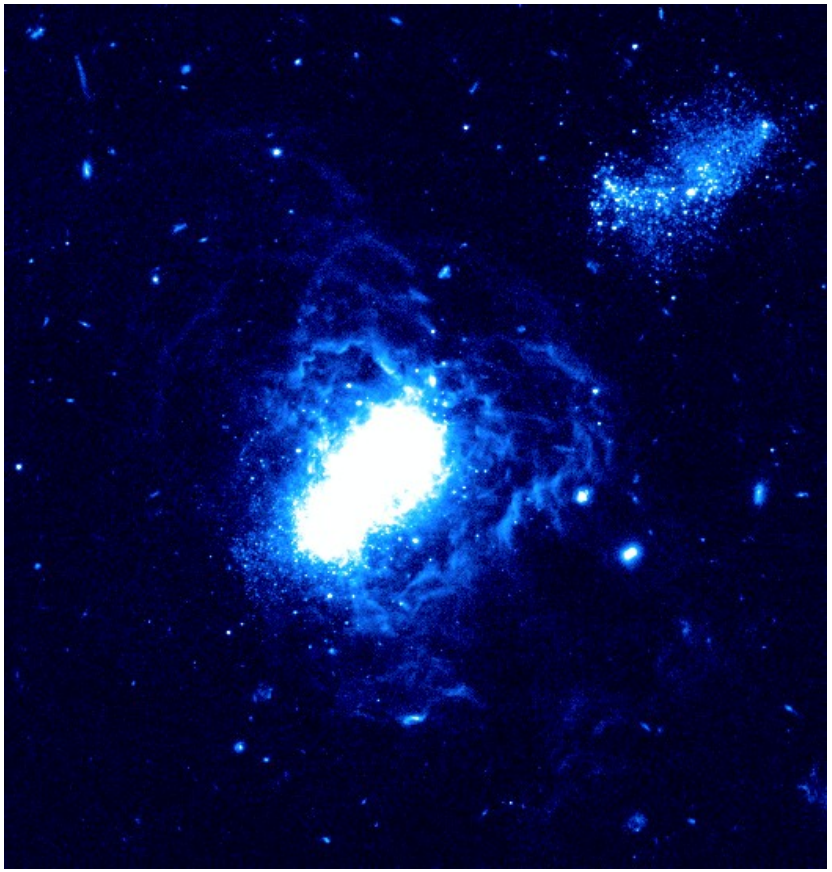

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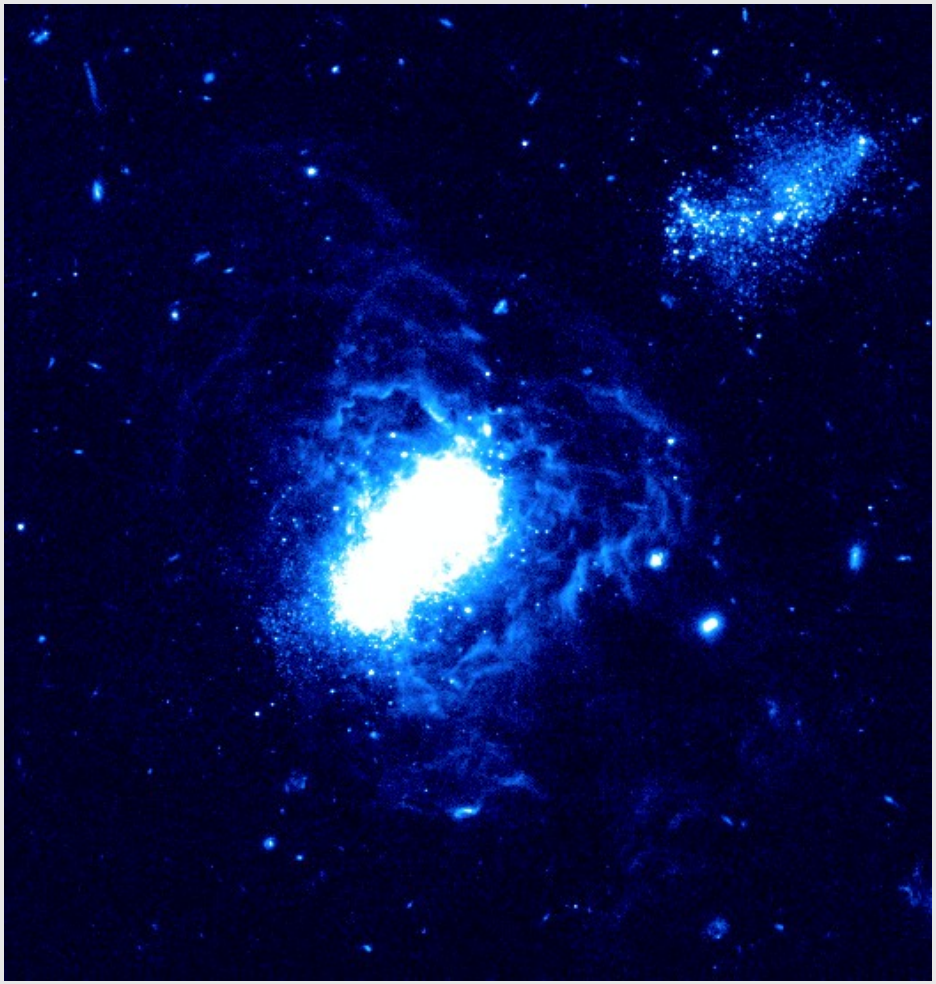
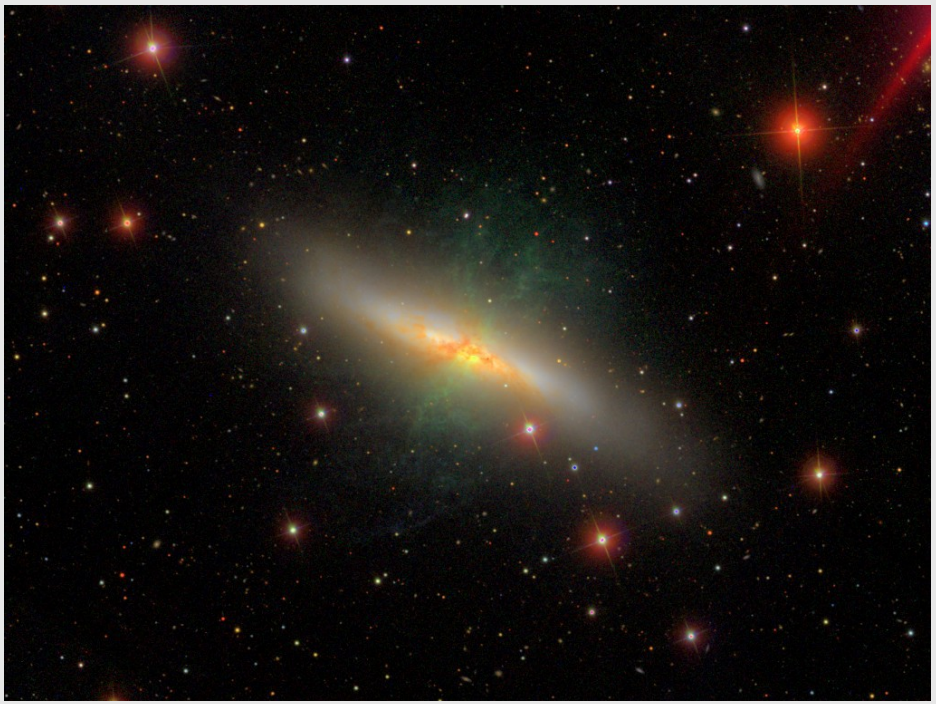
I Zw 18:
a hot metal-poor galaxy

