# SUPERNOVA REMNANT 0540-69.3:
## Continuum Emission of the Pulsar and its Nebula

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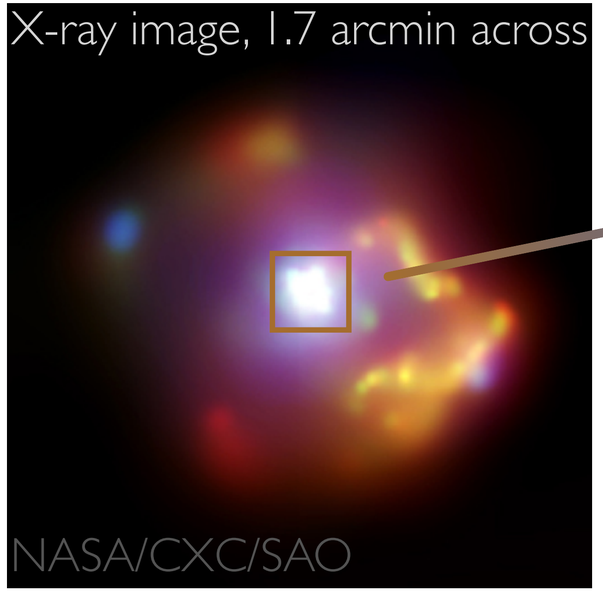
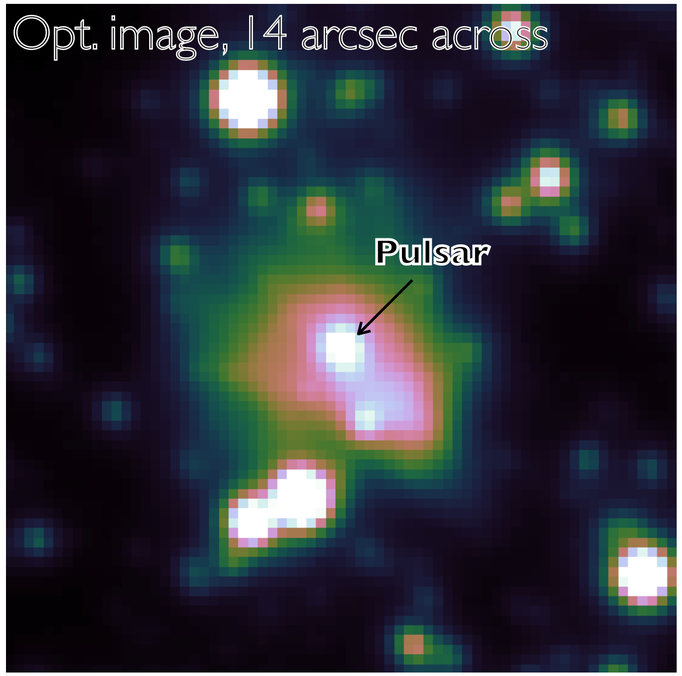
# SNR 0540-69.3

- Supernova remnants (SNRs) provide information of the last stages of stellar evolution, supernova (SN) explosion mechanisms and compact objects



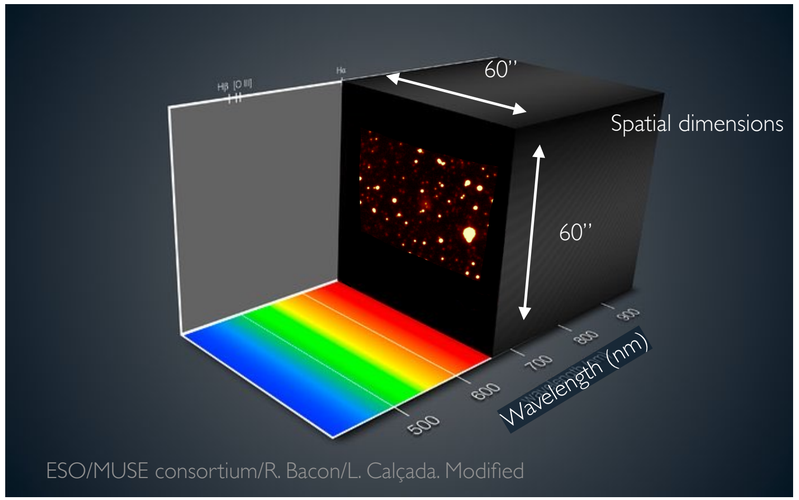

- Large Magellanic Could: ~50 kpc distance
- ~1000 yrs old, type II SN
- Crab twin: Pulsar (P = 50 ms) and Nebula

