

The background of the slide is a colorful artistic rendering of a Seyfert 1 galaxy. It features a central black hole (represented by a black dot) with a bright yellow and green accretion disk. Two large, blue, lobed structures represent the galaxy's wings or dust lanes. From the center, two jets of red and orange plasma extend outwards. The entire scene is set against a dark, starry background.

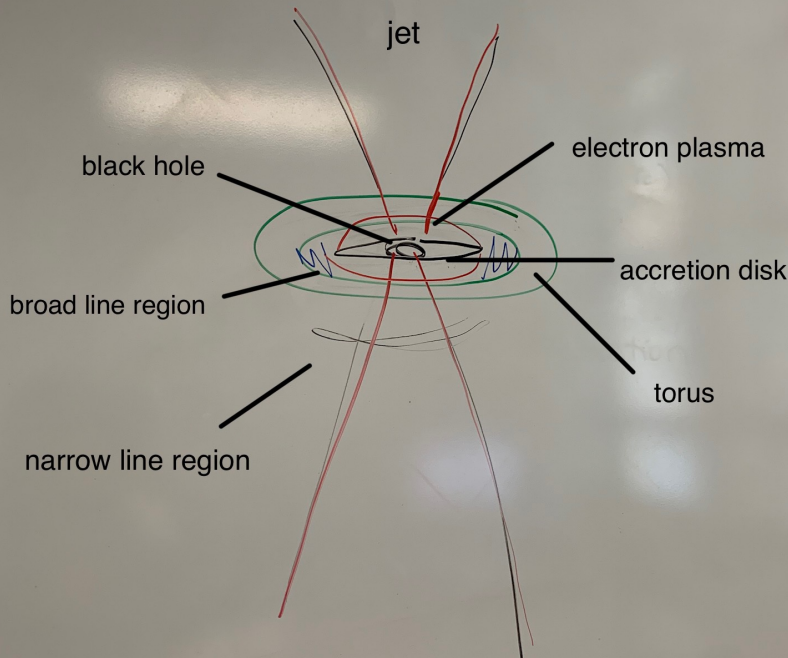
Millimeter Properties of Narrow-Line Seyfert 1 Galaxies

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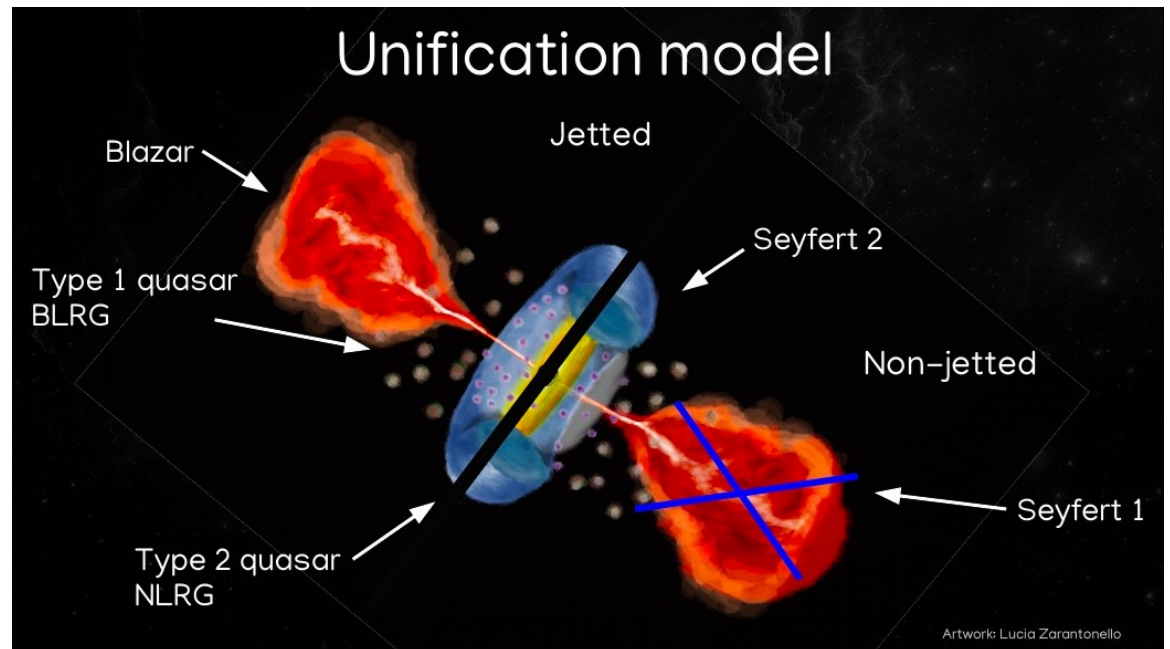
Artwork: Lucia Zarantonello

What are Active Galactic Nuclei (AGN)?



- Center of galaxy with supermassive black hole that is actively accreting matter
- Luminosity is greater than usual and not from stars, radiation ranging across entire electromagnetic spectrum
- Can outshine its entire host galaxy!
- Since their discovery they have been classified into many different categories, including quasars, blazars, Narrow-Line Seyfert 1 galaxies.

Unification Model



Narrow-Line Seyfert 1 Galaxies (NLS1s)

- Permitted lines from broad line region ($H\beta$) are narrow
- Low-intermediate black hole masses ($<10^8$ solar masses)
- Strong X-ray emitters
- Many have X-ray and radio variability that shows a high amplitude over unusually short periods.
 - **The sources I am looking at have unusually high radio variability over short timescales**
 - **Never observed before in any AGN in radio!**

Finding millimeter properties of NLS1 sources

- Strong, variable radio emission - jets
- Jets not detected yet
- Synchrotron Self Absorption (SSA)
 - Photons emitted and absorbed by same field
- Free Free Absorption (FFA)
 - Photons absorbed by external screen
- Could detect at shorter radio wavelengths (2 and 1.15mm)
- IRAM 30m telescope with NIKA2 camera



Citations

- Beckmann, V., & Shrader, C. (2013). *Active galactic nuclei*. Wiley.
- Järvelä, E. (2018). *Narrow-line Seyfert 1 galaxies: Observational and statistical analysis* [PhD thesis]. Aalto University.
- Active galactic nucleus. ESA/Hubble | ESA/Hubble. (n.d.). <https://esahubble.org/wordbank/active-galactic-nucleus/>
- Järvelä, E. *Millimetre view of the absorbed jets in NLS1s*.