INAF - ISTITUTO DI RADIOASTRONOMIA

UNIVERSITA' DI BOLOGNA

A MULTI-WAVELENGTH STUDY OF RADIO-LOUD BROAD ABSORPTION LINE QUASARS

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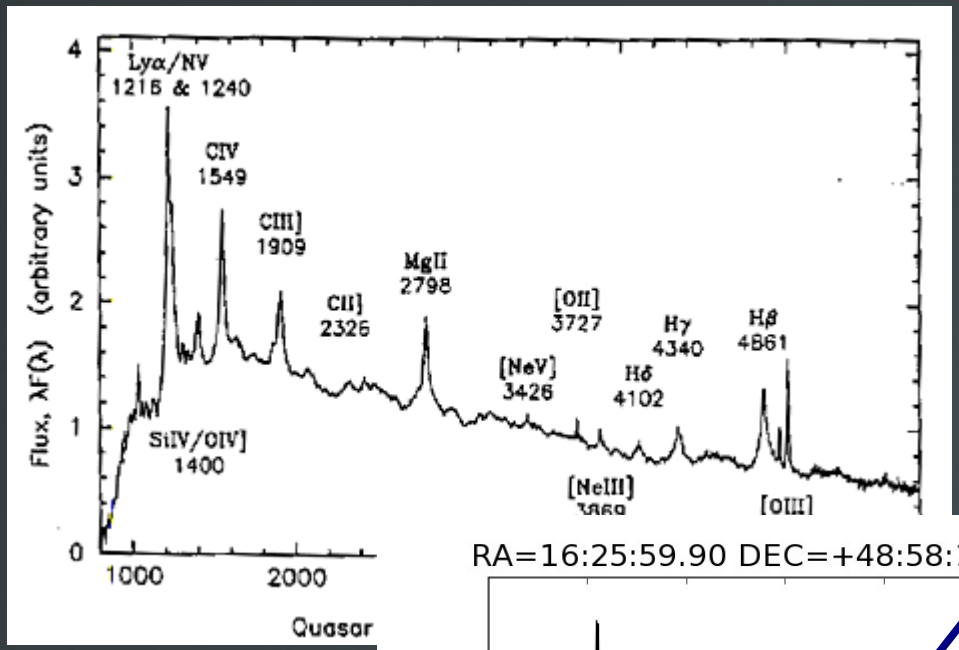
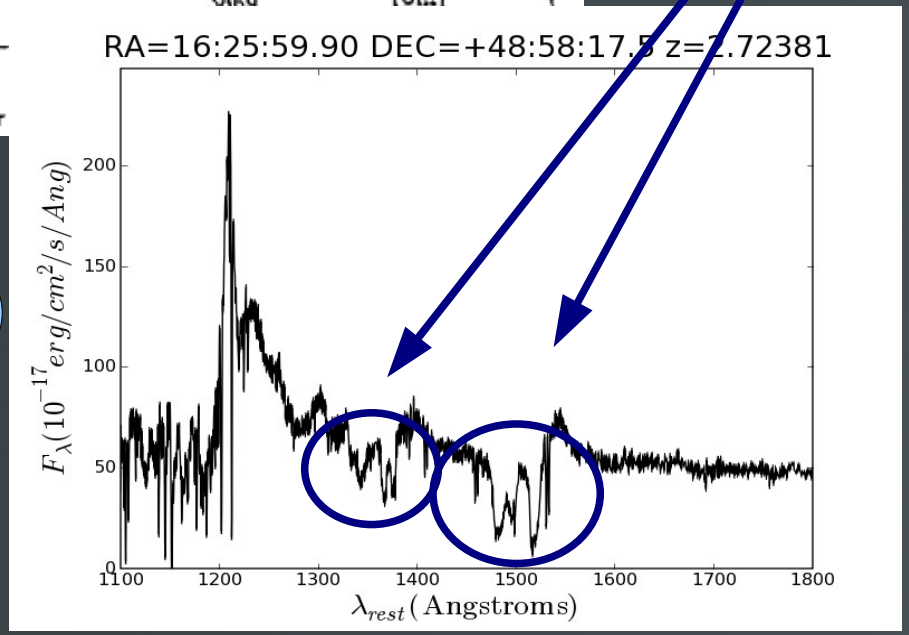




Broad absorption towards the blue wing of some UV emission lines, shifted up to ~ 0.2 c