- This talk: continuum emission from the pulsar and nebula
- Helps to understand pulsar properties and the physical conditions in this region

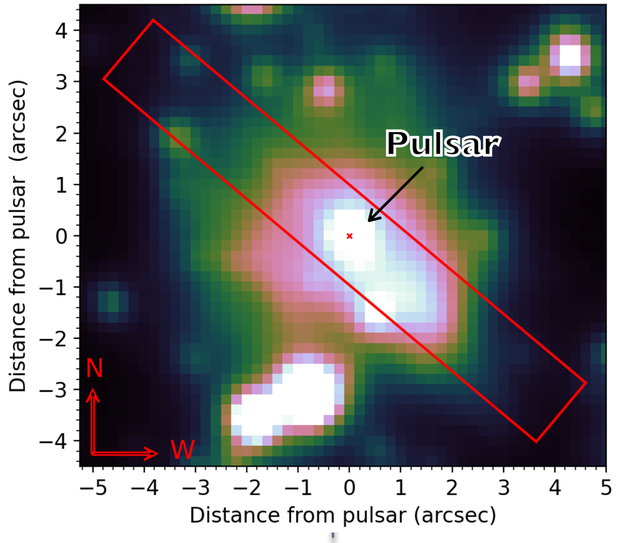
# DATA FROM VLT/ESO

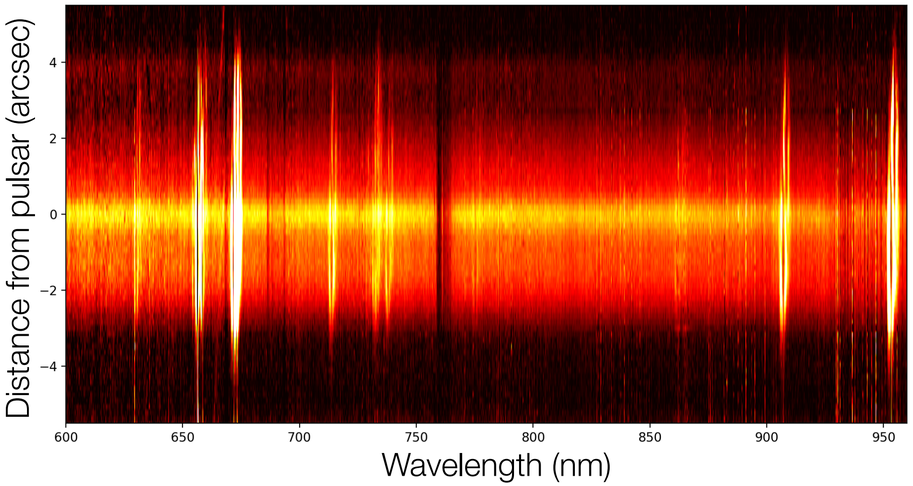
- 3D data
- 465 - 930 nm
- Field of View: 60” x 60”
- Observations: Jan & Mar 2019

- 2D data
- UVB, VIS, NIR: 300 - 2500 nm
- Slit dimensions: 1”.2 - 1”.6 x 11”
- Observations: Oct & Nov 2019
- First NIR spectrum of the source!



