Radio Source Counts and the Steady State Universe Revisited

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Integral Source Count in Static Euclidian Universe

$$S \propto D^{-2}$$
$$N \propto D^{3}$$
$$N(S) \propto S^{-3/2}$$

Bernie
Mills

Ryle
2C Survey

MSH

Steady
State
$N(S) \propto S^{-3/2}$

300

100

No. of sources

30

10

10   20   40   80   160

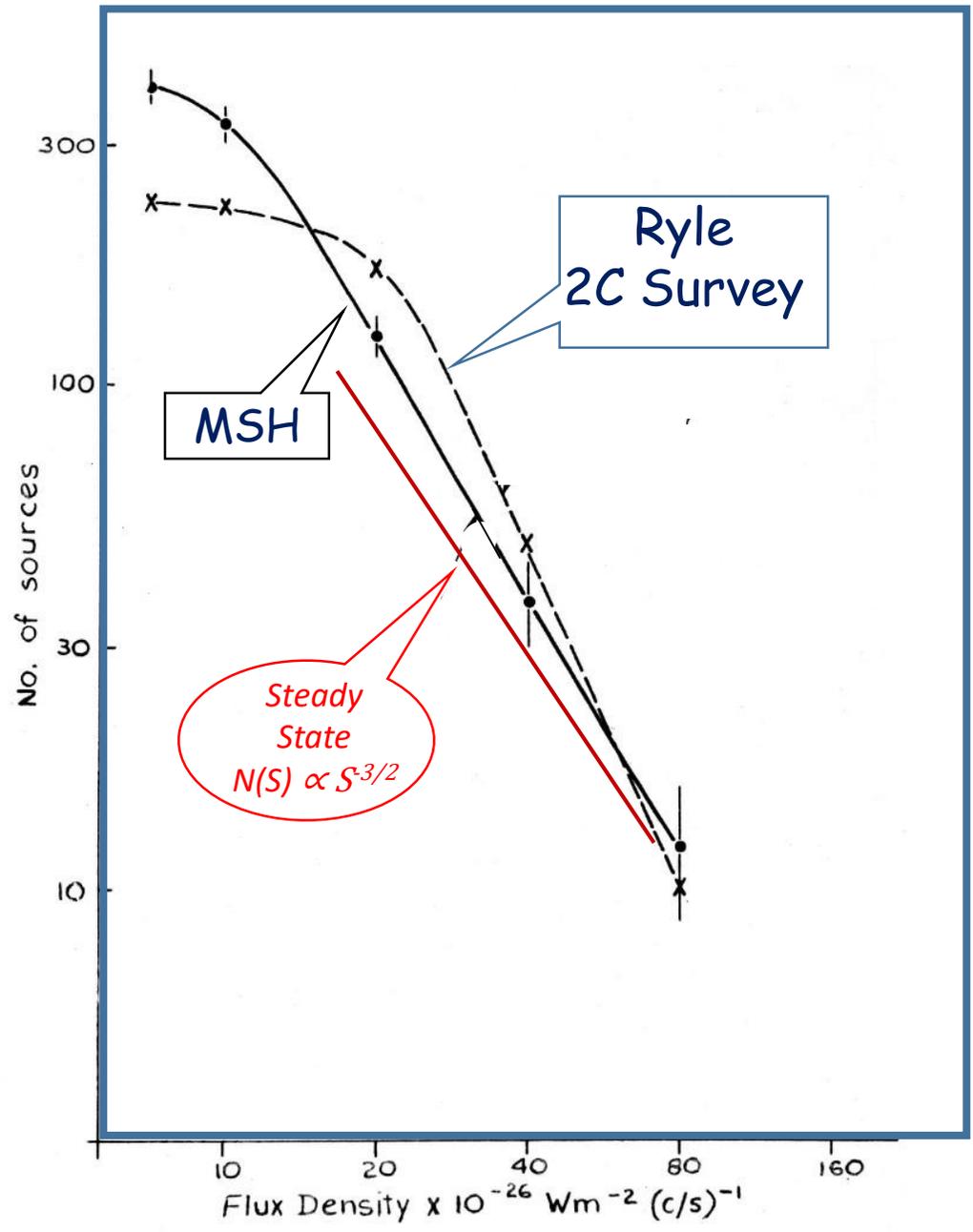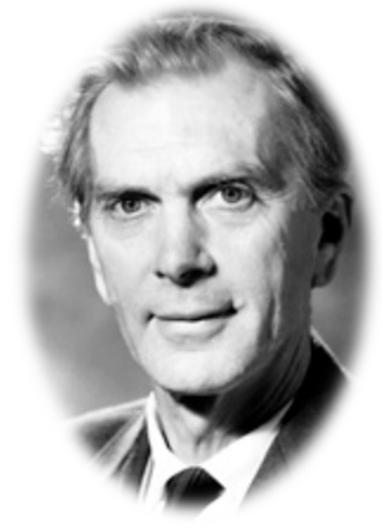Flux Density x 10^{-26} Wm^{-2} (c/s)$^{-1}$

FIG. 5 jas@75

Martin
Ryle

2C/3C and MSH Surveys Full of Errors

- Used integral instead of differential counts
- Both surveys heavily confused
- Noise and confusion – Edington effect (1913)

$$N(S) \propto S^{-x} \qquad x < 1.5$$

But did he?

