DICHOTOMY OF RADIO LOUD (RL) AND RADIO QUITE (RQ) QUASARS (QSOs) IN FOUR DIMENSIONAL EIGENVECTOR 1 (4DE1) PARAMETER SPACE

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INTRODUCTION

- Active galactic nucleus (AGN) is a compact region in the center of a galaxy with extremely violent energy release in most parts of the Electro Magnetic Spectrum (EMS)(Peterson, 1997 and references their in).
- Their energy source is the release of gravitational energy through the accretion of matter onto a super massive black hole (SMBH) (Osterbrock & Ferland, 2006)
- A much debated problem in AGN studies, and QSOs in particular, involves the possibility of a physical dichotomy between RL and RQ QSOs (e.g., Cirasuolo et al. 2003; Sulentic et al. 2007; Zamfir et al 2008; Garofalo D. 2019).
- Show widely differing line profiles, intensity ratios, and ionization levels (Marziani et al. 2015)
- High total luminosity, $L = 10^{11-15} L_{sol}$, (Bloom et al. 2009)
- High variability in luminosity (Bohme et al. 1978)
- QSOs are the most luminous objects in the Universe and can be seen over the entire redshift range (z=0-7) where matter is observed in the Universe (Venemans et al. 2017)
- A much debated problem in AGN studies involves the possibility of a real physical dichotomy between RL and RQ QSOs (Zamr et al. 2008).

4DE 1 PARAMETER SPACE

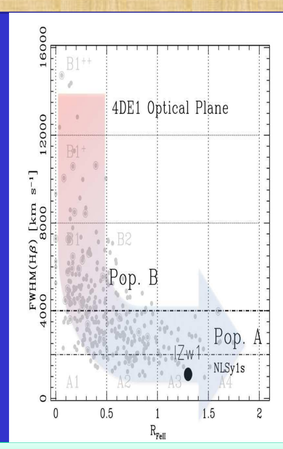

Fig 1: Optical plane of the 4DE1 parameter space (Sulentic et.al 2000)

- Provides a fundamental discrimination between major AGN classes (Sulentic et al. 2007)
- 4DE1 parameter space contains four species
  1. FWHM of low ionization broad optical lines, Hβ
  2. EW Ratio of the optical FeII 4570Å and broad line Hβ
  3. Soft X-ray photon index (Γ_soft)
  4. High ionization broad lines c (1/2) CIVλ1549Å
- Population A: Whose sources have FWHM < 4000kms−1 and RFE > 0.5
- Population B: Whose sources have FWHM > 4000 kms−1 (up to 20,000 kms−1) and RFeII values < 0.5.

MOTIVATION

- The possibility of a dichotomy b/n RL and RQ QSOs is an open controversy (Hite et al. 2000; Cirasuolo et al. 2003)
- Intriguing differences in the optical and UV spectra b/n the two types of QSOs (Sulentic et al. 1995, Corbin 1997)
- RL QSOs are not distributed like most of RQ QSOs
- The RQs are distributed in both populations A and B (Zamfir et al. 2008)
- The lack of good spectra of RL sources (Sulentic et al. 2012)

GENERAL OBJECTIVE

- To study the property of RL and RQ QSOs, a possible dichotomy b/n them, the reason behind observed low fractions in RL by using the 4DE1 parameter space and to understand better the properties of radio jets

RESEARCH QUESTIONS

- What are the properties of the radio emission and the relation between radio and optical parameters of our samples?
- Do the RQ and RL QSOs have different physical properties?
- Is there any evidence for a physical dichotomy between RL and RQ QSOs?
- How is the correspondence between RL QSOs and QSOs of Population B in the 4DE1 scheme?
- What are the kinematics and physical properties of the broad emitting region, the effect of the outflows and jets on the surrounding medium?

SAMPLE, DATA and METHOD

- New data obtained mainly at the Observatory of Calar Alto (CAHA, Almeria Spain) with the TWIN spectrograph to get blue and red spectral regions, MgII2800A and Hβ – FeII respectively.
- 50 RL QSOs with high redshift (0.35 < z < 1)
- Archives: SDSS, FIRST, NVSS , Vizier and HST
- A standard data reduction by using IRAF
- Multicomponent non-linear fitting of the emission lines by using IRAF package SPECFIT, MgII2800Å and Hβ – FeII regions

