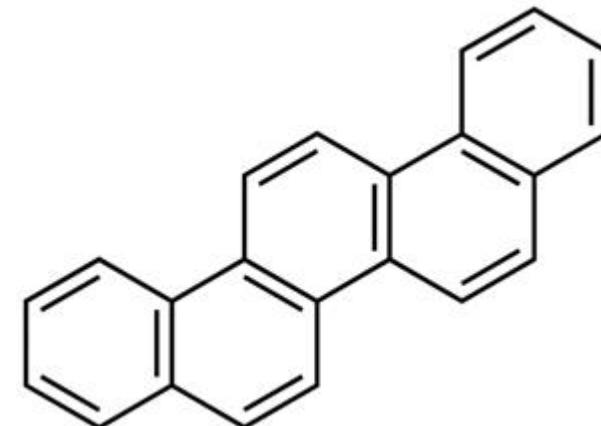


COSPAR Workshop 2025



Spectroscopic study of PAH molecules in the central region of NGC 7469

Amrutha S
Indian Institute of Astrophysics

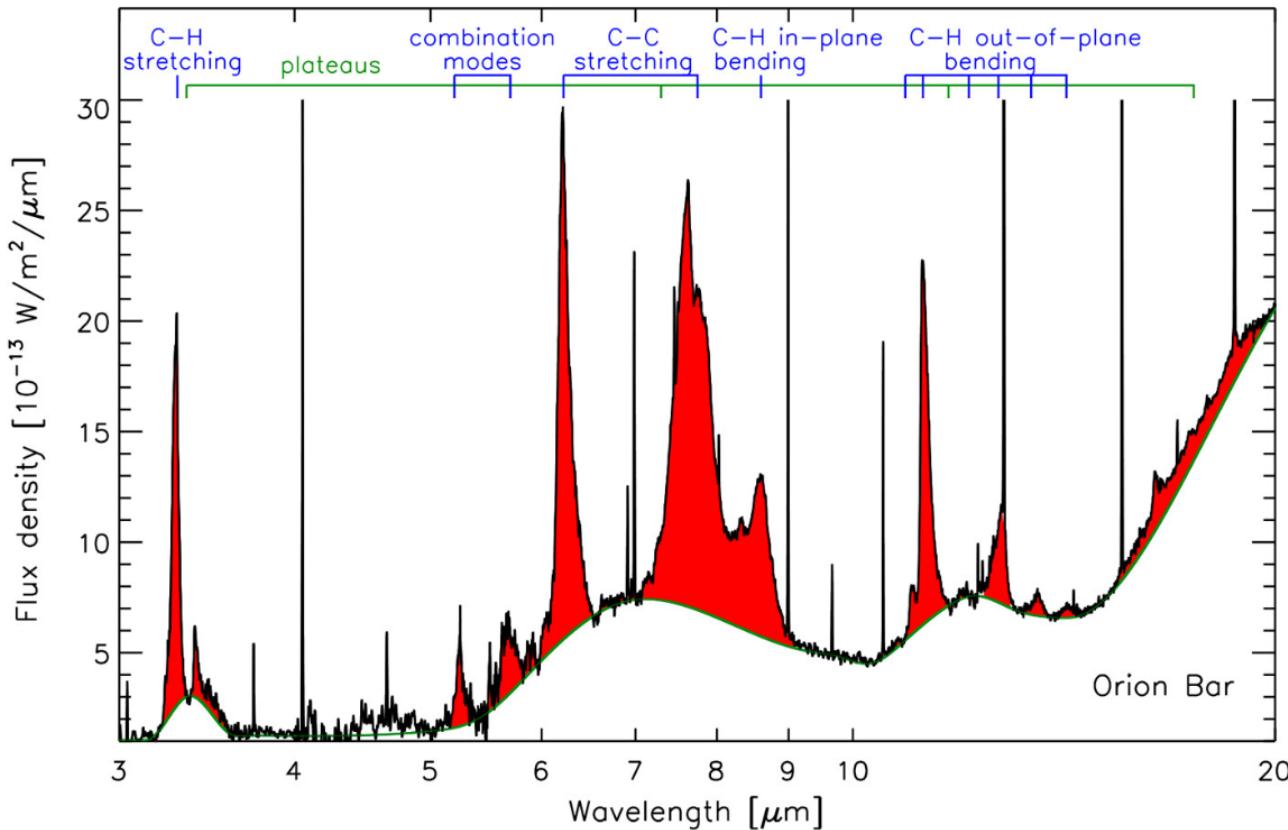


31 October 2025

CHRIST (Deemed to be University), Bangalore

