The Extragalactic Radio Sky at Faint Flux Densities

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THE AUSTRALIAN NATIONAL UNIVERSITY

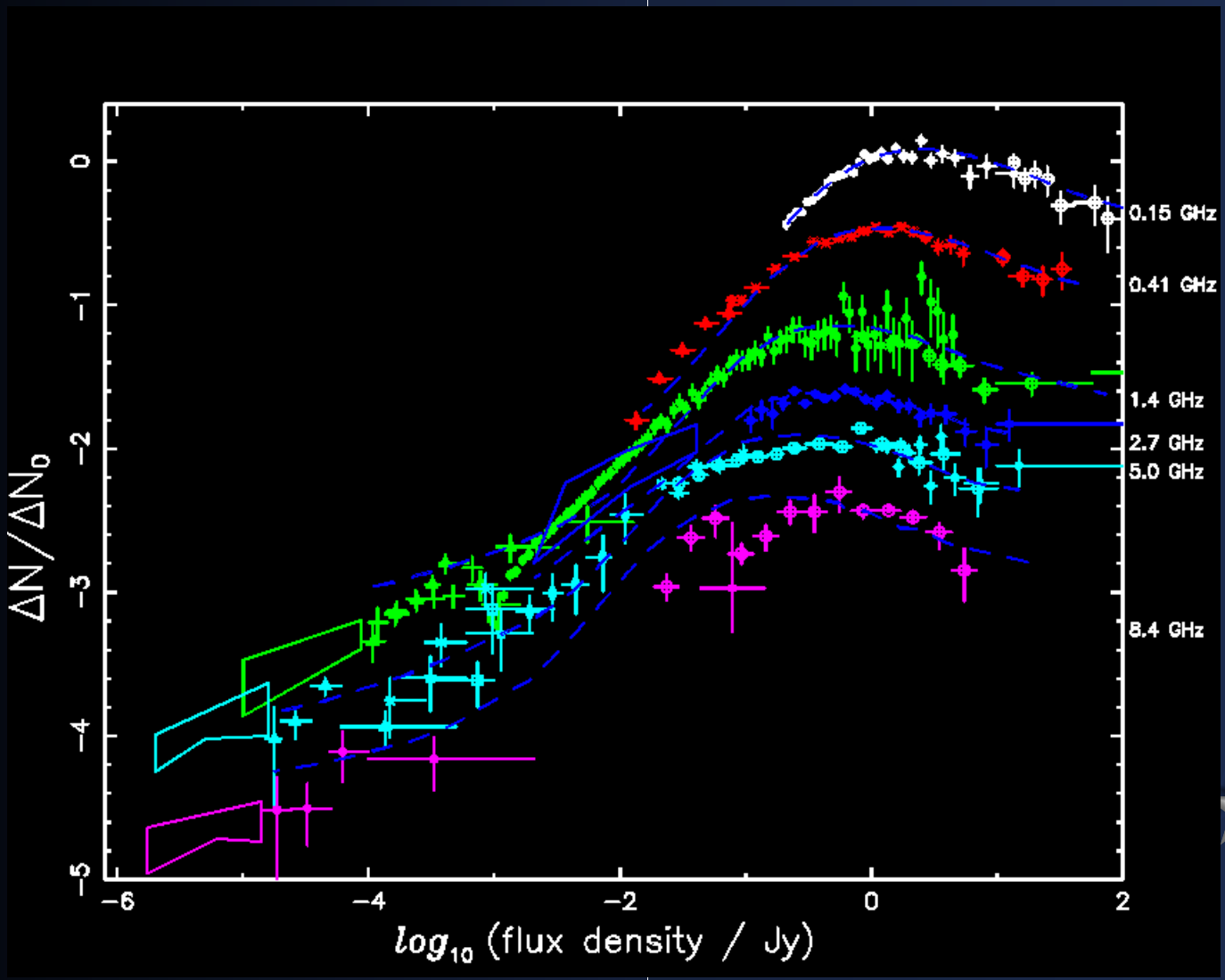
Probing deep fields…

~ 3000 galaxies

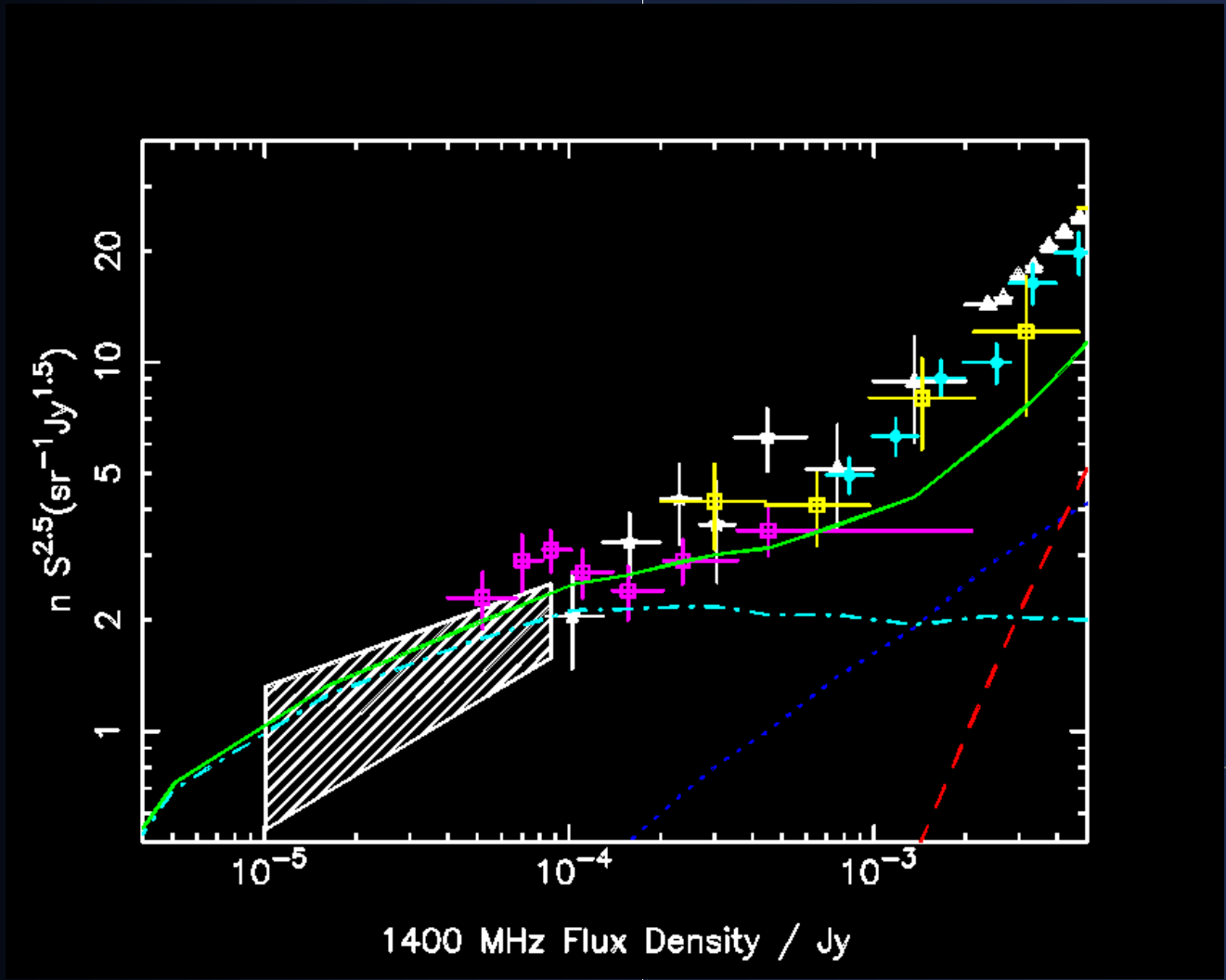
13 radio sources