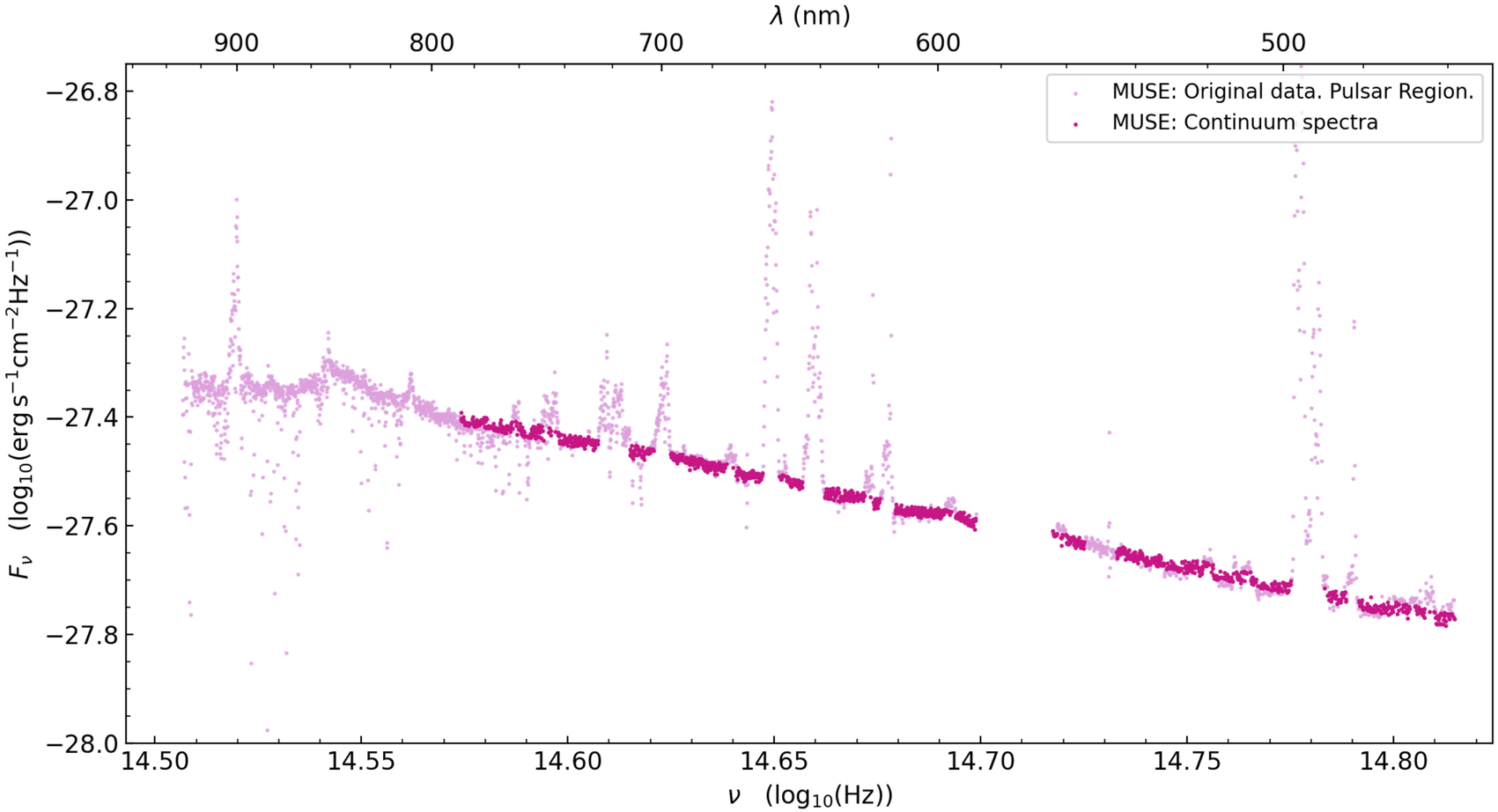

URL: https://www.eso.org/public/ireland/teles-instr/technology/ifu/



# ISOLATING THE CONTINUUM SPECTRUM

- Masking and sigma-clipping lines and artefacts
- Fit a power law: $F_\nu \propto \nu^{-\alpha}$