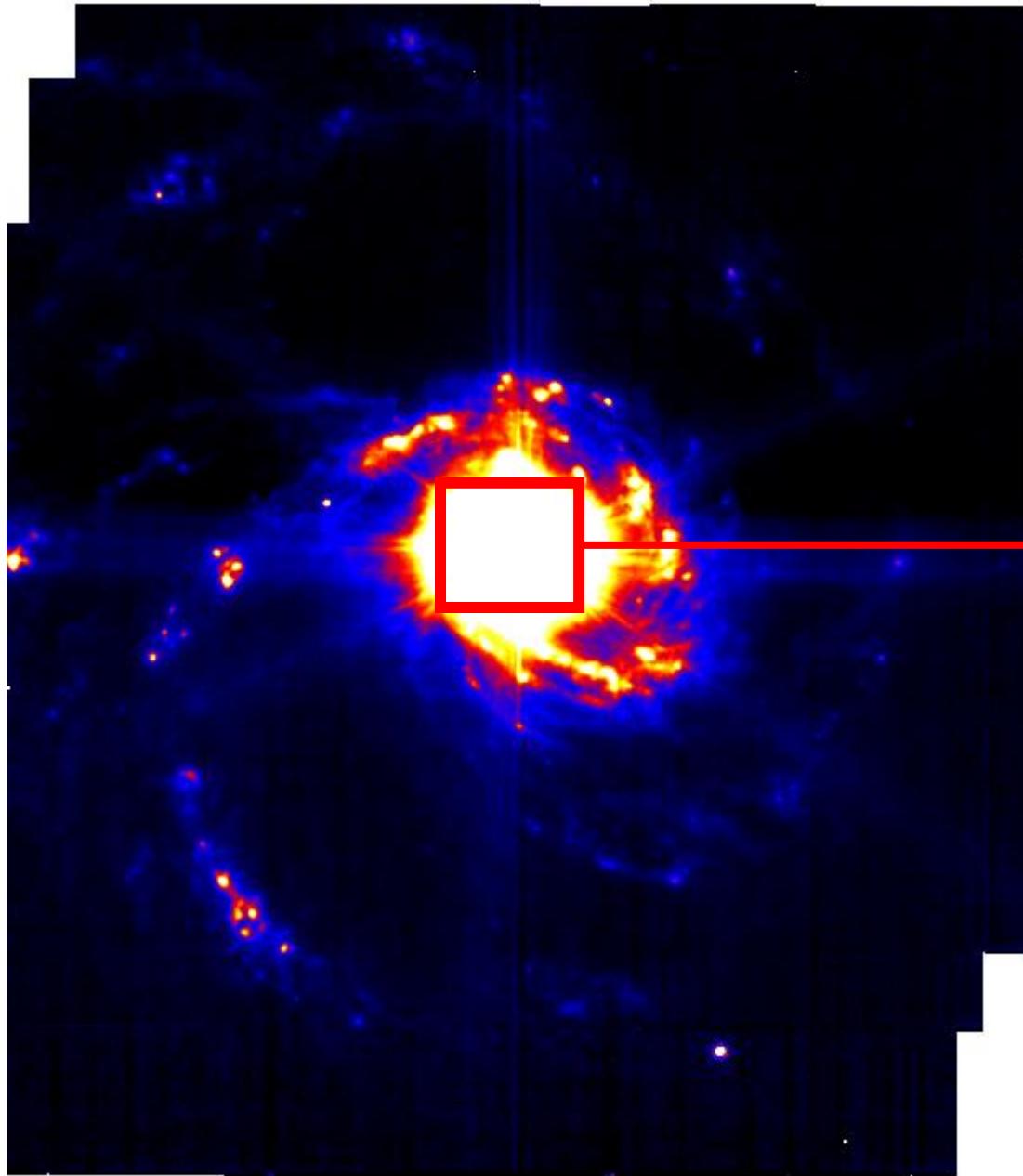


Interstellar Polycyclic Aromatic Hydrocarbon



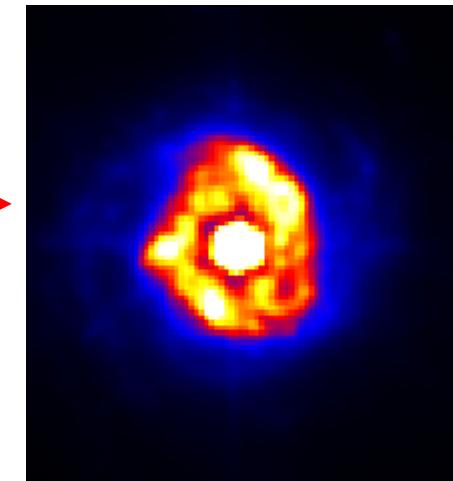
(Peeters et al 2004)

- 20% of the total IR emission in star-forming galaxies comes from PAH molecules (Smith et al. 2007)
- UV and high-energy visible photons from massive stars excite the PAH in star-forming regions.