Radio waveband samples different population of galaxies

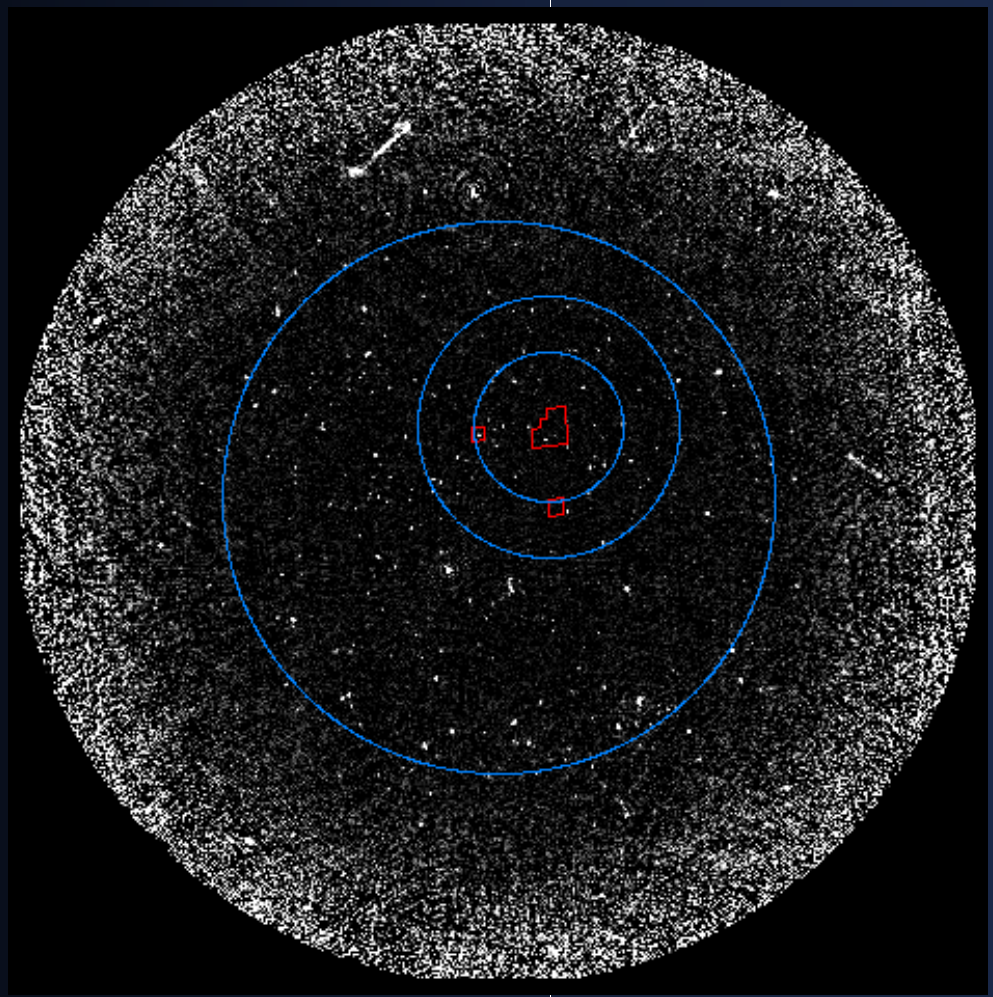
Current Deep Radio Surveys



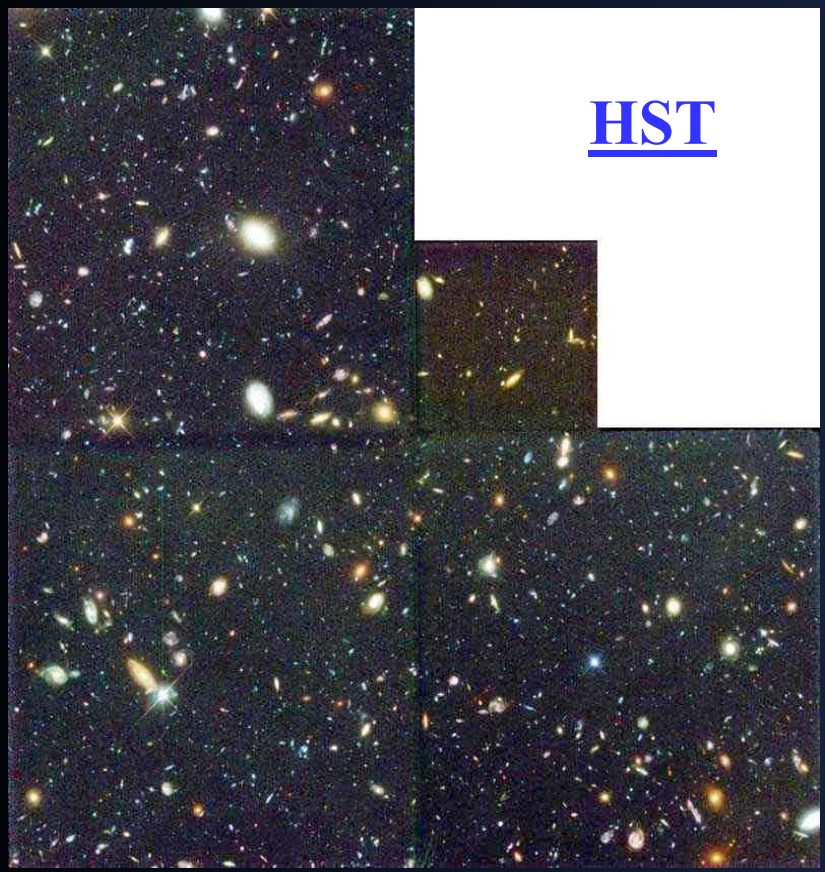
Current Deep Radio Surveys

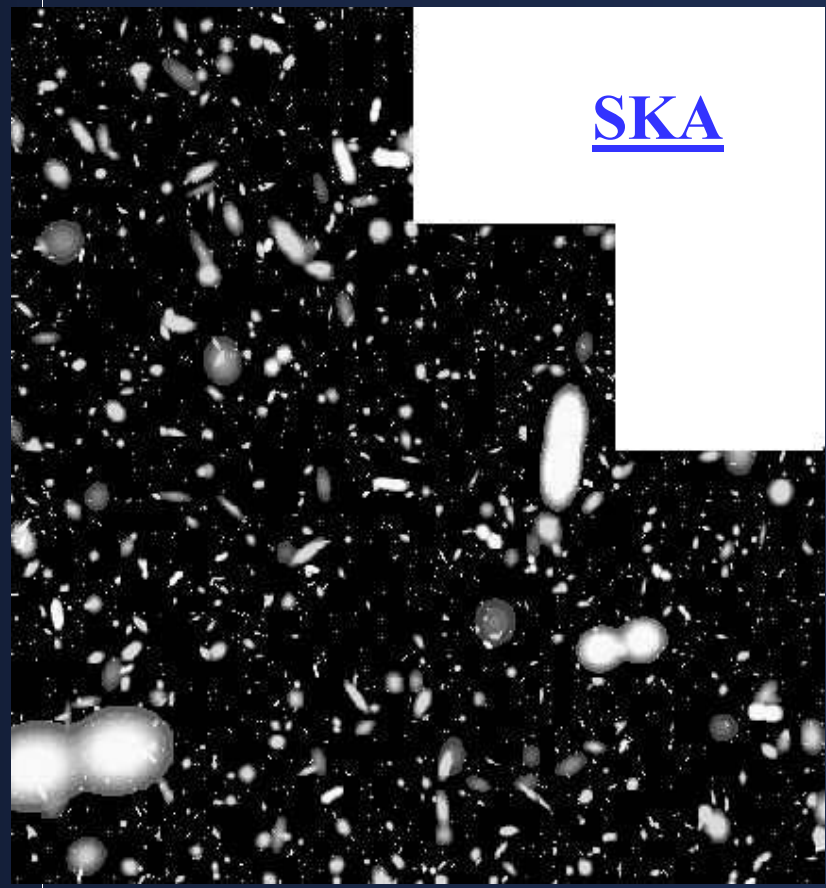


HDF-s ATCA Image (rms=7 microJy)



The future ….. 1 nJy at 1.4 GHz?