MSH had better data but got wrong answer

Ryle had worse data, but got the right answer
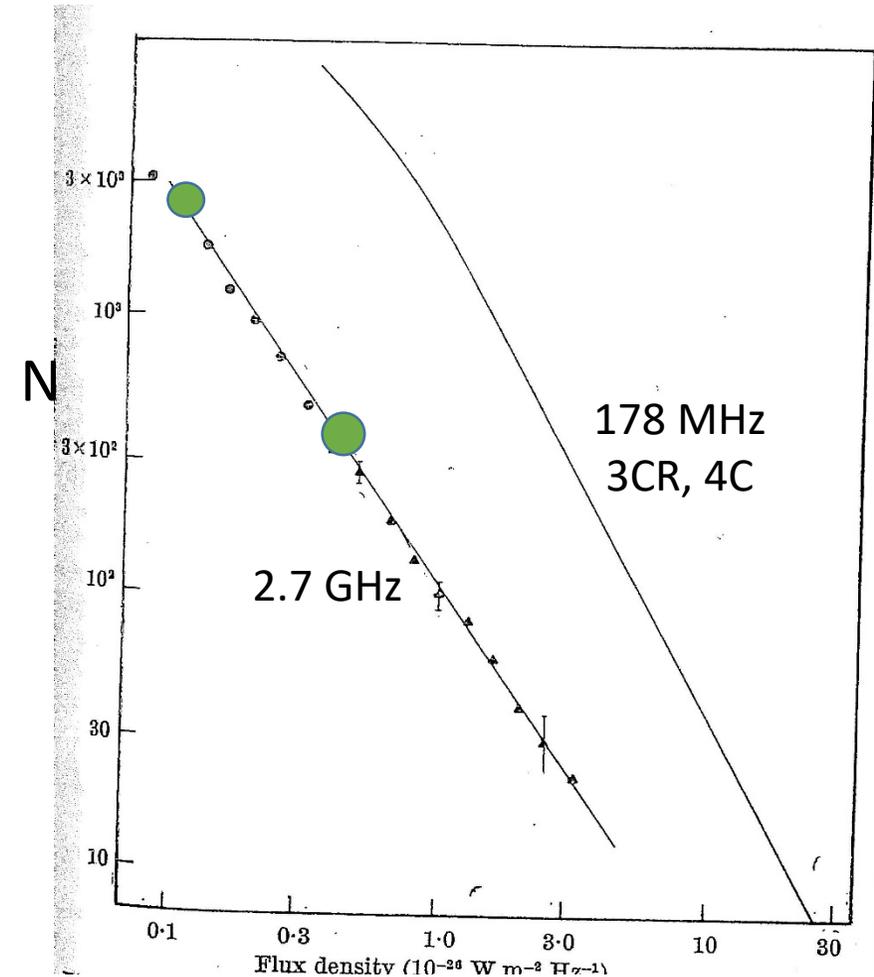
Shimmins, Bolton, Wall, 1968, Nature,

Log N–Log S

Freq. = 2700 MHz

Ω = 0.4 sr,   S> 0.4 Jy
Ω = 0.08 sr, S> 0.08 Jy
X = − 1.38 (−1.29)

178 MHz
3CR, 4C

2.7 GHz

N

Flux density (10⁻²⁶ W m⁻² Hz⁻¹)

Radio Source Surveys

Survey	Frequency-MHz	n	S_{lim} (Jy)	X	n/sr
2C	81	1906	10	-2.7	
3C (R)	159 (178)	242 (236)	8 (10)	-2.0 (-1.9)	76
4C	178		2	-1.8 ± 0.12	3900
MSH	85.5	1658	7	-1.8 ± 0.1	330
P(D)	178		0.35	-1.8	
Parkes	408	~100		-1.85 ± 0.1	
SBW	2700	135 210	0.4 0.08	-1.38 (-1.29)	390 3100

Local Hole or Cosmic Excess?