- They emit in distinctive IR bands at 3.3, 6.2, 7.7, 11.3, 12.7, and 17 μm.
- PAH flux ratios can give us information of charge and size of the PAH molecules.



MIRI-F770W image

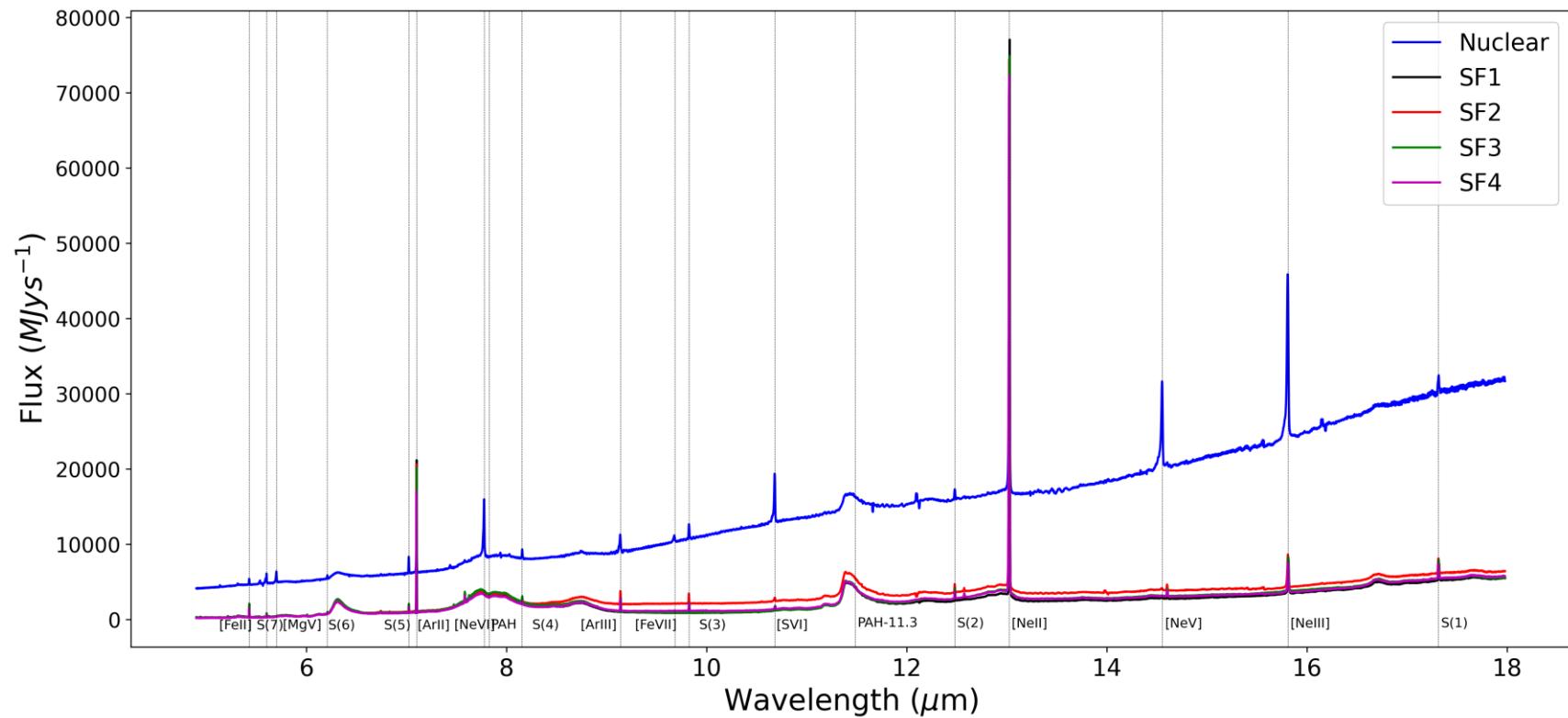
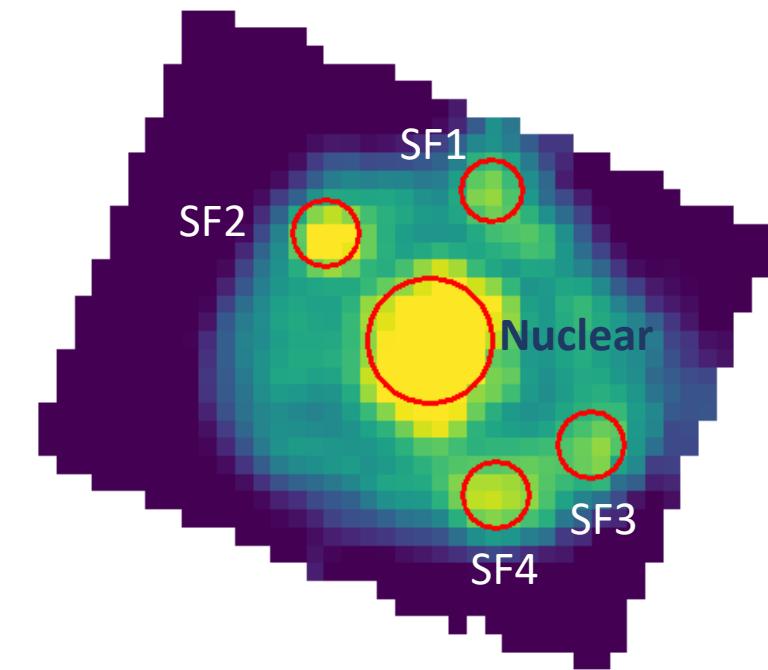
NGC 7469