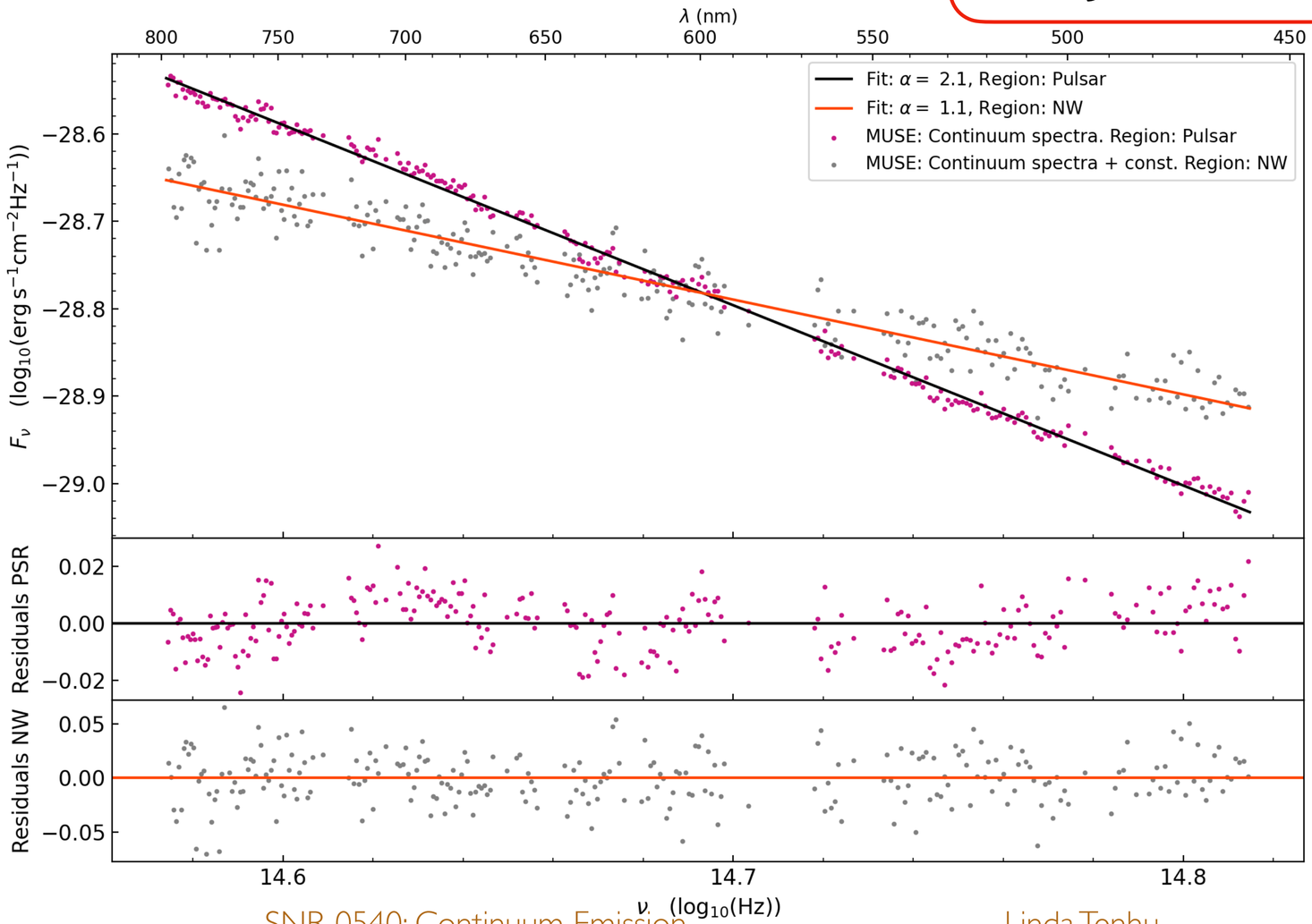


# MUSE: RESULTS

- Spectrum well-described by a single power law

Power law fit:

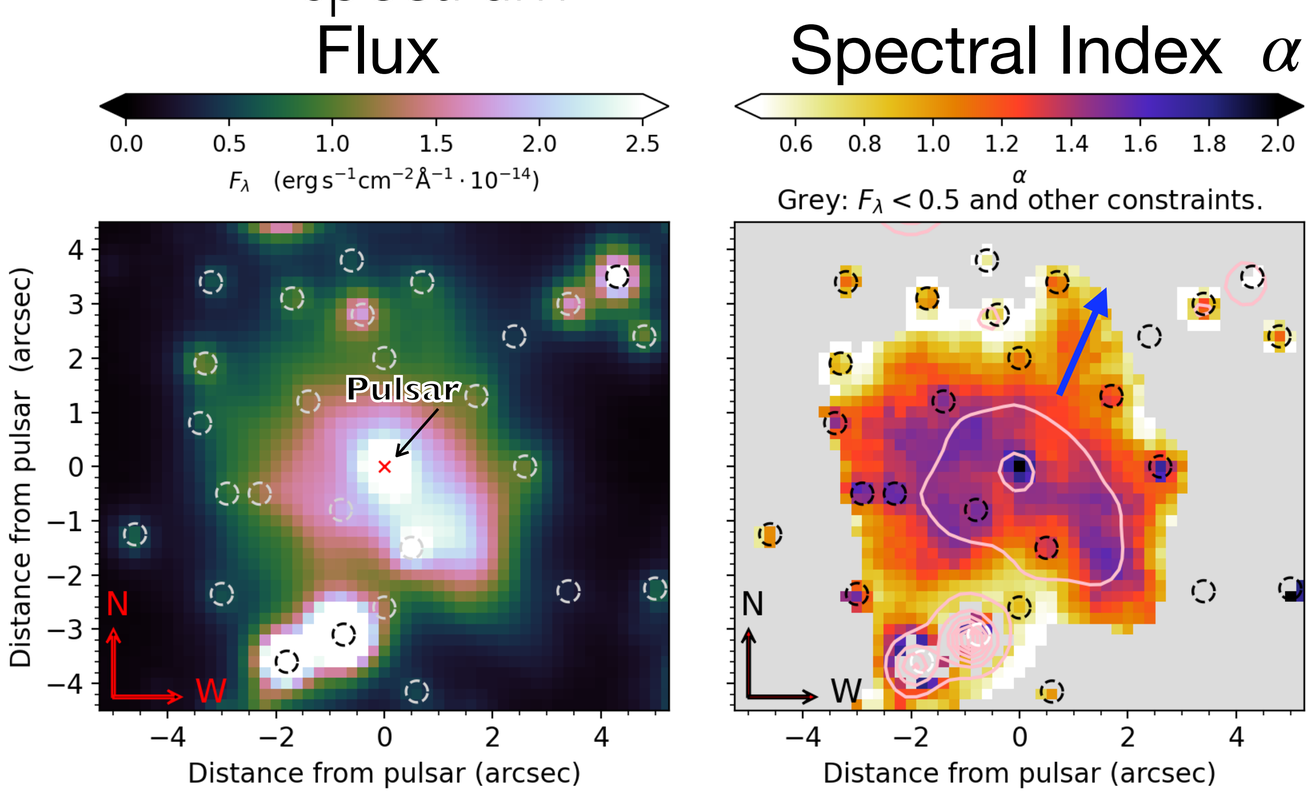
$$F_\nu \propto \nu^{-\alpha}$$

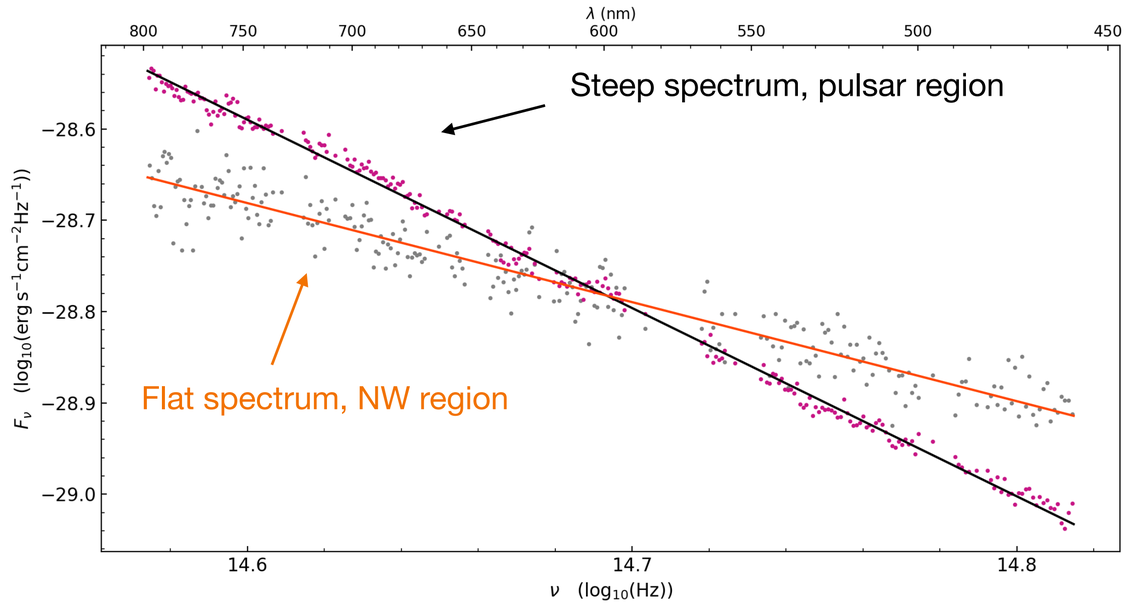


# MUSE: RESULTS

- Clear spatial variation in the spectral index (was not possible to see before)
- Pulsar region has the steepest spectrum