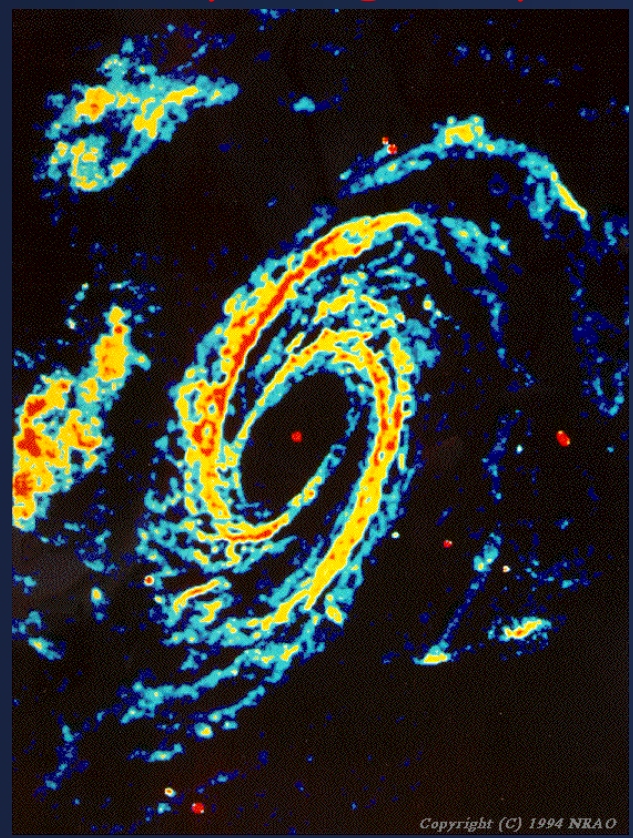


Radio-loud AGN (Quasars & radio galaxies)

CSIRO ATCA
PKS 2356-61 FRII RG

Starburst galaxies

NRAO VLA
M81 spiral galaxy



Physical characteristics Of the source populations

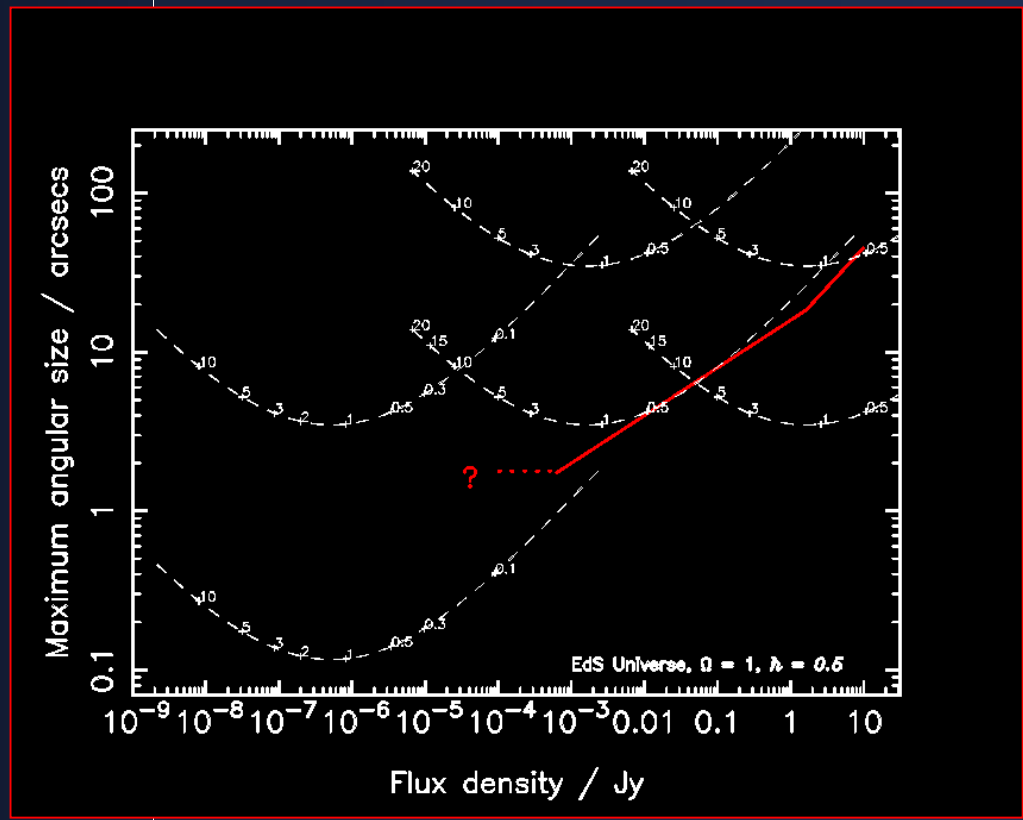
Spectral Shape

Simple $S \propto \nu^{\alpha}$ with –0.7 or fitted spectral model

-Ignores (peaked) low-frequency population (if there is one)

-Ignores GHz-peaked sources

Source Sizes



Recipe for predicting the radio sky from the LRLF + Evolution

For the 3 radio galaxy populations (FRI, FRII & SB):

-Determine the LRLF & Evolution
  Adopt reasonable evolution type (LDDE)
  Use source counts & complete samples
    to constrain model