MIRI IFU FOV

- Distance -70 Mpc
- Hosts type-1 Seyfert at nucleus.
- Shows inner star formation ring.

Reduction and Analysis

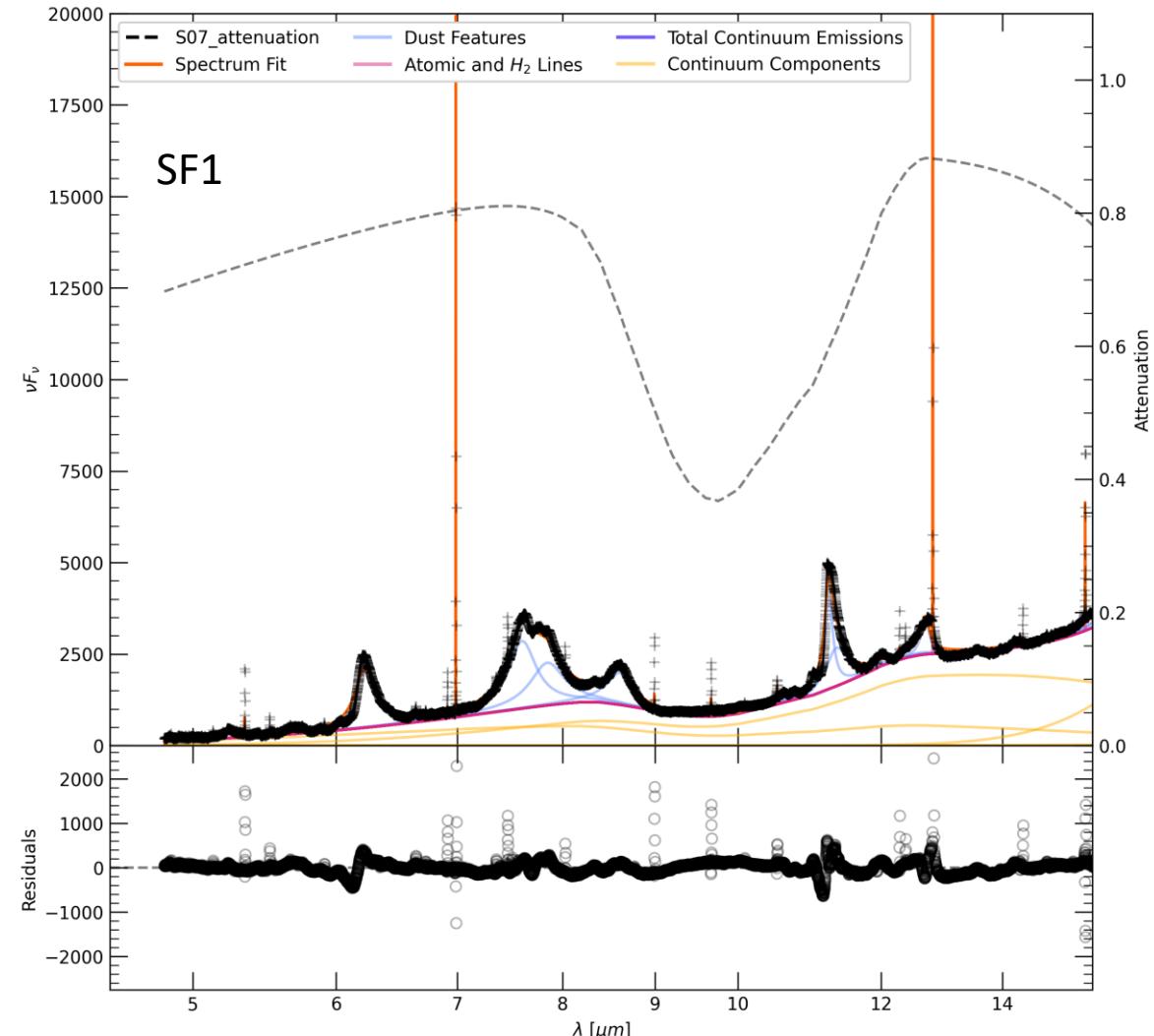
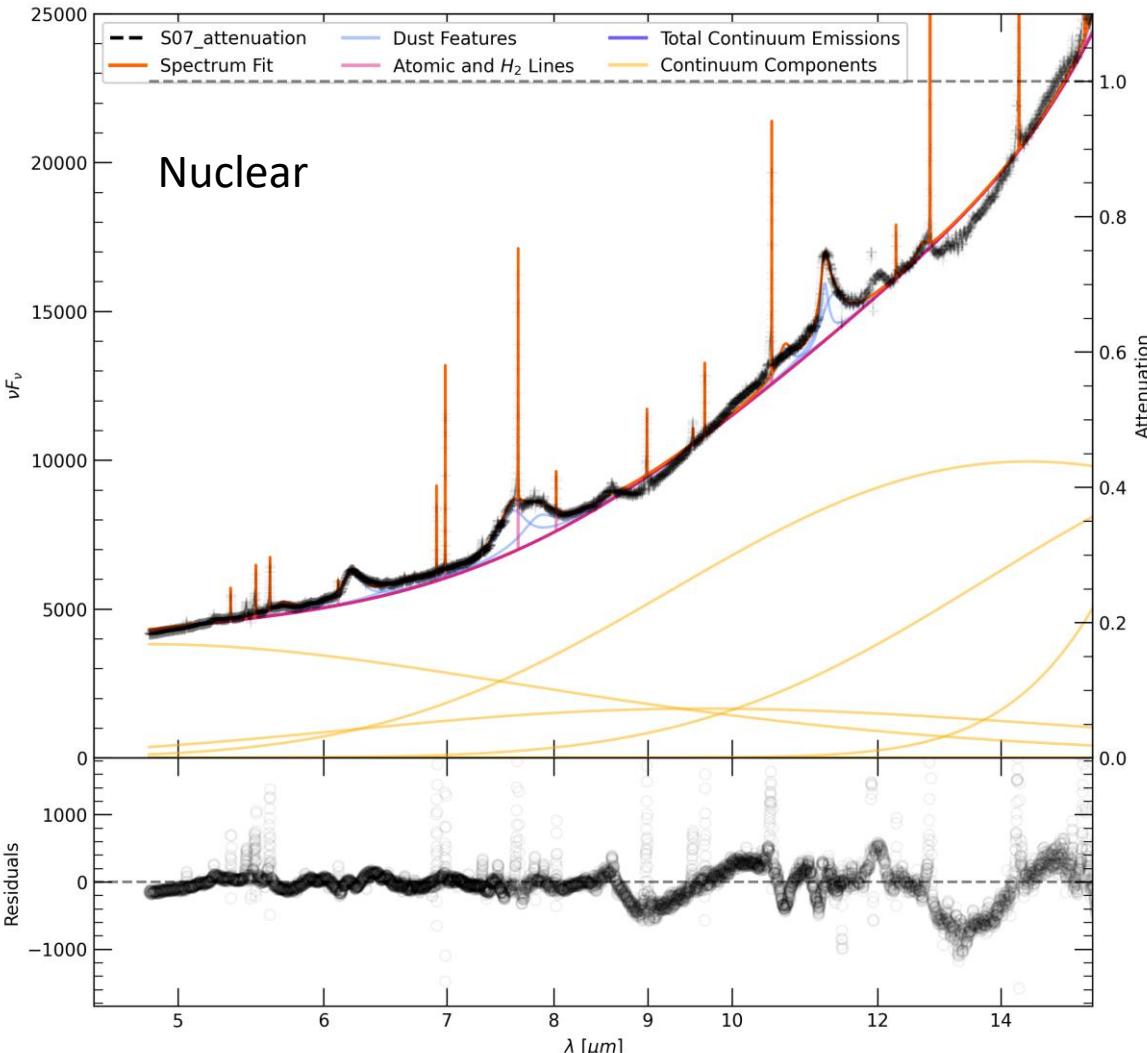