I Zw 18
Basic parameters



- Distance ~ 12.6 Mpc
- Size ~ 1 kpc
- SFR ~ 0.05 M_sun/yr
- Metallicity ~ 0.02 solar

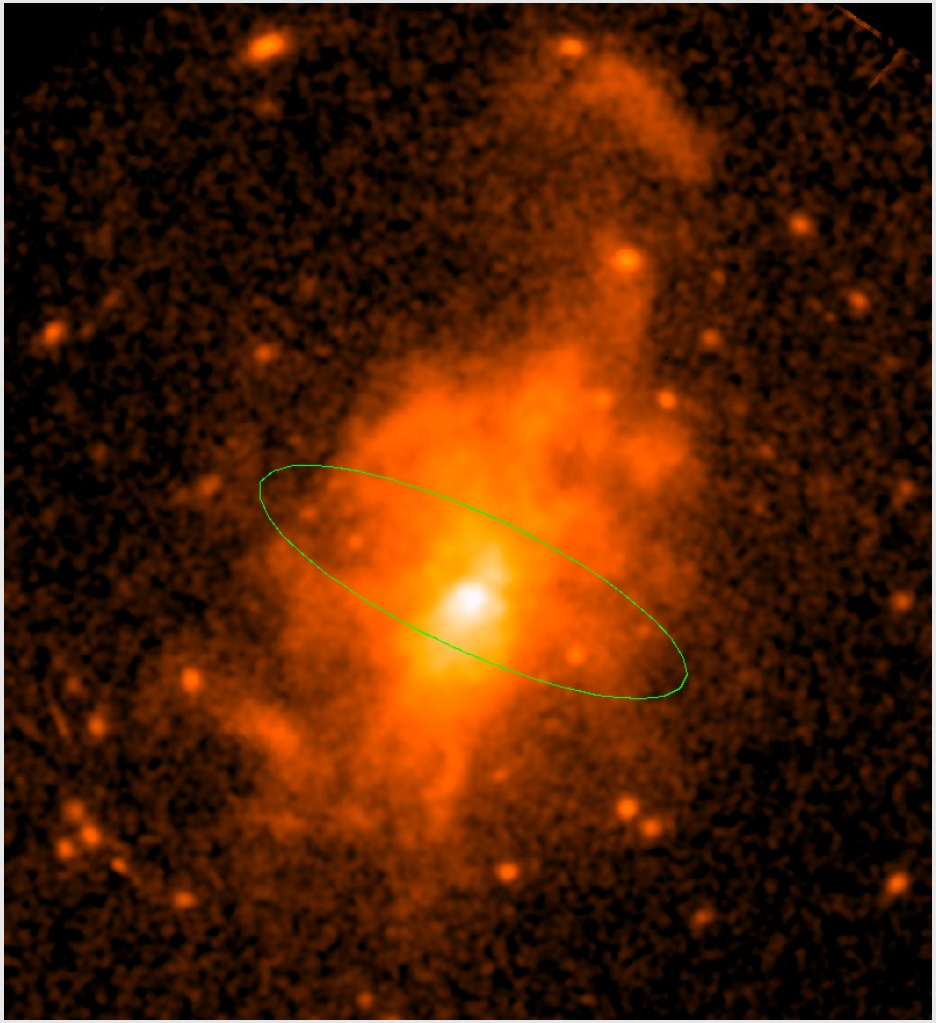
X-ray diffuse emission
Distribution and properties