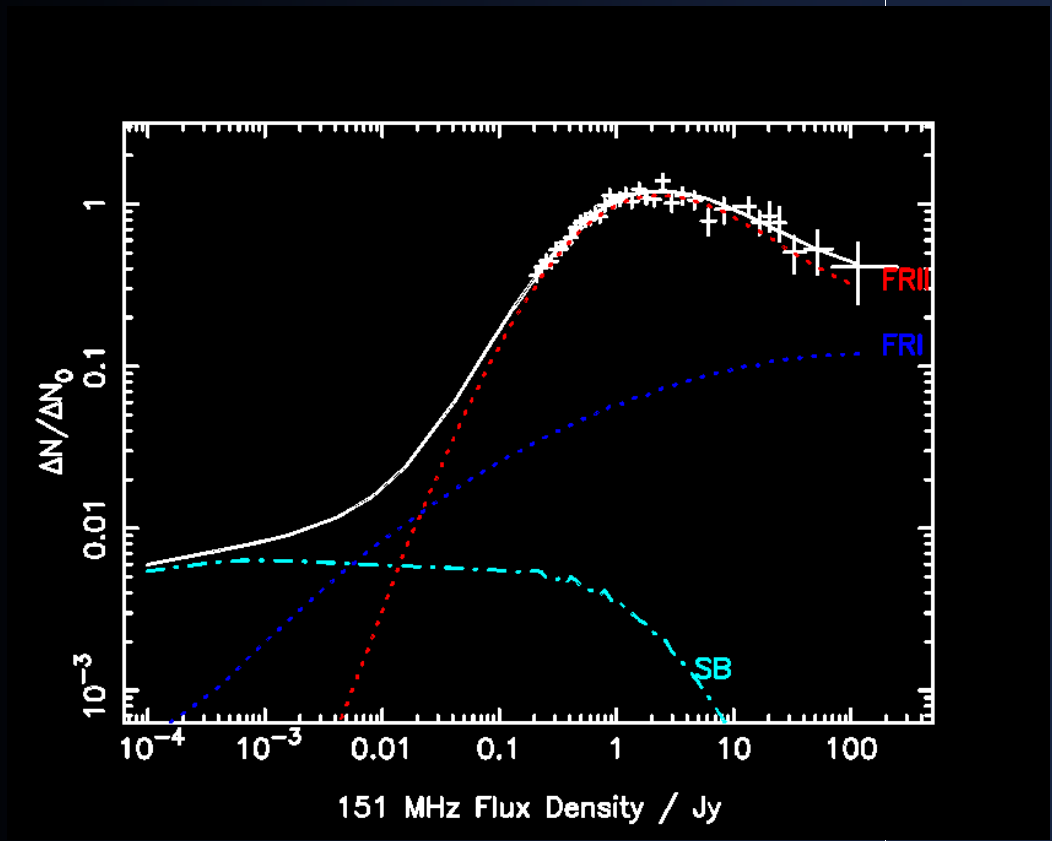
-Transpose Frequency if required

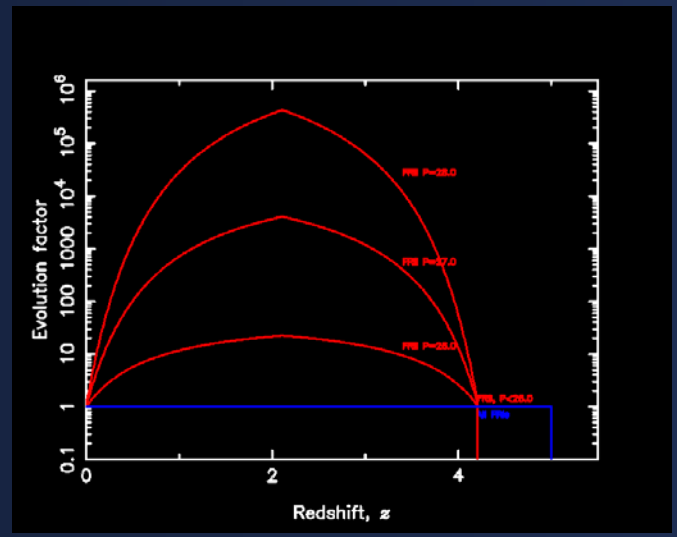
- Calculate source density (sky area, z distr)

- Adopt reasonable source sizes & shapes
   Randomly place & orient sources on sky

FRI & FRII Evolution & the LRLF

Best-fit to 151 MHz source count





LDDE - FRIIs strongly evolving, FRIs not

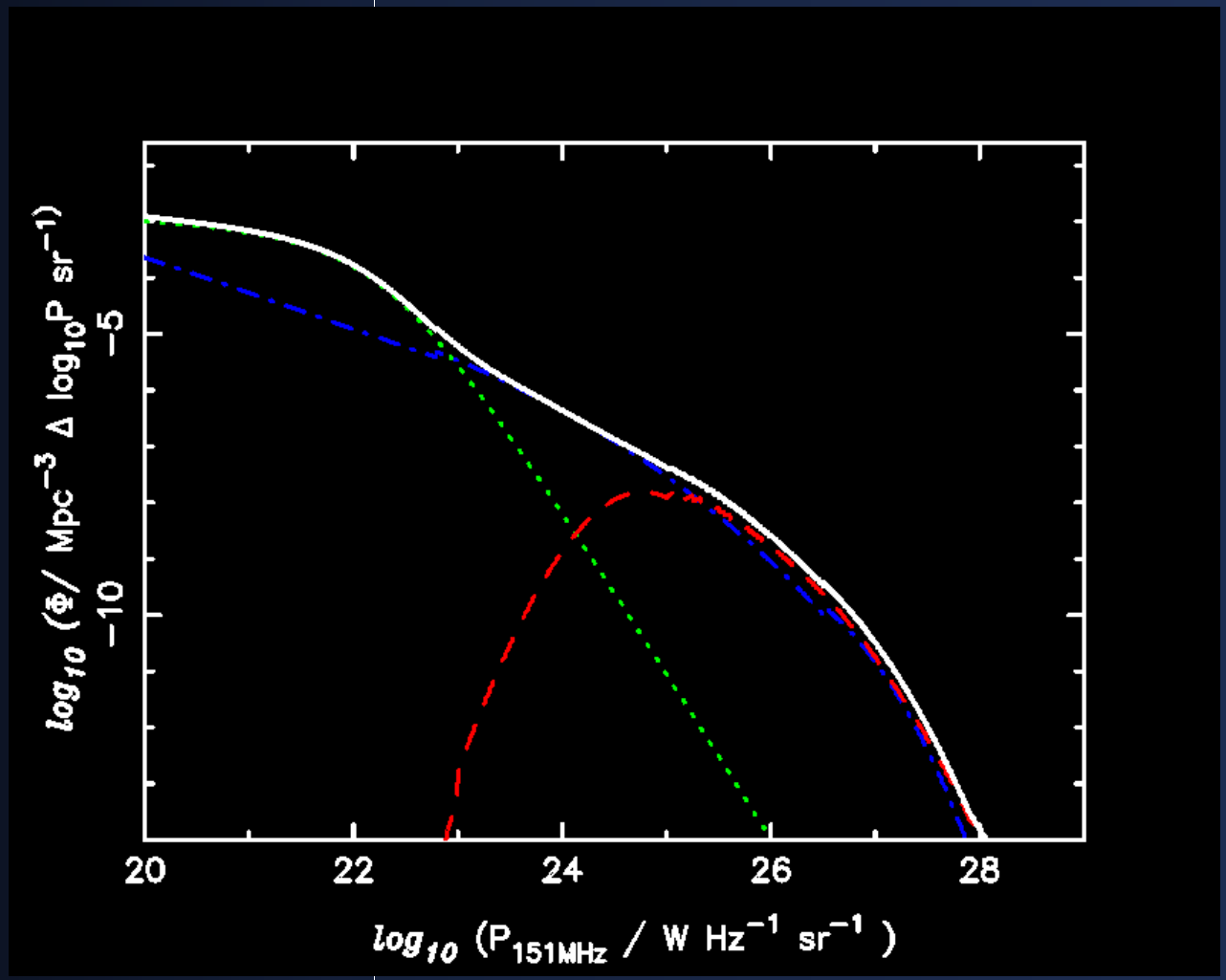
Evolution & the LRLF

LRLF from best-Fit model.

Starburst galaxy

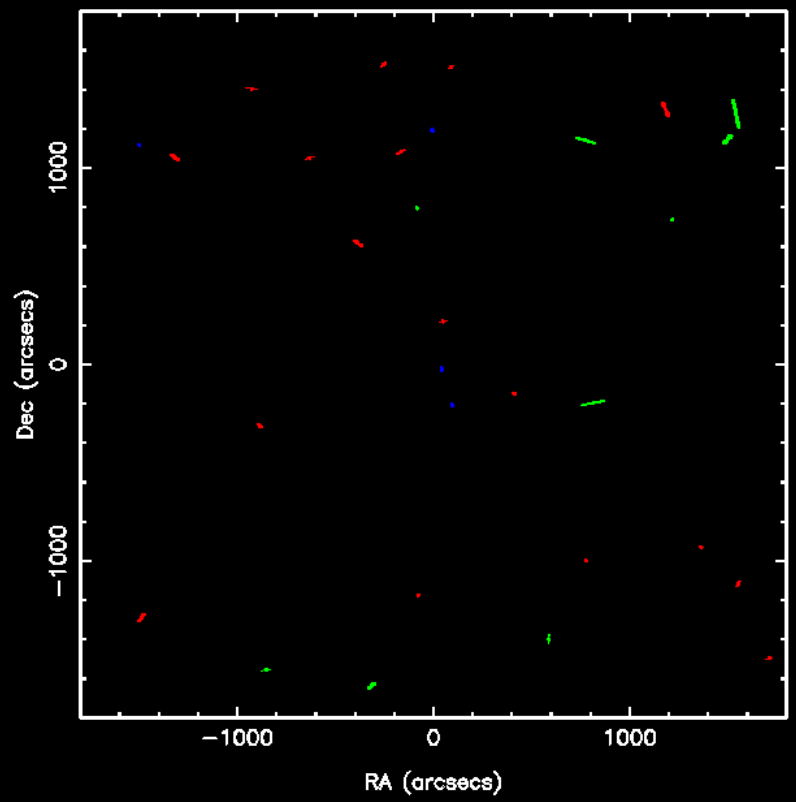
LRLF from 2dFGRS-NVSS (Sadler et al 2002)