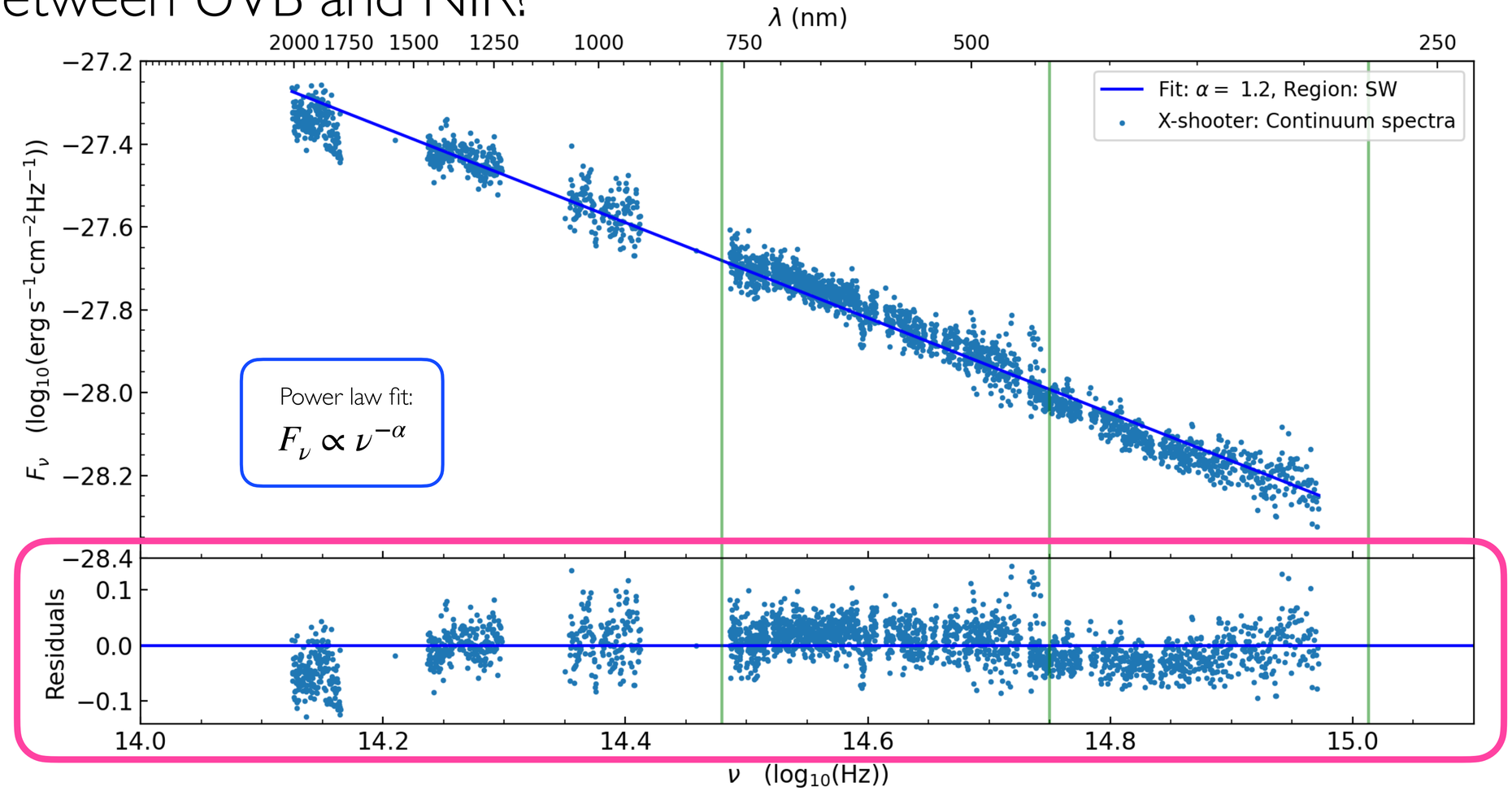
- Previously measured values [0.5, 1.5]
- Jet-like structure in the NW? (suggested by X-ray observations)



# X-SHOOTER: RESULTS

- A single power law not a good fit – spectral break somewhere between UVB and NIR?
- Future plan is to investigate more complex models



# SUMMARY: SNR 0540

## Continuum Emission of the Pulsar and its Nebula

- MUSE (optical) results:
  - Spectrum well-described by a single power law
  - Clear spatial variation in the spectral index tells us about the particle distribution and acceleration in the nebula
- X-shooter (UVB - NIR) results:
  - single power law is not a good fit for the whole wavelength region from UVB to NIR
- Future plan:
  - More detailed analysis and interpretation in progress



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