- Diffuse X-ray emission traces hot gas
- XMM-Newton provides currently the best sensitivity to such emission
- Accurate background subtraction is difficult but crucial for good spectra
- Despite good sensitivity small sources are challenging

M82 soft X-ray image based on XMM-Newton archives

X-ray diffuse emission
Distribution and properties



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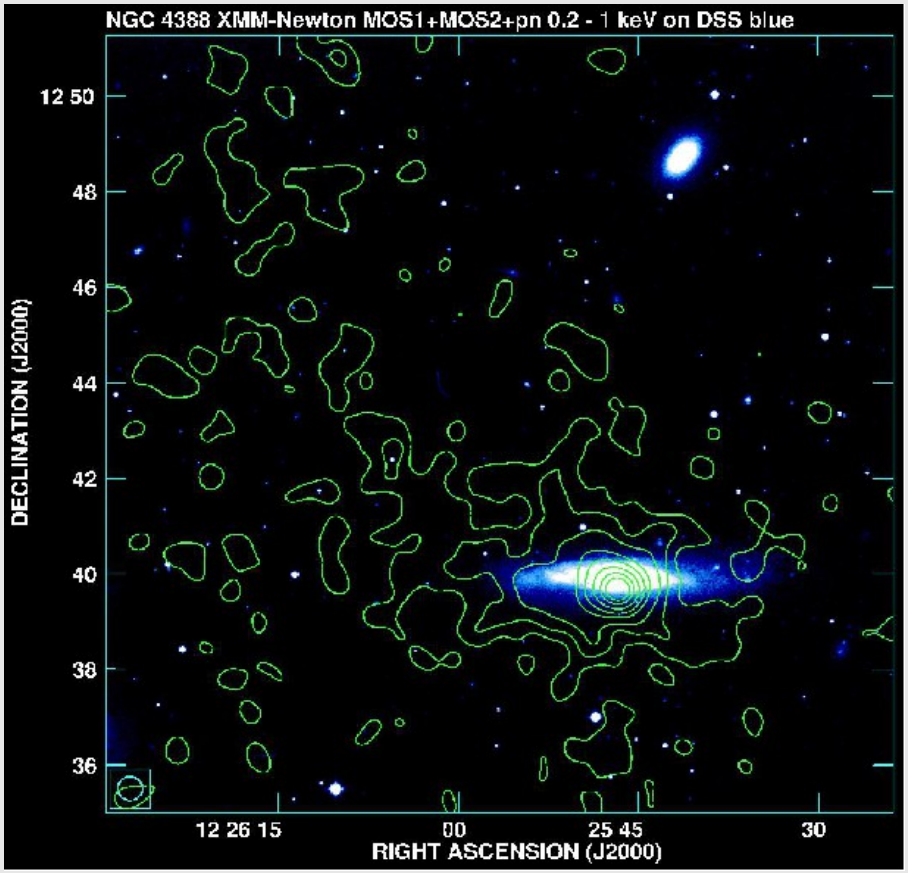
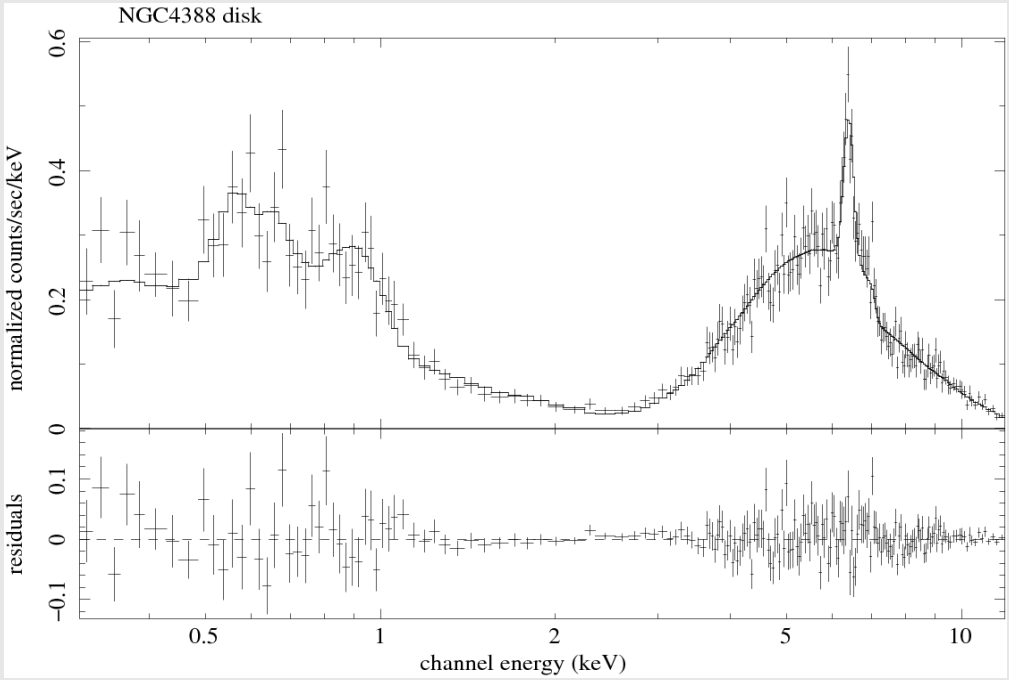
M82 soft X-ray image based on XMM-Newton archives