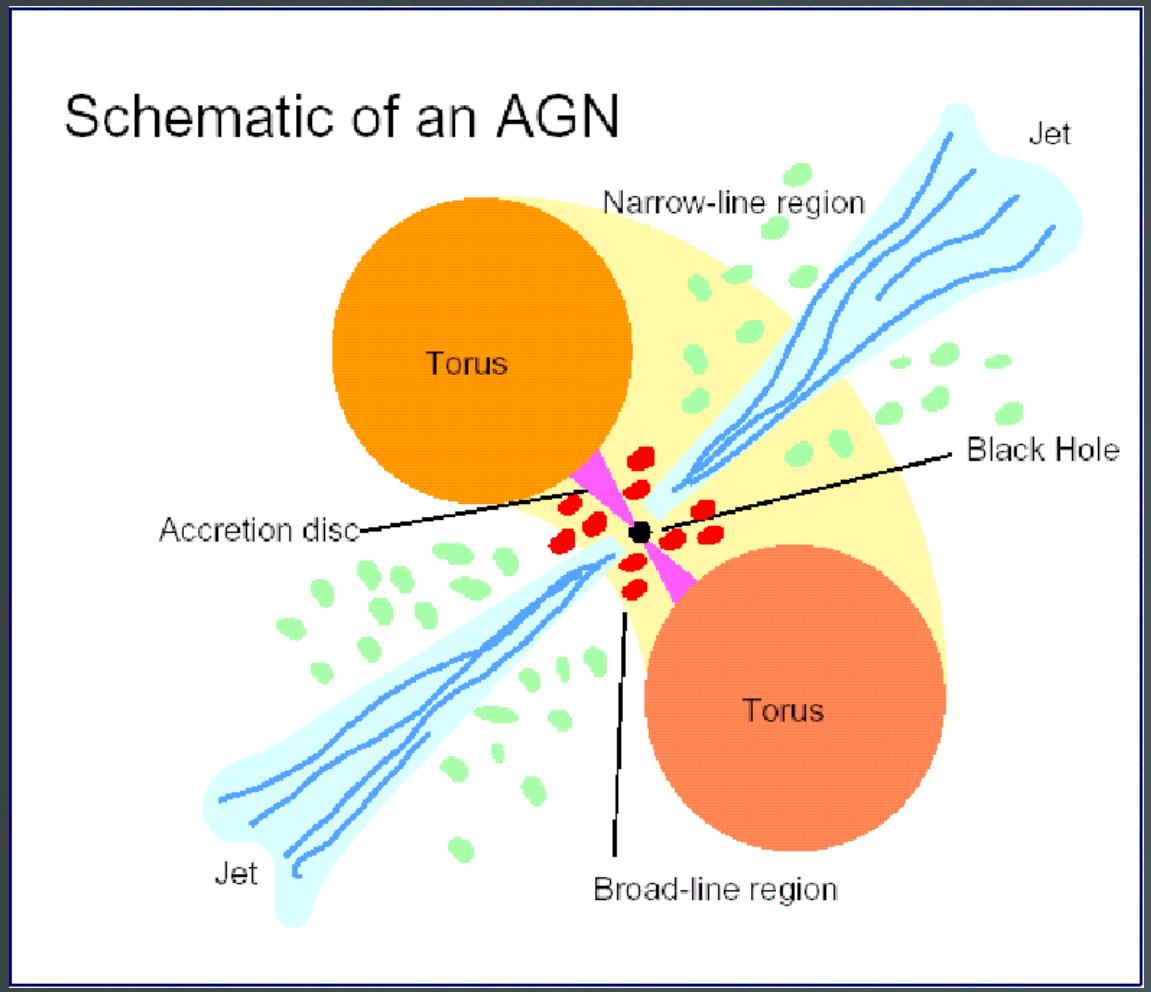
- Most probably intrinsic
- Al III, Mg II, Si IV, C IV
- HiBALs, LoBALs, FeLoBALs.