ANALYSIS AND RESULTS

❑ Fitting of the continuum for both Hβ and MgII

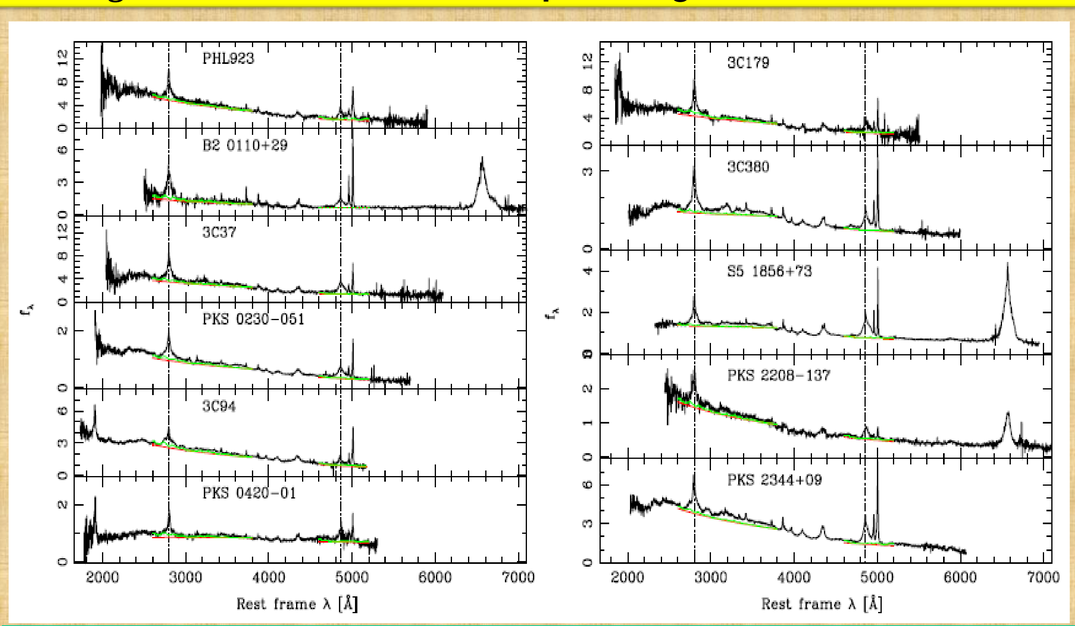

Fig 2: Rest frame spectra with the fitting of the Continuum in the region of Hβ and MgII.

❑ Multicomponent non linear fitting of main emission lines , Hβ, MgII …

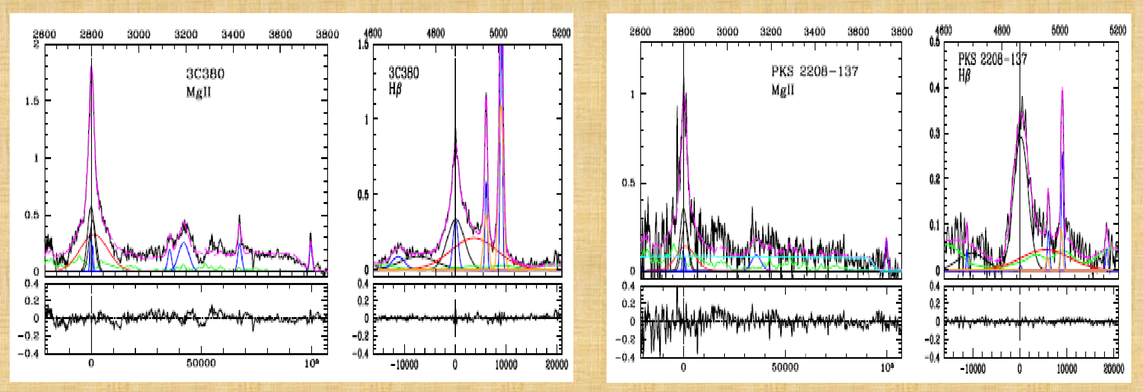

Fig 3: Some of the multicomponent fitting results of Hβ and MgII as well as other main lines after continuum subtraction. 3C380 (left) and PKS2208 -127 (right),.

❑ Placement of our sources in 4DE1 parameter space and other correlation

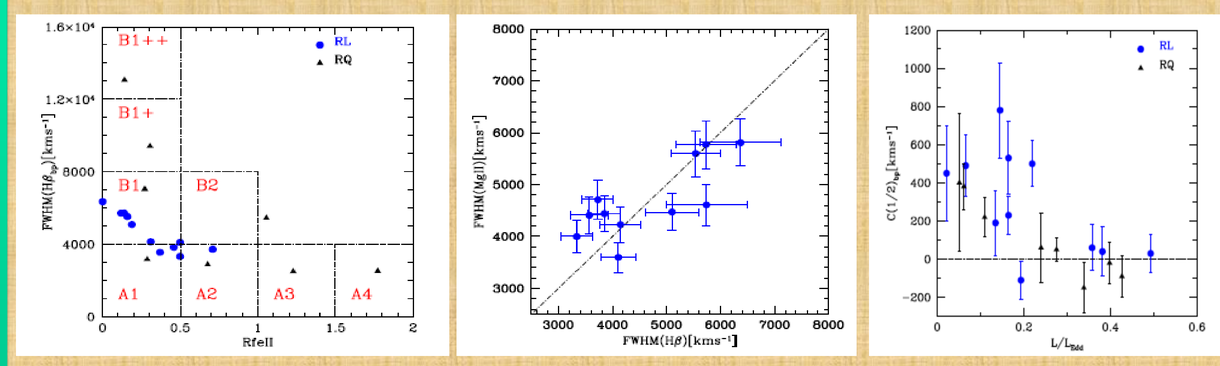

Fig 4: location of our sources and RQ ((Marziani et al., 2013) in the optical plane (left), FWHM Hβ vs FWHM MgII correlation for the broad profile (middle) and eddington ratio Vs centroid at half intensity (right).

ONGOING WORK

- Error analysis for the specfit output results
- Checking for superluminal motion
- First paper preparation under progress

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