

Optical monitoring of Mrk 501 at the Cananea observatory

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MW monitoring of γ sources

- Optical photometry and spectroscopy with 2.1m Cananea telescope
- NIR photometry (JHK) from Cananea
- Optical photometry with polarization from San Pedro Martir (2.1, 1.5, 0.8m)
- To extend to mm-wave monitoring and ID program with the Large Millimeter Telescope

Our team

- Cananea optical:
 - Carramiñana, Eduardo de la Fuente, Yoli Pedraza + Vahram Chavushyan (spectroscopy)
- Cananea NIR photometry:
 - Luís Carrasco (CANICA PI), Carramiñana
- MW wave project
 - with Greg Stacy, David Hughes, Grant Wilson

Mrk 501 data

All optical and NIR data taken at Cananea 2.1m telescope

- BVRI imaging: single epoch around 2454555.0 - six quasi-consecutive exposures on each filter; observers Carramiñana, de la Fuente, Pedraza
- JHK imaging: between 7 and 9 single measurements at different epochs between +4552 and +4631; observer Carrasco (and Carramiñana at +4552)
- We do have (unreduced) long slit spectroscopy

NIR epochs

4552.0	JHK
4565.0	JHK
4574.0	JH
4590.0	JHK
4595.0	JH
4597.0	JHK
4620.0	H
4629.0	JHK
4631.0	JHK

Most observations are slightly before the epoch (~0.1 days)

Data reduction

- All images reduced with IRAF (noao + package)
- Systematic zero point magnitude errors between 0.03 and 0.08 magnitudes
- Statistical measurements errors at the 0.003 mag level
- Aperture photometry at 10, 15, 20, 30, 40 and 44 CANICA pixels = 3.2, 4.8, 6.4, 9.6, 12.8 and 14.08 arcsec

Galaxy subtraction

- With all the data on a given filter we fit $F(r)=A*(1-\exp(-r/r_0))$ using fluxes in rings outside central aperture
- Interpolation to central aperture gives F_{gal} (adding outside rings) and F_{agn} (flux on central aperture - fit)
- We obtain a reference value of F_{agn} for each color
- r_0 is kept fixed for all images of a given filter
- A can be varied for images and set to have constant flux outside the central aperture

reference fluxes

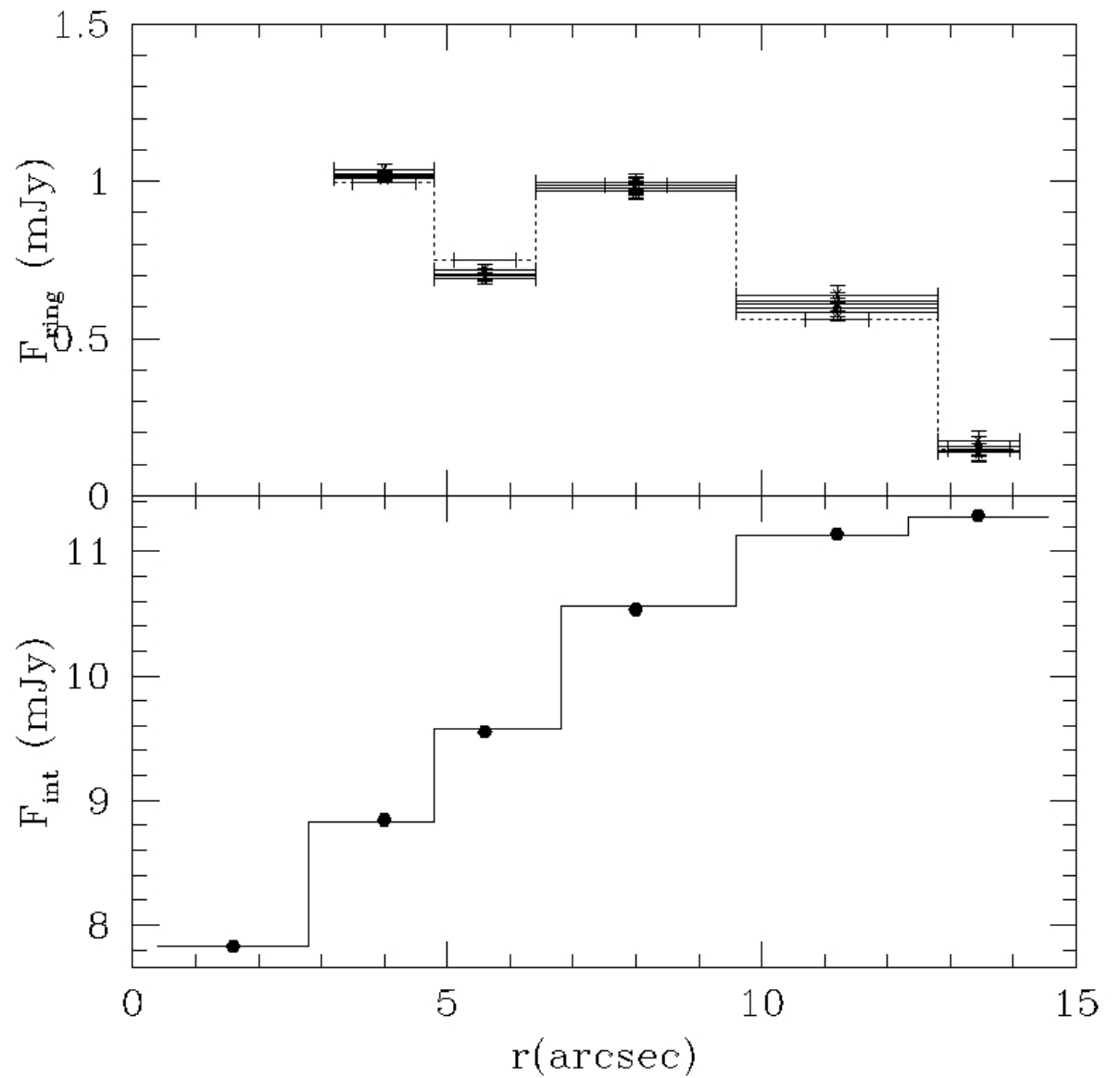
- B: AGN = 5.30 mJy : Gal = 2.87 mJy
- V: AGN = 7.08 mJy : Gal = 5.94 mJy
- R: AGN = 8.33 mJy : Gal = 7.58 mJy
- I: AGN = 9.57 mJy : Gal = 10.76 mJy
- J: AGN = 18.05 mJy : Gal = 19.24 mJy
- H: AGN = 13.15 mJy : Gal = 14.38 mJy
- K: AGN = 18.34 mJy : Gal = 18.23 mJy