X-ray diffuse emission
Spectral analysis

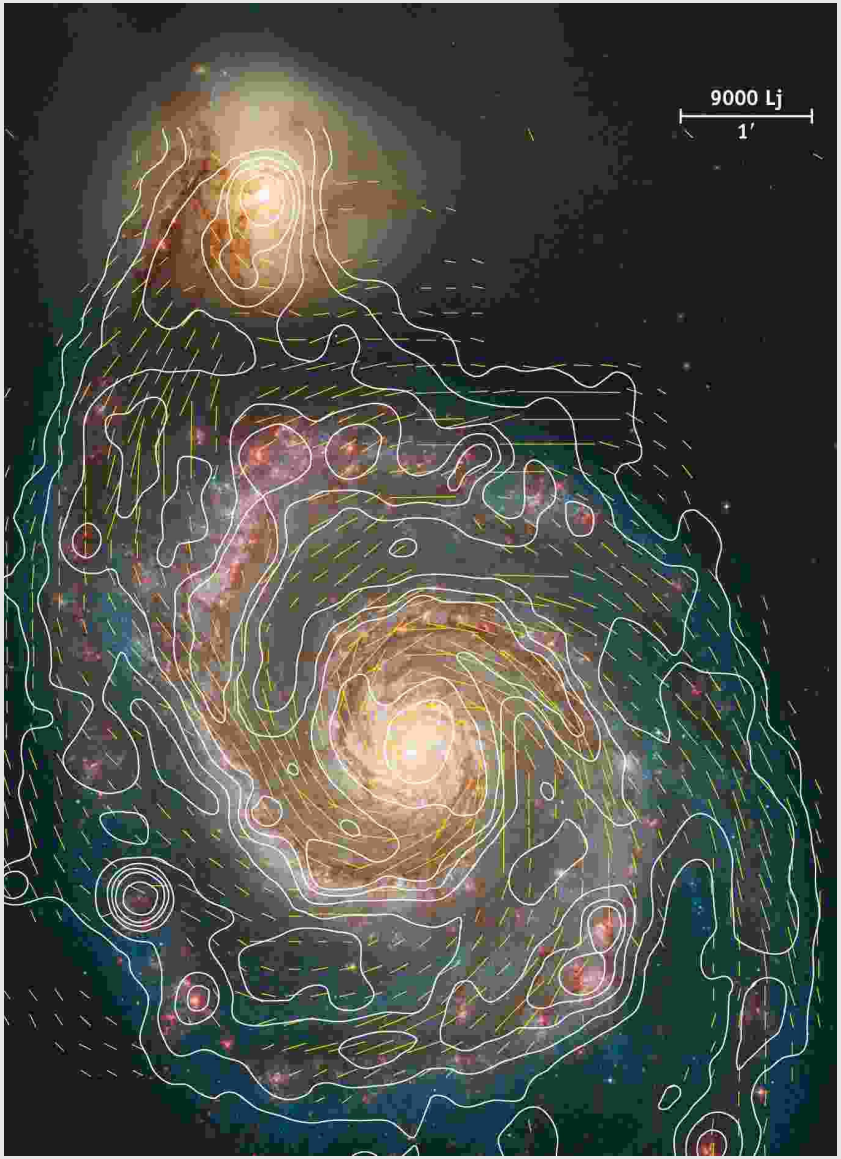


Weżgowiec et al. 2011, A&A, 531, 44



- Even with low statistics we are not helpless
- Above: a complex model (two temperature component + power-law + absorbed power-law with an iron line) fits the data quite well