Evolution from HDF (Haarsma et al 2000)



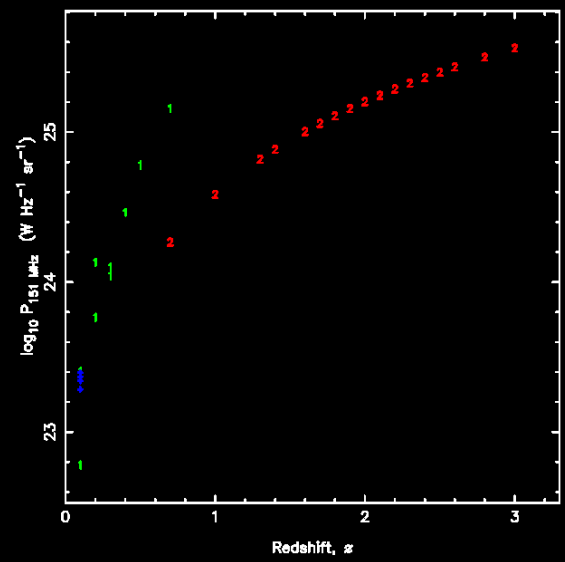
Faint radio skies at 151 MHz

1 degree sky region



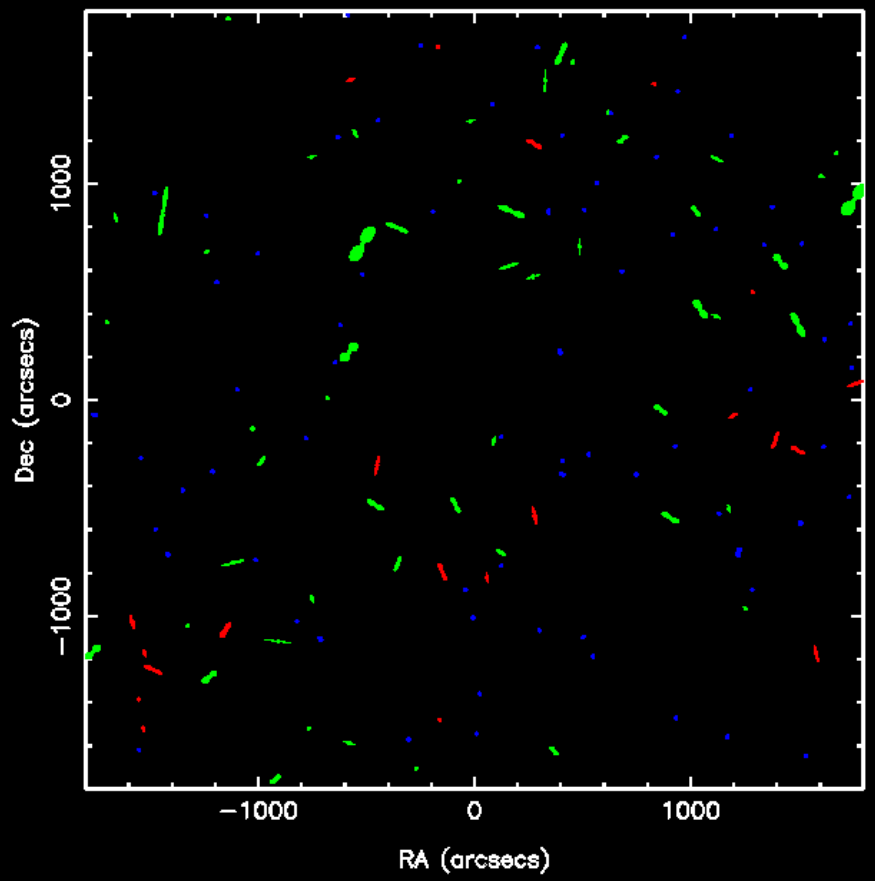
10 mJy at 151 MHz

P-z distribution



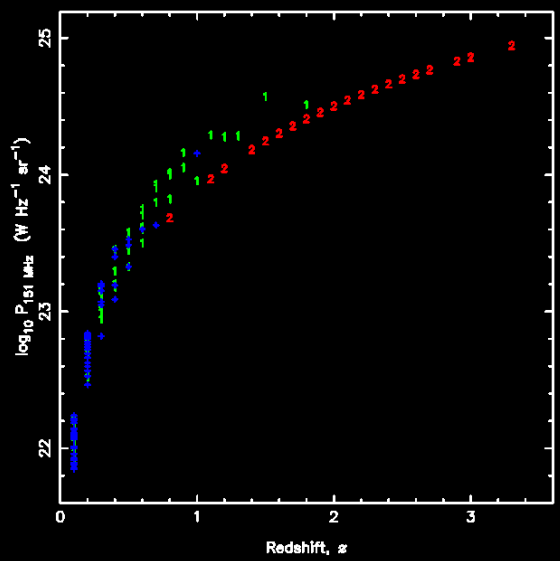
Faint radio skies at 151 MHz

1 degree sky region



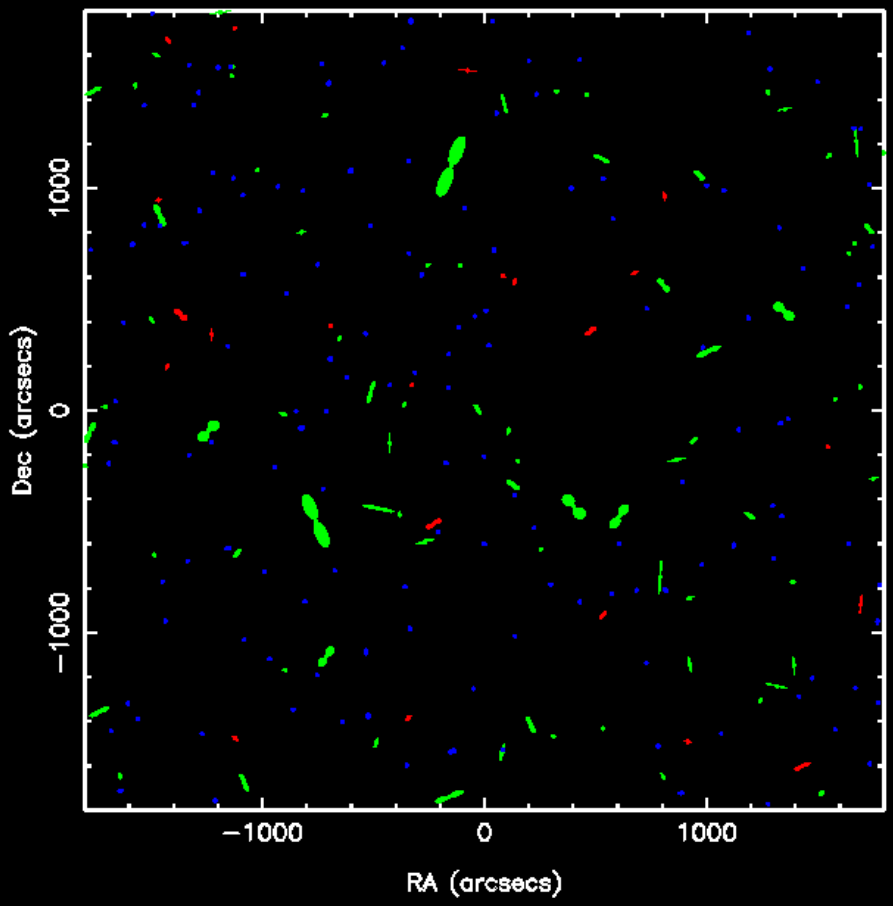
2 mJy at 151 MHz

P-z distribution



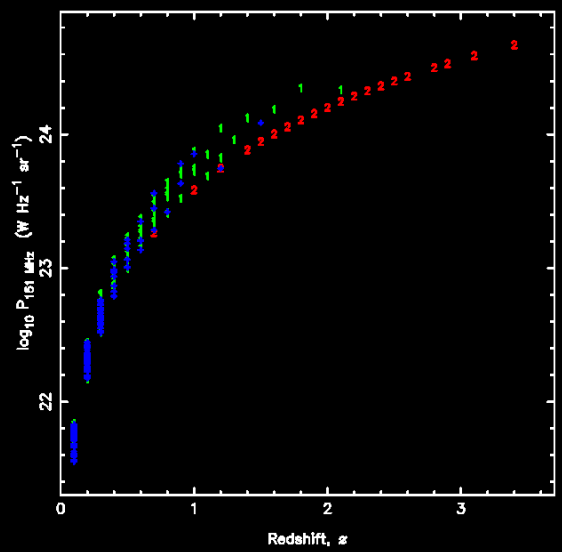
Faint radio skies at 151 MHz

