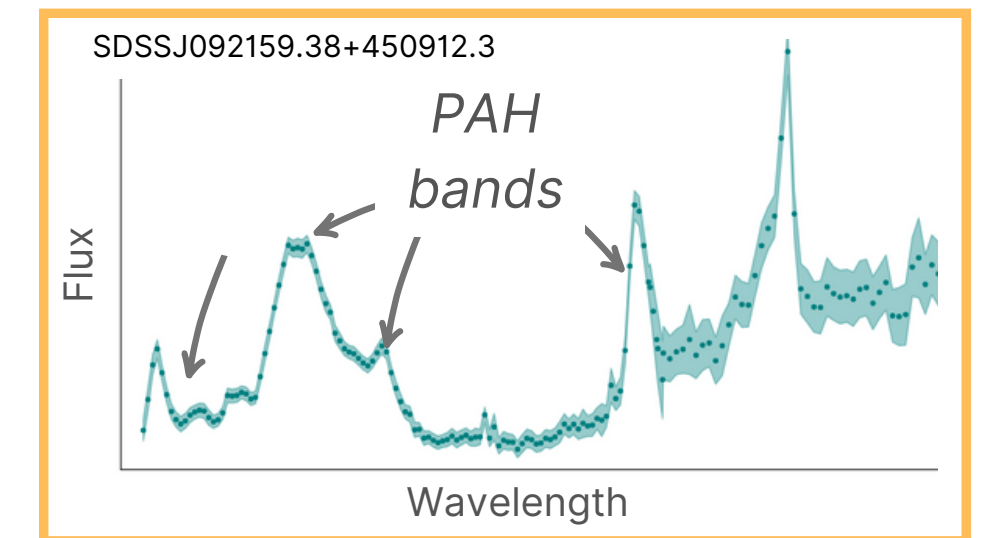
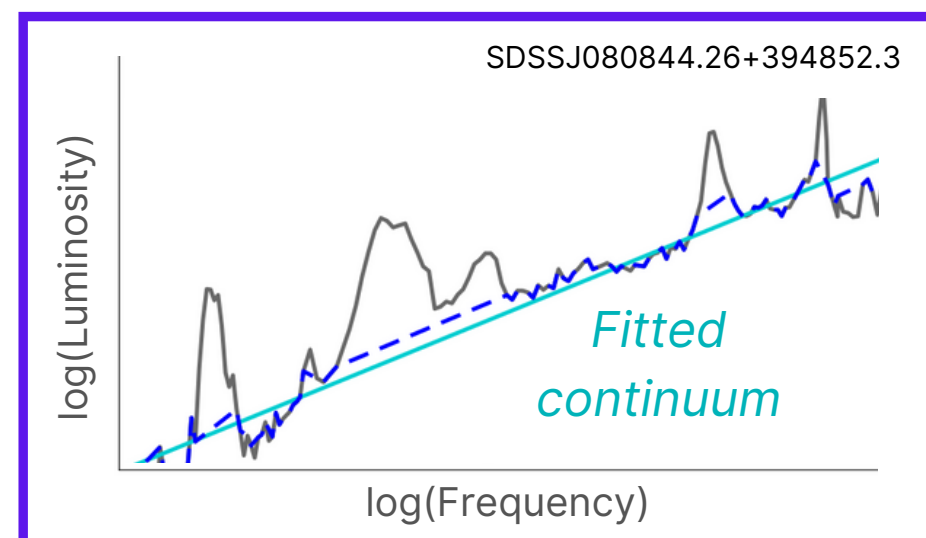
Motivation and approach

- **Lyman Break Analogs** are rare, ultra-compact UV-luminous galaxies similar to the high-redshift Lyman Break Galaxies, star-forming galaxies at $z > 2$

In some LBAs the luminosity of the galaxy is dominated by a central dominant object. These objects have shown compelling evidence of being the perfect site for a small growing black hole... If growing black holes are indeed found in LBAs, they can be used as proxies to study the formation and evolution of supermassive black holes in the early Universe. So, our problem is

Do LBAs host growing black holes?

- **Mid-infrared spectroscopy** to find growing black holes using the slope of the continuum and strength of PAH features



Our findings and conclusion

Our results are consistent with the presence of growing black holes obscured by dust in our sample of LBAs

- This strengthens the other evidences that LBAs host low-luminosity growing black holes and that they are good candidates for the study of the high-redshift relation between star-formation and black hole growth;
- More analysis will be done to ensure more robust and definitive diagnostics;
- This work is in preparation for the James Webb Space Telescope launch, JWST will allow these studies to be done with much more spatial details