11.33 μm MIRI IFU image of NGC 7469

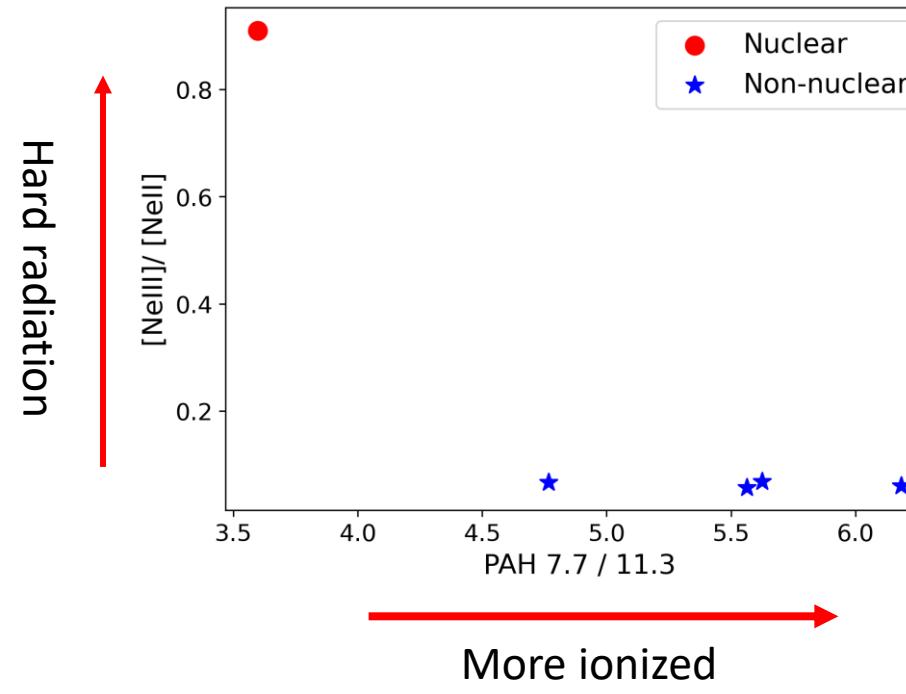
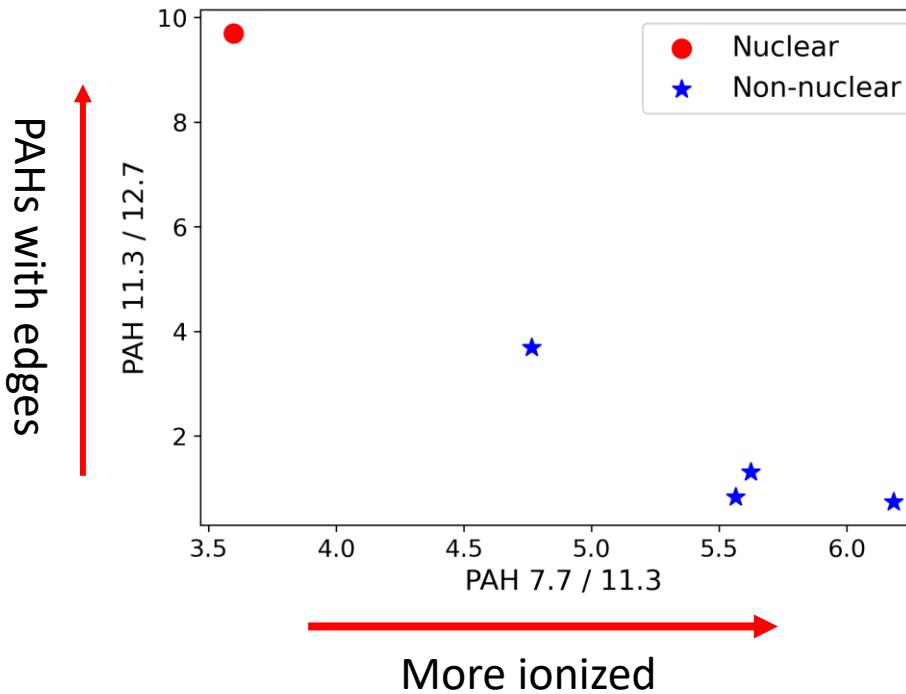
Extracted MIR spectra from regions of NGC 7469