1 degree sky region



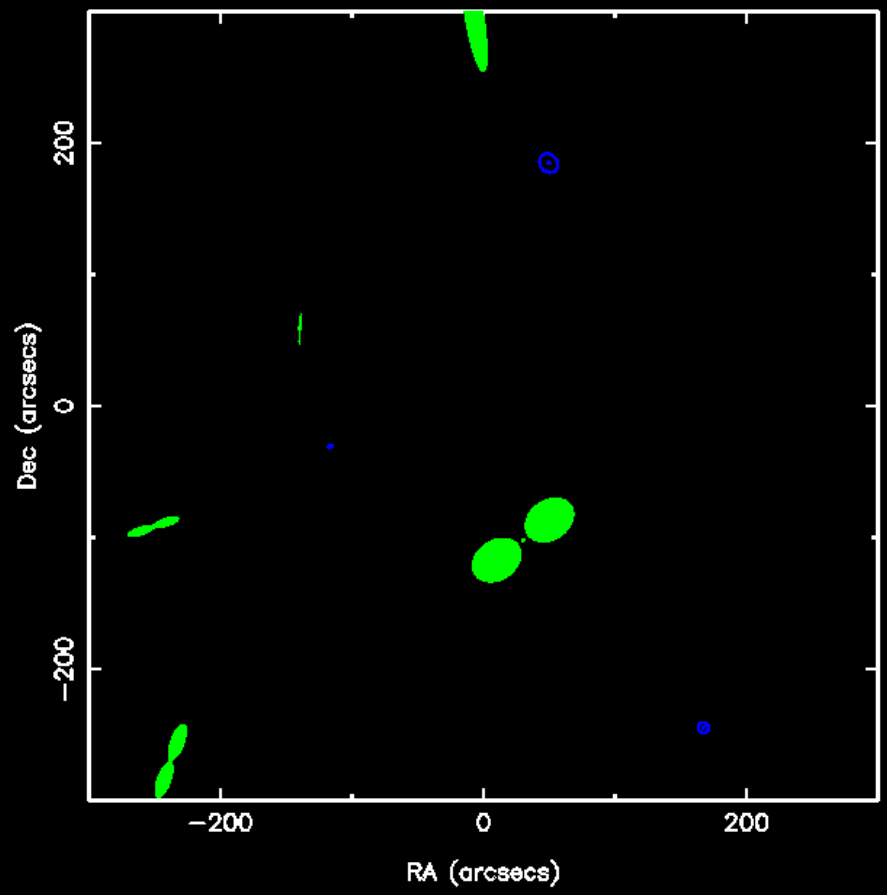
1 mJy at 151 MHz

P-z distribution



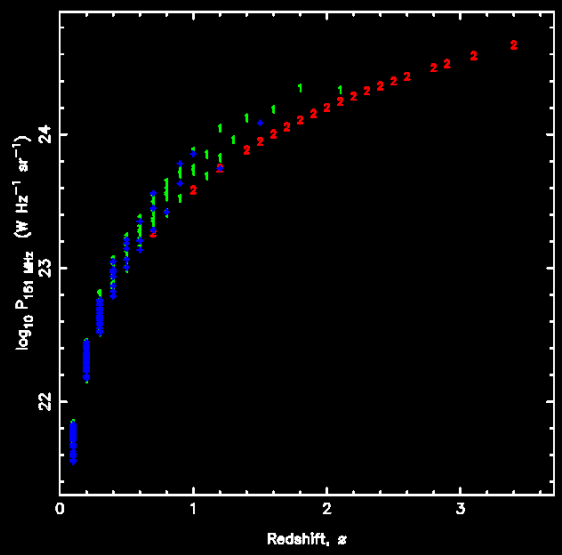
Faint radio skies at 151 MHz

10 arcmin square sky region



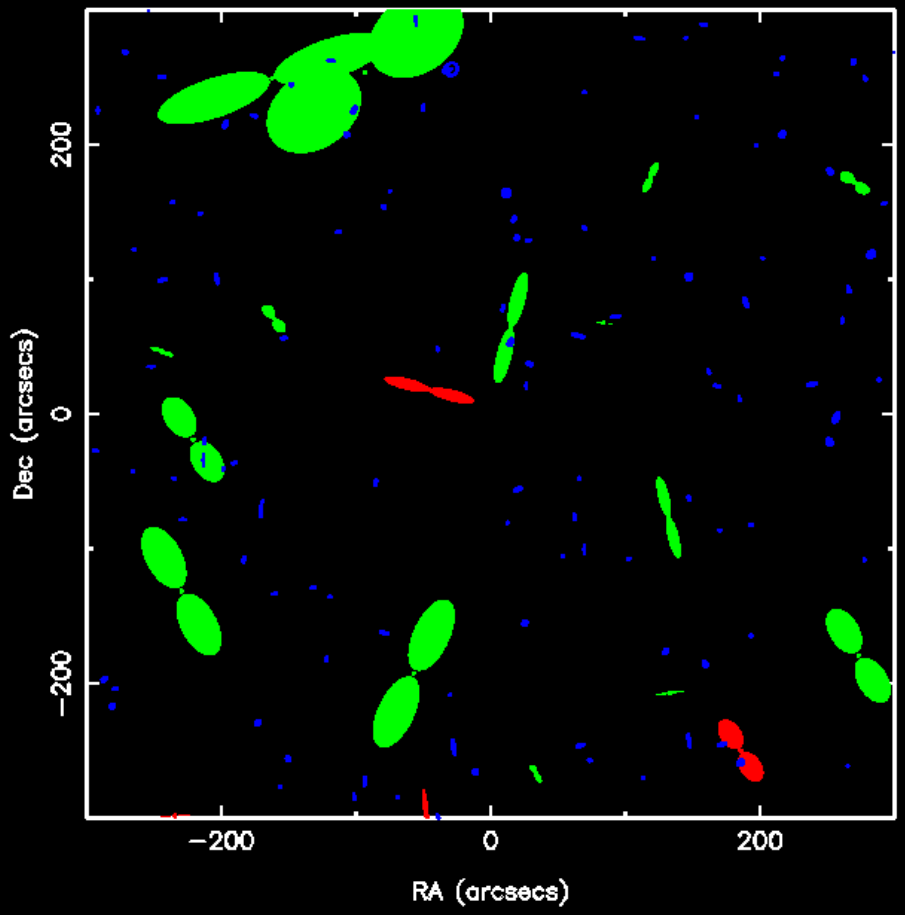
1 mJy at 151 MHz

P-z distribution



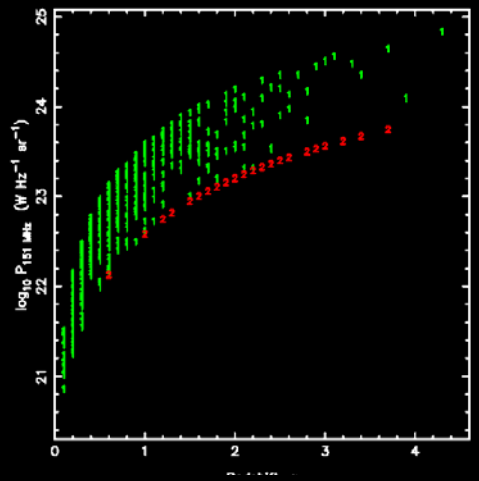
Faint radio skies at 151 MHz

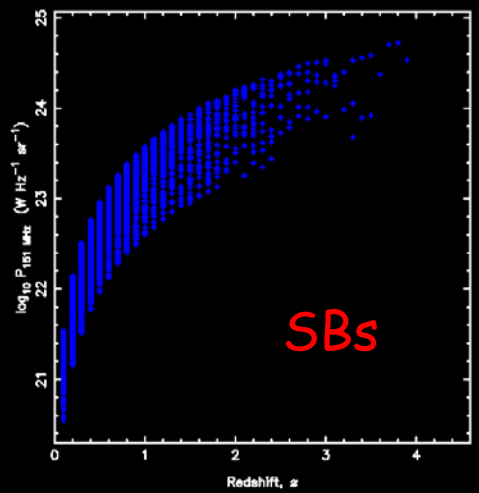
10 arcmin square



0.1 mJy at 151 MHz

P-z distributions
FRI & FRIIs





SBs