Radio emission
Distribution and properties



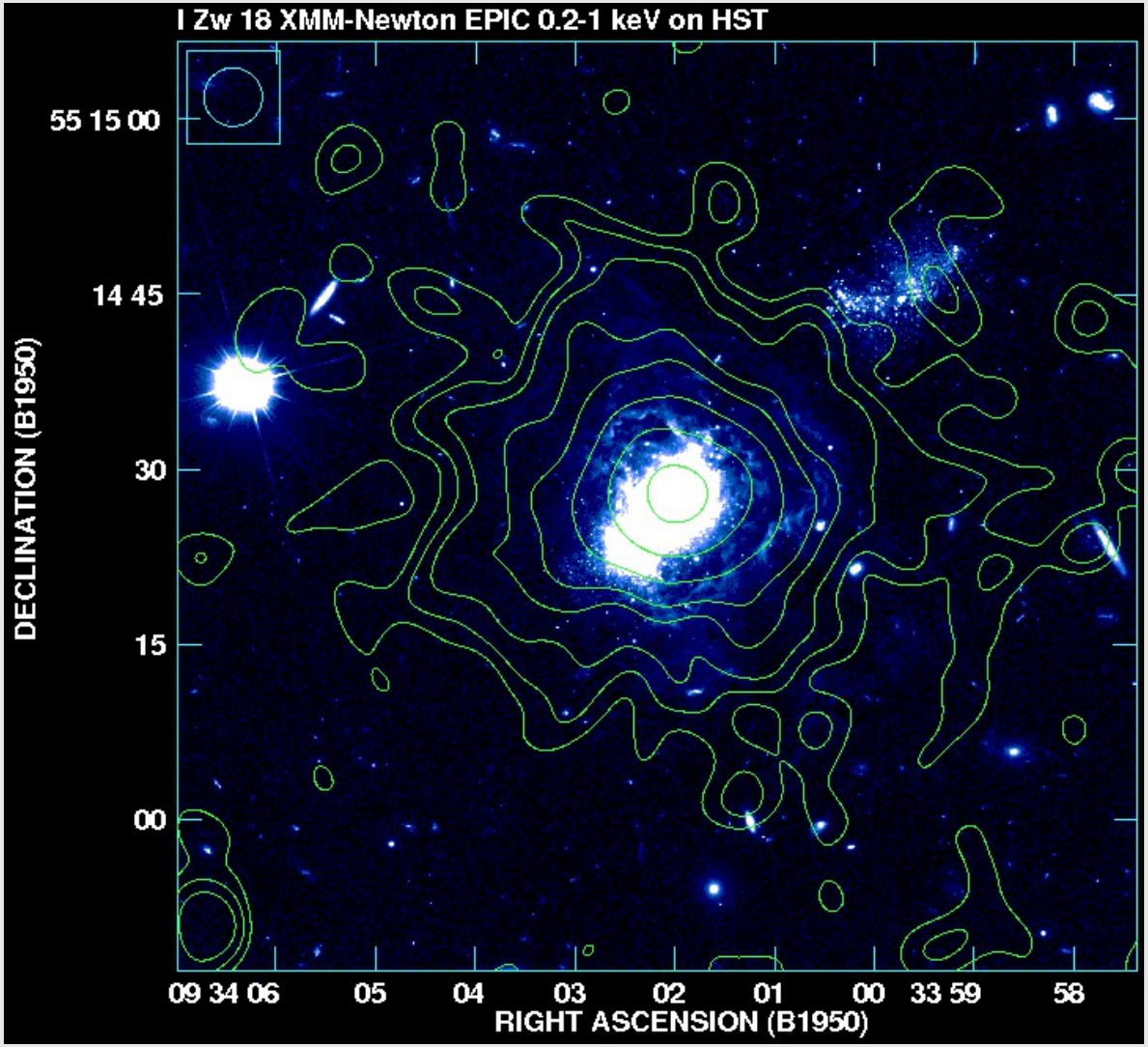
- Traces star forming regions (thermal) and magnetic fields (non-thermal)
- Polarized emission marks regions of regular magnetic fields

M51: Fletcher et al. 2011, MNRAS, 412, 2396

Radio emission
Observations

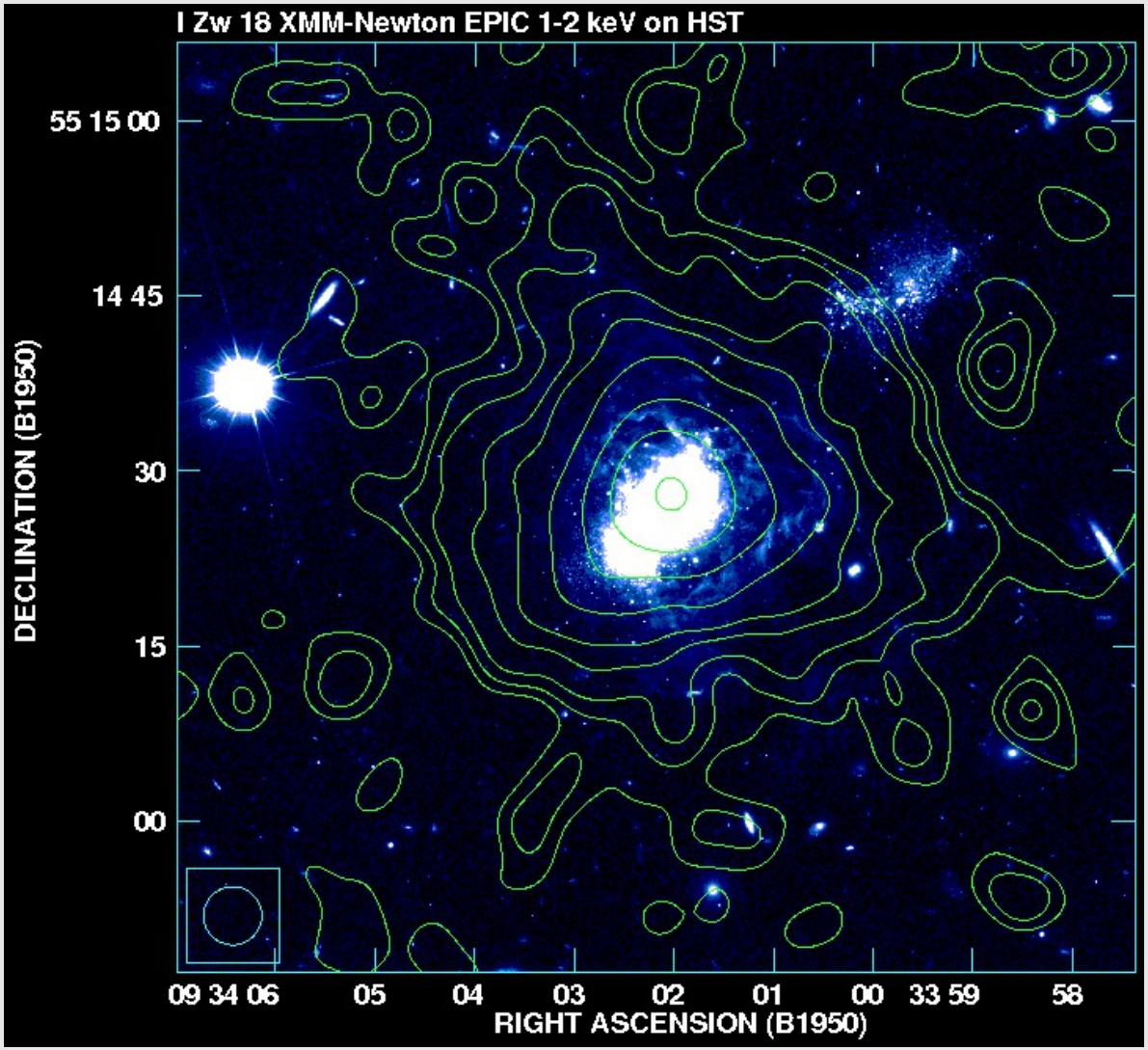
- For objects of angular sizes below 1' the VLA is the only compromise between resolution and sensitivity to extended emission