PAHFIT

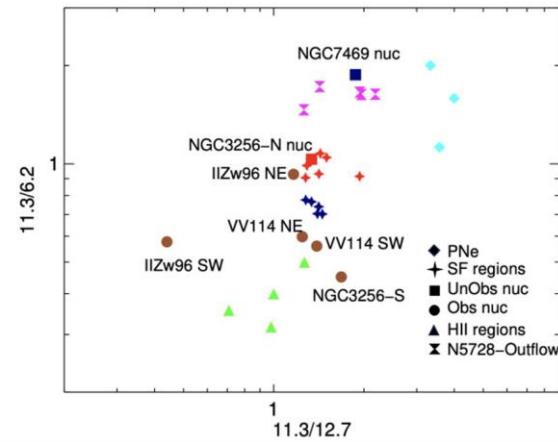
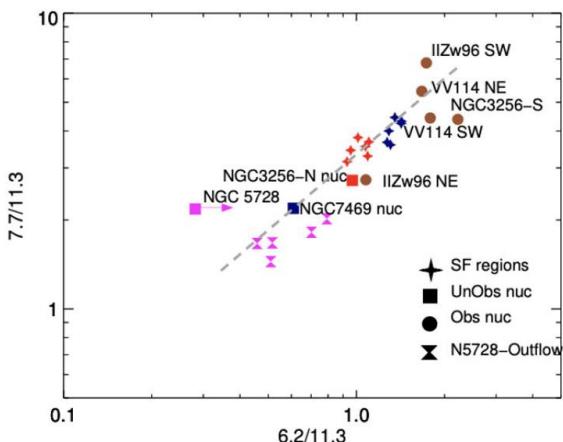
Decomposition model for astronomical infrared spectra, focusing on dust and gas emission features from the interstellar medium. (Smith, J.D.T et al. 2007)



Properties of PAHs



- Star forming regions - more ionized PAHs.
- AGN – large neutral PAHs.
- PAHs with open structures – more in more ionized regions



- Harder radiation (As in AGN) – high fraction of large neutral PAHs.
- Star forming regions – more ionized PAHs

Summary

- ❑ Reduced MIRI IFU data of NGC 7469 galaxy
- ❑ Extracted spectra from nuclear and circumnuclear region of galaxy.
 - ❑ Fitted PAHFIT to get PAH and emission line fluxes.
- ❑ Fraction of ionized PAHs and PAHs with open structures is more in star forming regions than Seyfert nucleus.
- ❑ Fraction of large and neutral PAHs increases with the increase in radiation field (Mostly hard radiation as in AGN).

Thank you!