Faint radio skies at 151 MHz

From simulated skies – predict resolution required
- fraction of sources 'overlapped' (line of sight)

Assumes no frequency-size dependence (probably ok up to 1 GHz?)

Assumes no size-RG age dependence

FRI+FRII LRLF + evolution (?) – degenerate, really FR-split ???

Starburst LRLF + evolution (?) – difficult to determine (HDF small sample)
- Late-type galaxies in LRLF ?

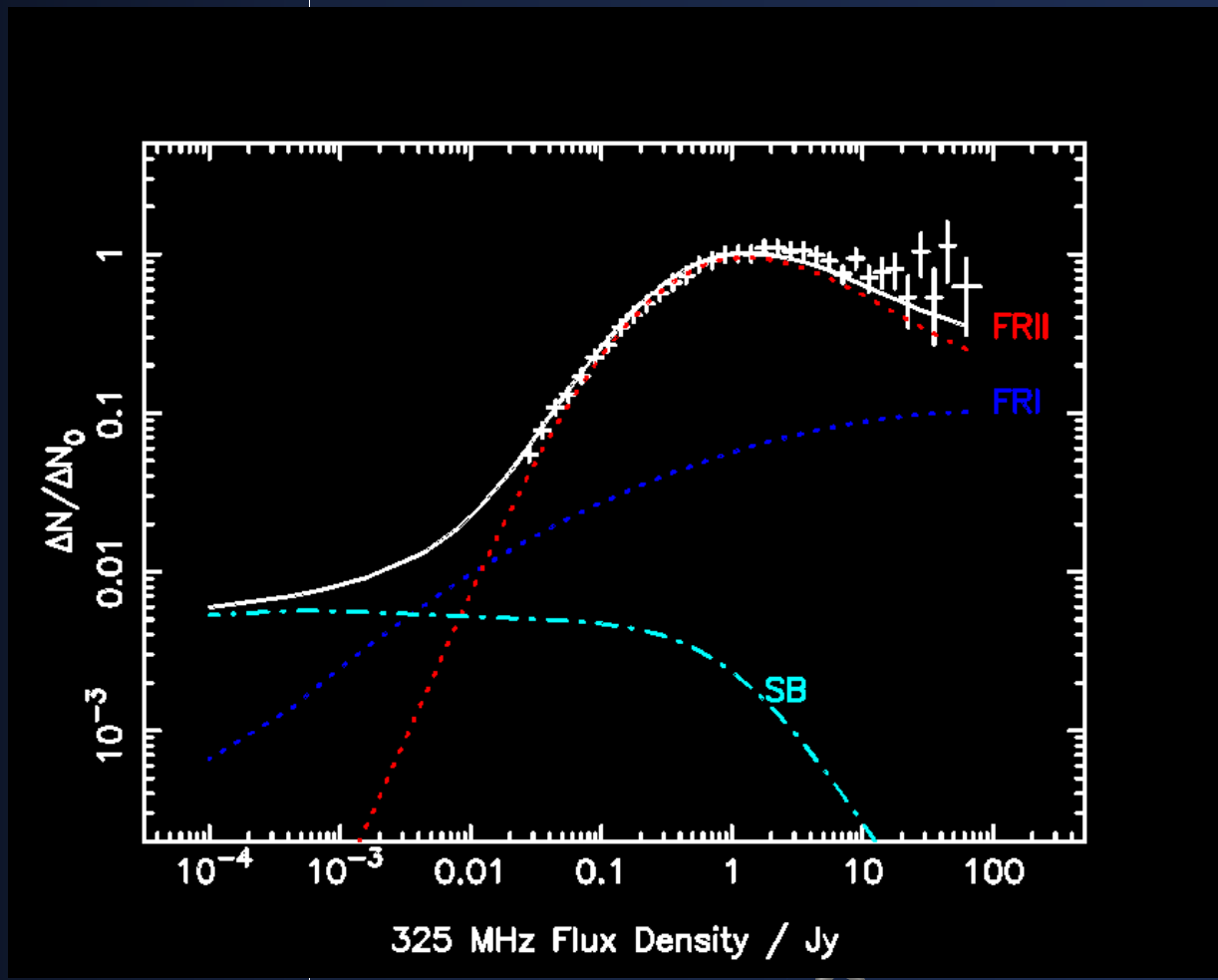
Other populations ?