How many?
~ 20 %

BAL QSOs *vs* "normal" QSOs

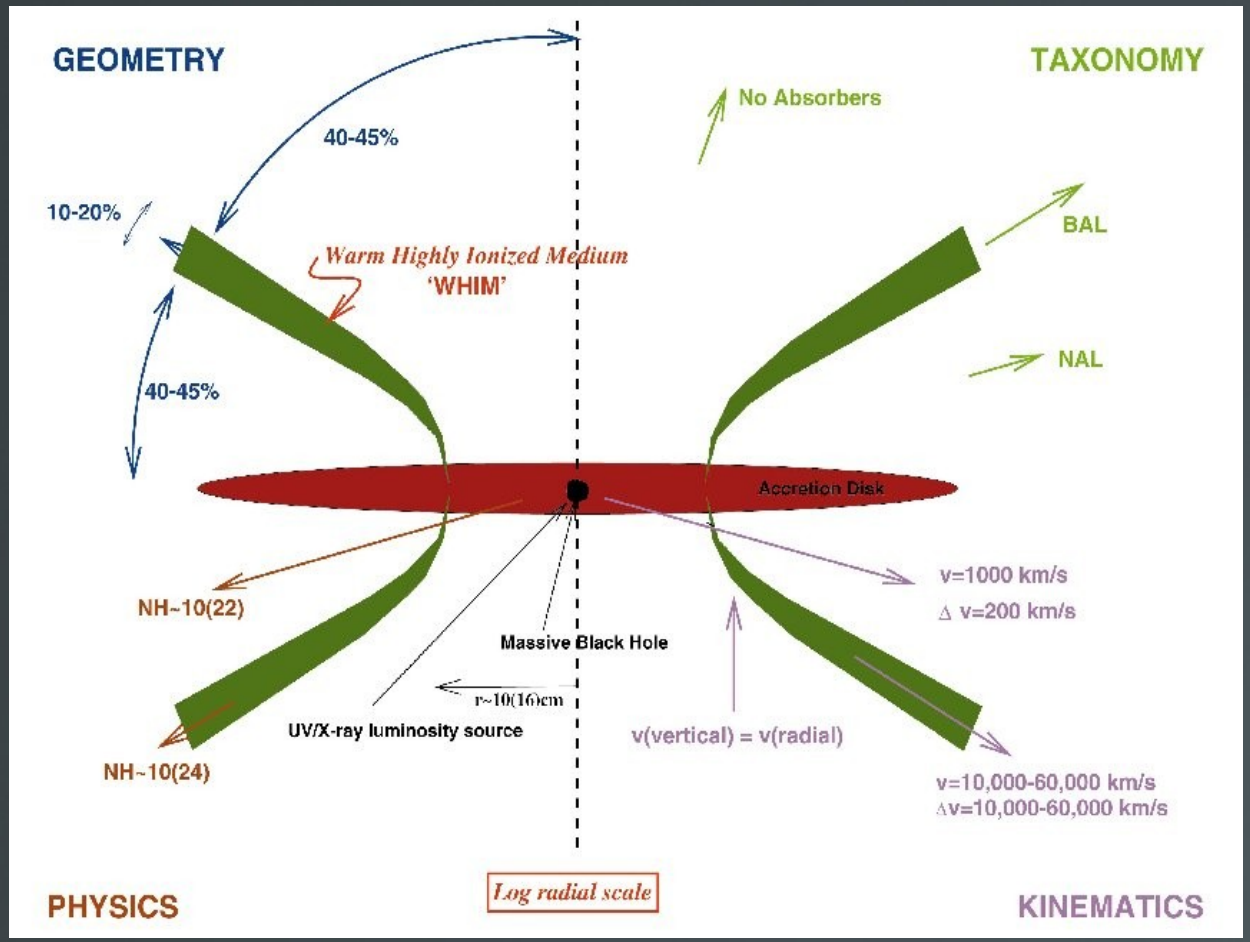
- X-Rays: Emission intrinsically similar, BAL QSOs more absorbed (Green et al. 2001, Gallagher et al. 2007)
- Optical: BALs more reddened, more highly polarized
- Mid-IR: Similar properties (Gallagher et al. 2007)
- Sub-mm, mm: No differences (Lewis et al. 2003, Willott et al. 2003, Priddey et al. 2007)

Unification scheme of AGN



Explanations for the BAL phenomenon

Orientation Scenario:



Martin Elvis (2000)

Explanations for the BAL phenomenon

Orientation Scenario:

PRO:

- Naturally explains why BAL/non-BAL QSOs are so similar
- Explains higher reddening/obscuration in BAL QSOs
- Explains higher polarisation via resonant scattering

CONTRA:

- Variety of radio spectral indices (Becker et al. 2000, Montenegro-Montes et al. 2008)
- Found both edge-on (FR II) and polar (strongly beamed) BAL QSOs (e.g., Gregg et al. 2006, Zhou et al. 2006)

Explanations for the BAL phenomenon

Evolutionary Scenario: Young or recently refueled quasars

(Becker et al. 2000; Gregg et al. 2000, 2006; Kunert-Bajraszewska & Marecki, 2007)

Explanations for the BAL phenomenon

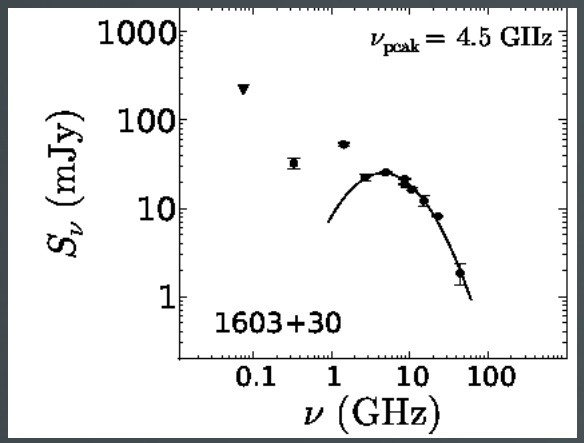
Evolutionary Scenario:

PRO:

- Anticorrelation for FR II BAL QSOs between R* and BI (Gregg et al. 2006)
- Radio BAL QSOs are compact sources "like" CSS/GPS (Montenegro-Montes et al. 2008)

CONTRA:

- Same cold and warm dust properties of BAL/non-BAL QSOs



Pilot sample of 15 RL BALs ($S_{1.4}$>15 mJy)

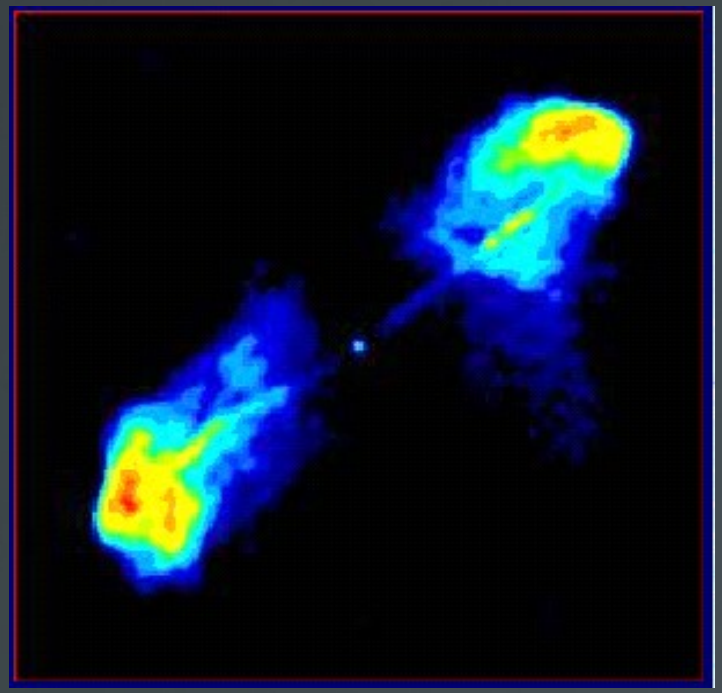
VLA (74 MHz – 43 GHz), Effelsberg (2 – 10 GHz), IRAM (mm), VLBA (5 GHz, 8 GHz)

- Quite compact, ~ 50 mas ~ 0.5 kpc
- Weak variability
- Convex-peaked spectra (some double-components)
- On average weakly polarised
- Same α distribution on non-BAL QSOs (orientation)
- Consistent with anticorrelation ν_{peak} vs LS

(Montenegro-Montes PhD thesis)

New sample of 30 RL BALs ($S_{1.4}$>30 mJy)

- Radio continuum & polarization (Effelsberg, VLA)
- Morphology & orientation (EVN, VLBA, global VLBI)
- Dust properties (IRAM, APEX, JCMT)
- H I absorption & CO lines: gas component in the central engine environment (GMRT, WSRT, IRAM)
- Optical band: International Time Project at La Palma observatories in 2008. Ionization parameters and distance of the BAL region from the center (data still to be reduced...)



...Thank you!