I Zw 18
X-ray data



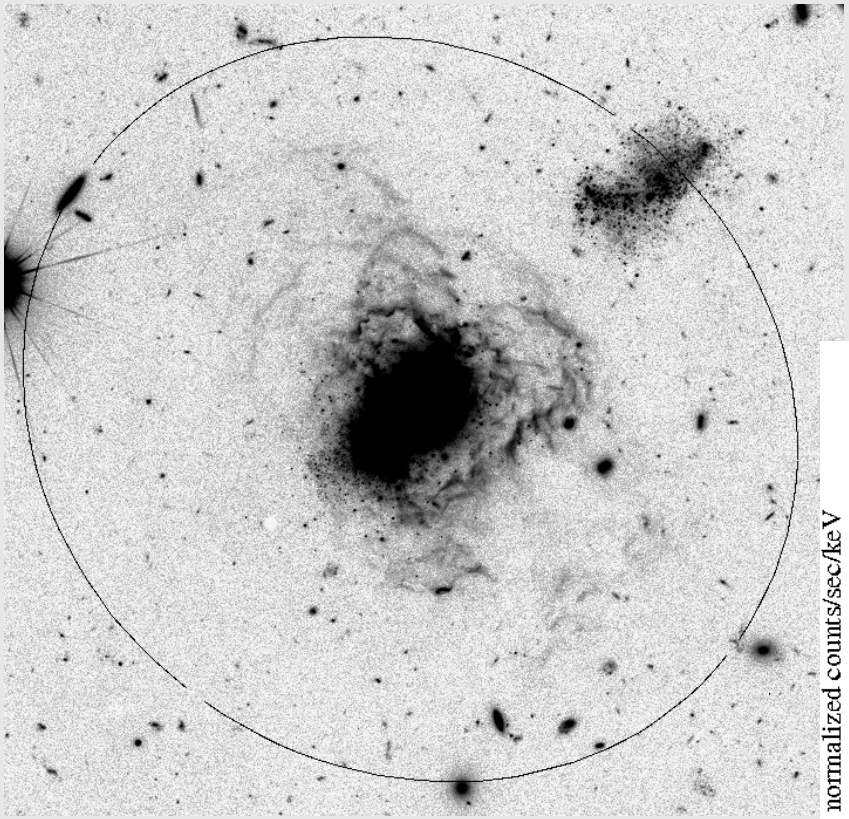
- Hot gas nicely follows Hα outflows
- A clear hot halo around a dwarf galaxy