Faint radio skies at 325 MHz

325 MHz – WENSS source count

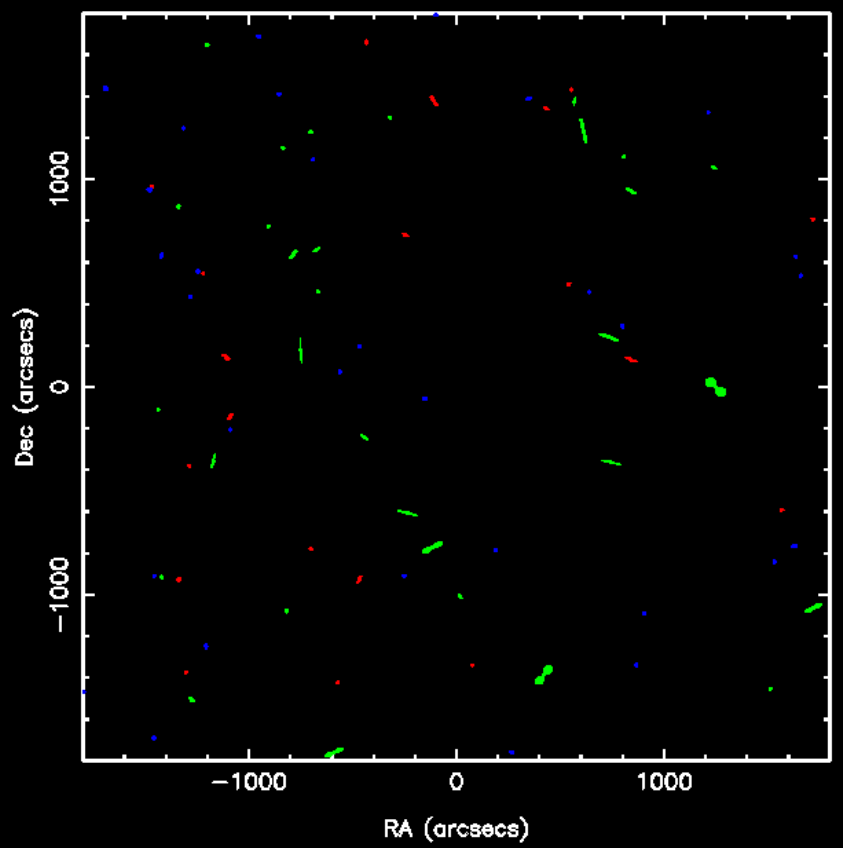
Transpose LRLFs to 325 MHz & generate model count to 0.1mJy

Molonglo Demonstrator project – to 300 MHz science – HI absorption against bright RGs

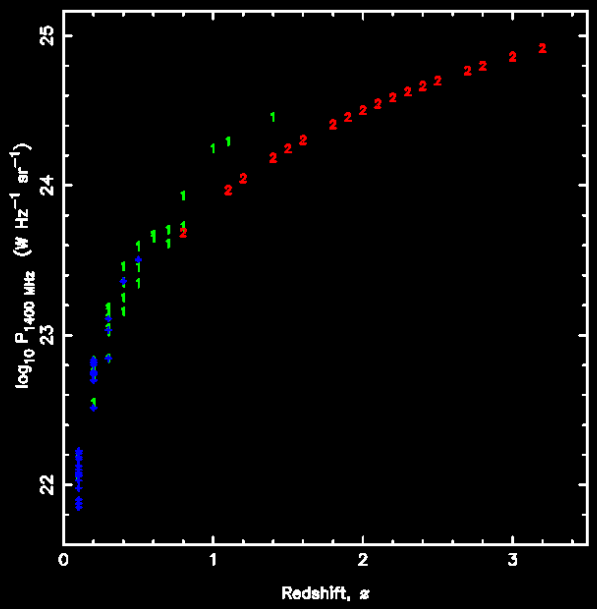


Faint radio skies at 325 MHz

1 degree sky region

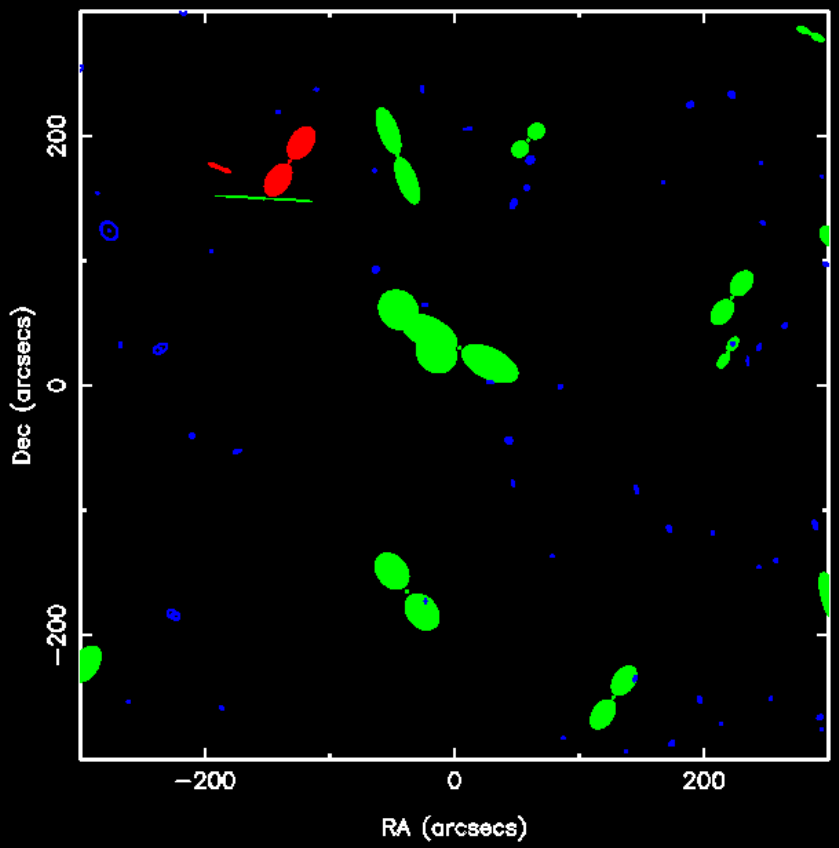


2 mJy at 325 MHz

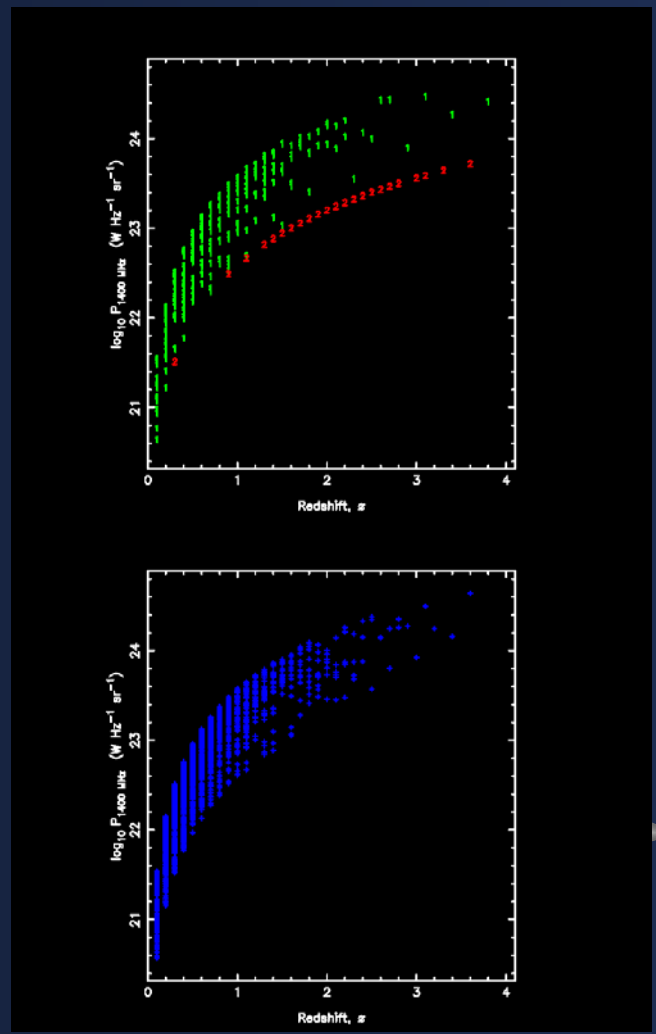


Faint radio skies at 325 MHz

10 arcmin square



0.1 mJy at 325 MHz



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