Nominal errors at the 0.01 to 0.03 mJy level (still checking...)

H looks strange....

Galactic disk fits

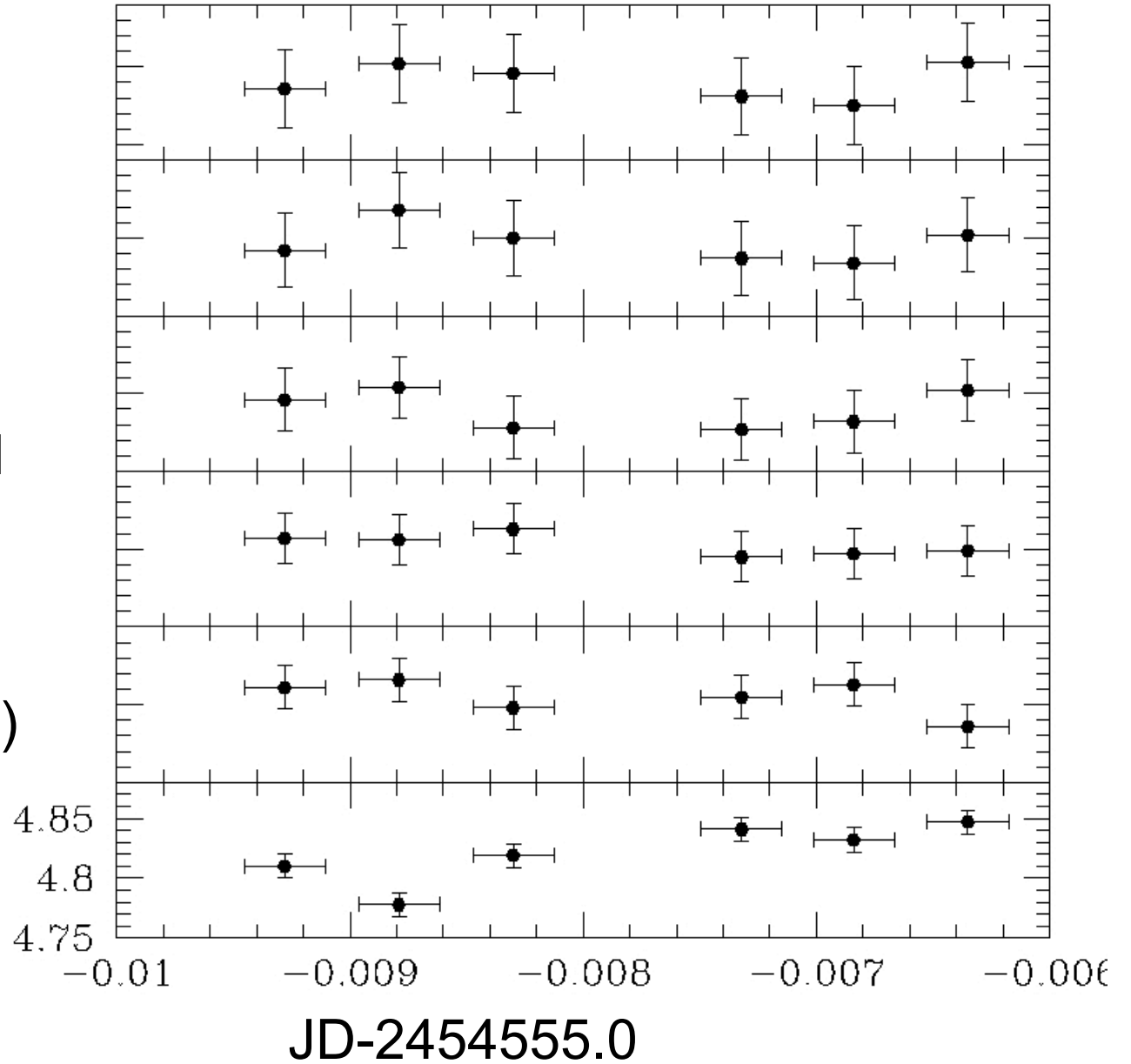
example



Flux histor example

Lower panel: AGN
Upper panels:
galaxy rings

This case (V band)
points
to short terms
variability



Where we are

- Getting the BVRI properly made (errors and galaxy=constant)
- JHK have been fitted; need to see each epoch (same analysis as above)