I Zw 18
X-ray data

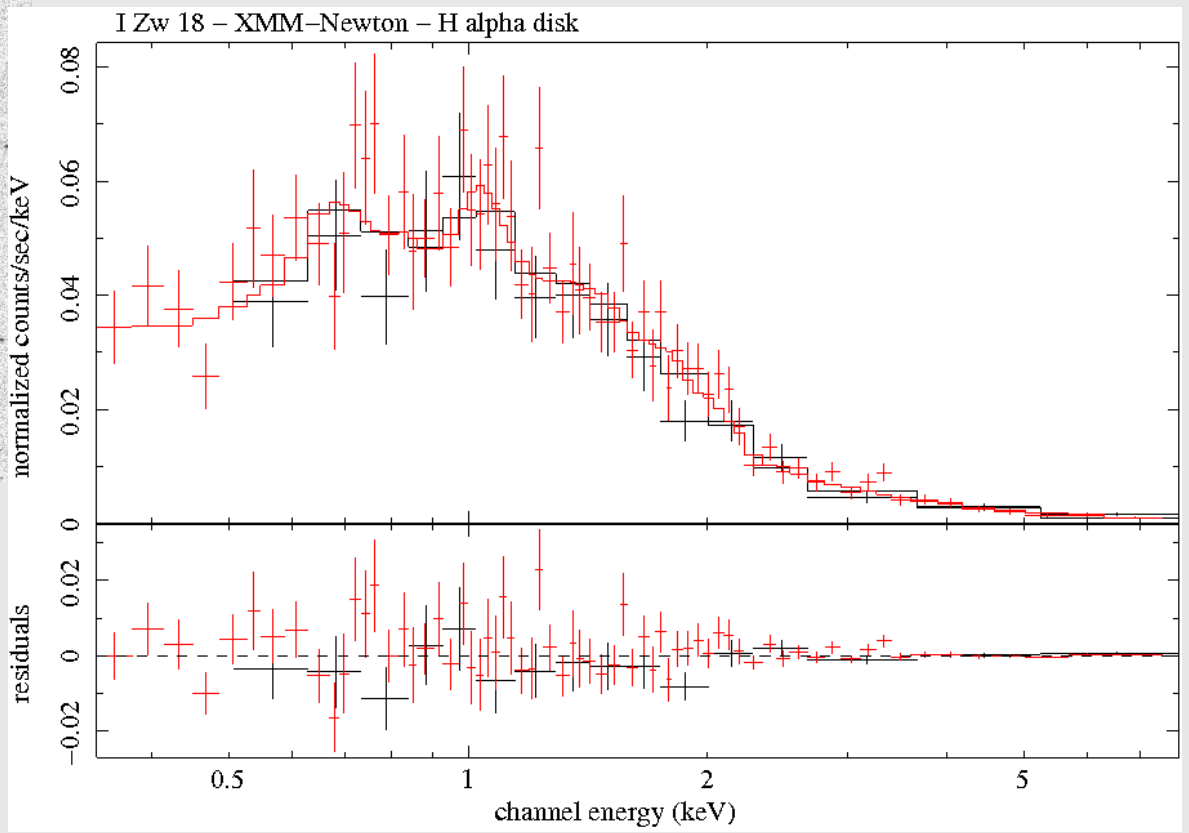


- Even better correspondence of the hottest gas with Hα outflows
- A steeper gradient visible along the major axis → is it “shocking” the companion?

I Zw 18
X-ray spectrum



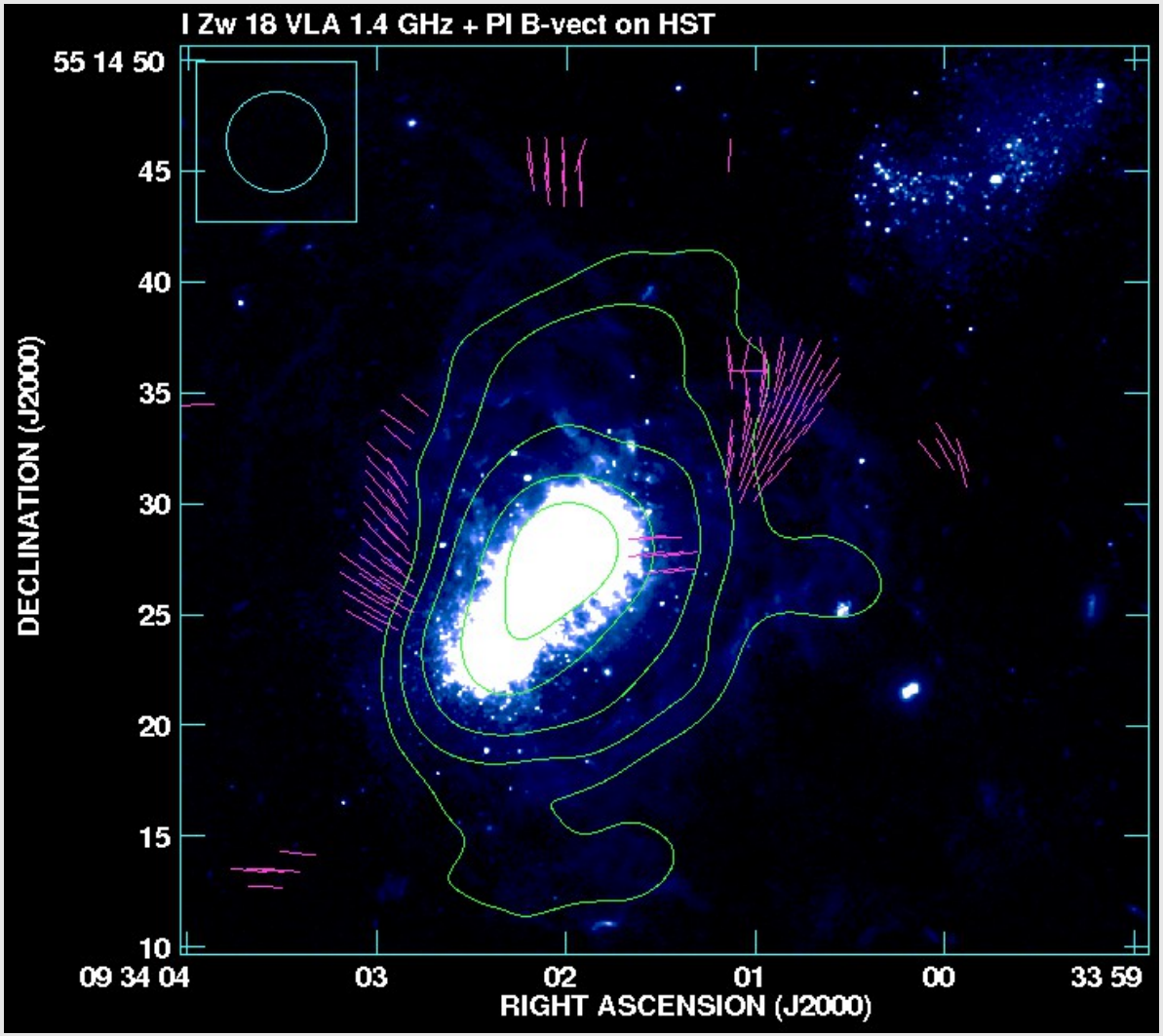
- Only a global fit possible
- Two plasmas with low metallicities