Hoyle: Local Hole not cosmic excess

Ryle: Hole would need to be hundreds of Mpc in extent – not so local
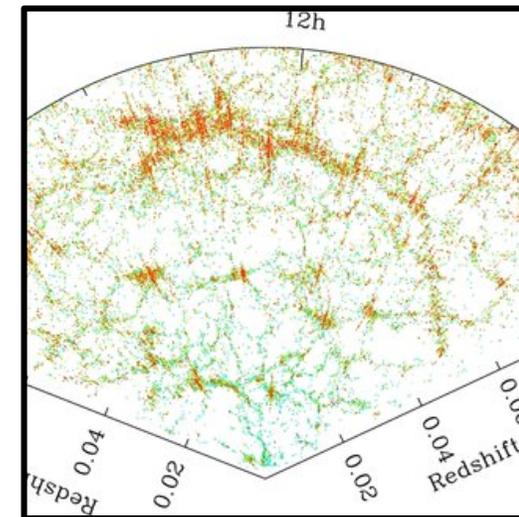
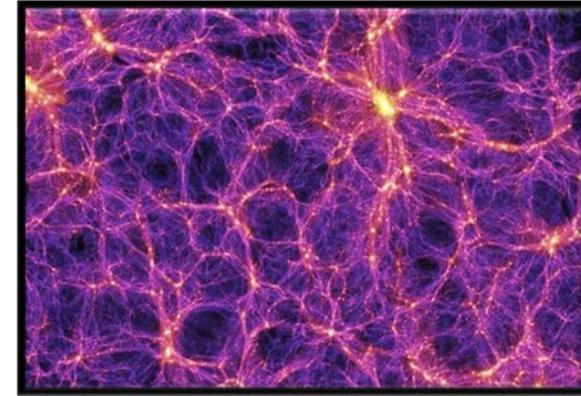Isotropy argues against local hole?