kT_cool = 0.29 keV
kT_hot = 1.26 keV

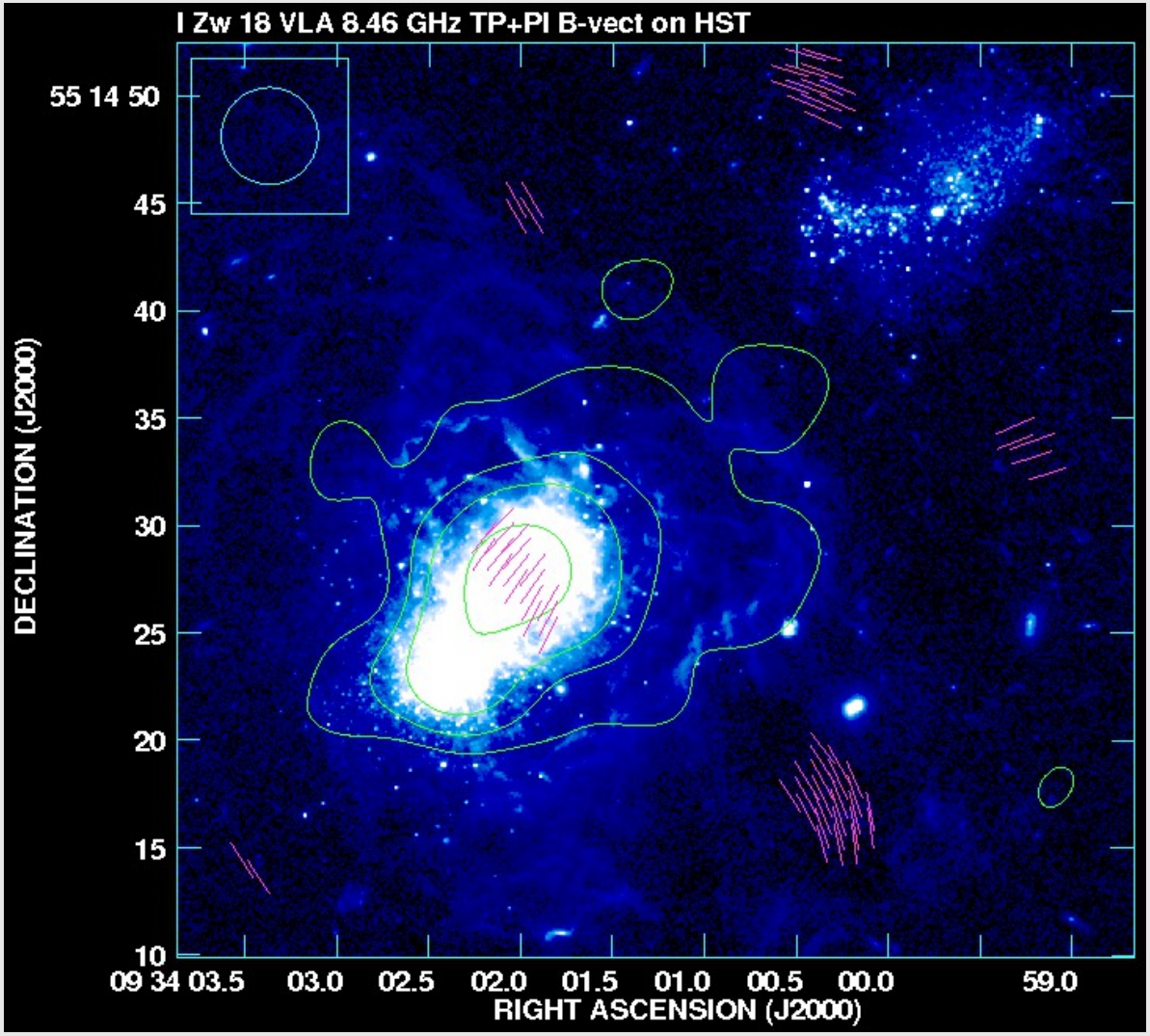
S_hot = 10 x S_cool

I Zw 18
Radio observations



- Despite probable missing flux the entire disk visible
- A polarized outflow towards the companion?
- Magnetized plasma outside the main body

I Zw 18
Radio observations



- A “flat” spectral index possibly due to missed flux at 21 cm
- Only the central part (source) is polarized
- Magnetic field strength of the order of 20 μG!

Summary
I Zw 18: hot and strong

- Hot gas halo extends far outside the optical disk
- Low-metallicity (Z~0.15 solar), yet still enhanced, of the hot gas
- Unusually hot phase at 1.26 keV (confined? less cooling?)
- Significant radio emission even at higher frequencies, unusual for a dwarf galaxy
- Galactic-scale outflow possibly interacting with the companion?
- Very strong magnetic field of 20 μG
- This might help to confine the hot gas in the outflow