No! Strong Source Counts are not isotropic!
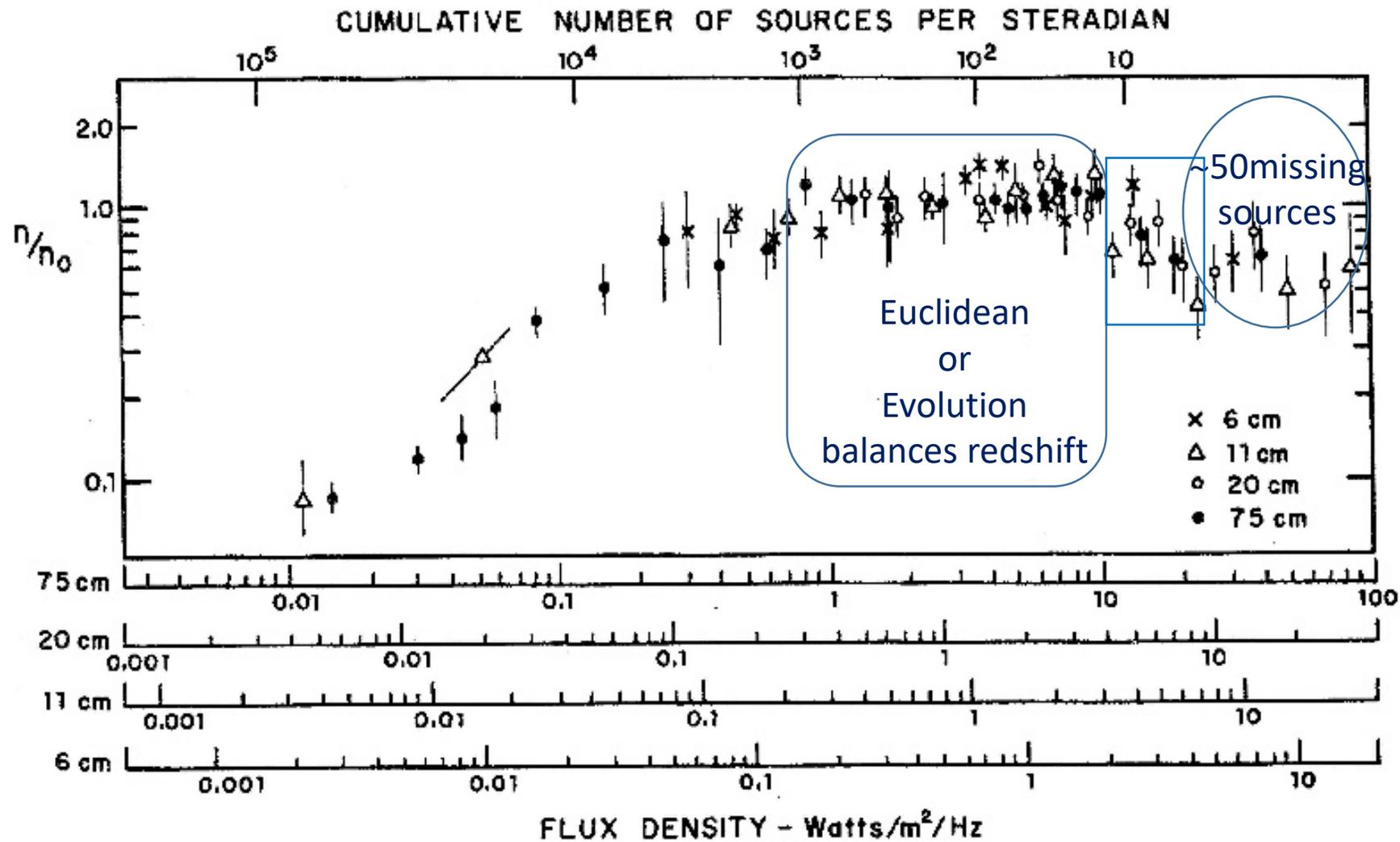
>Pauliny-Toth and Kellermann (1972)
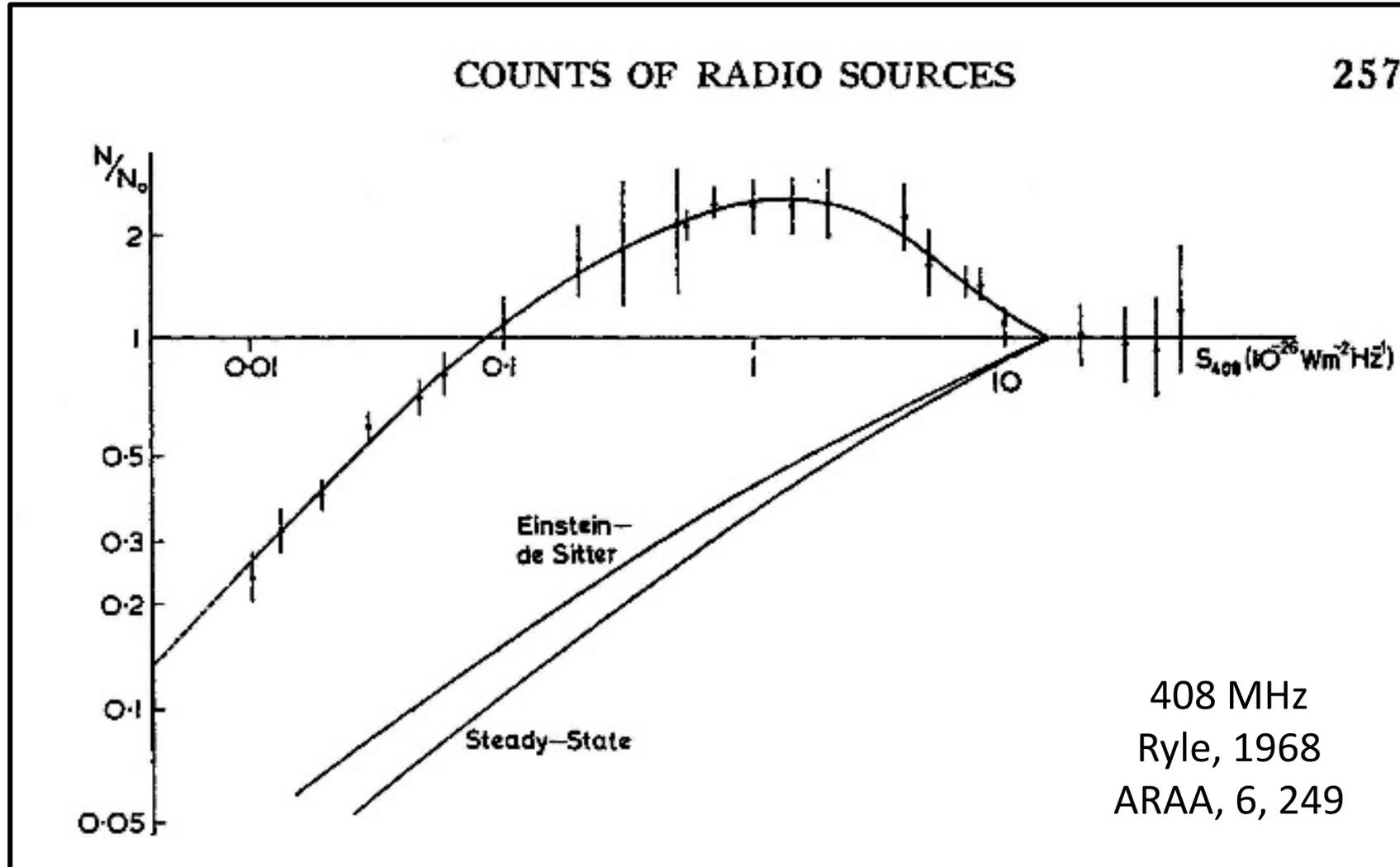>Pearson (1974)
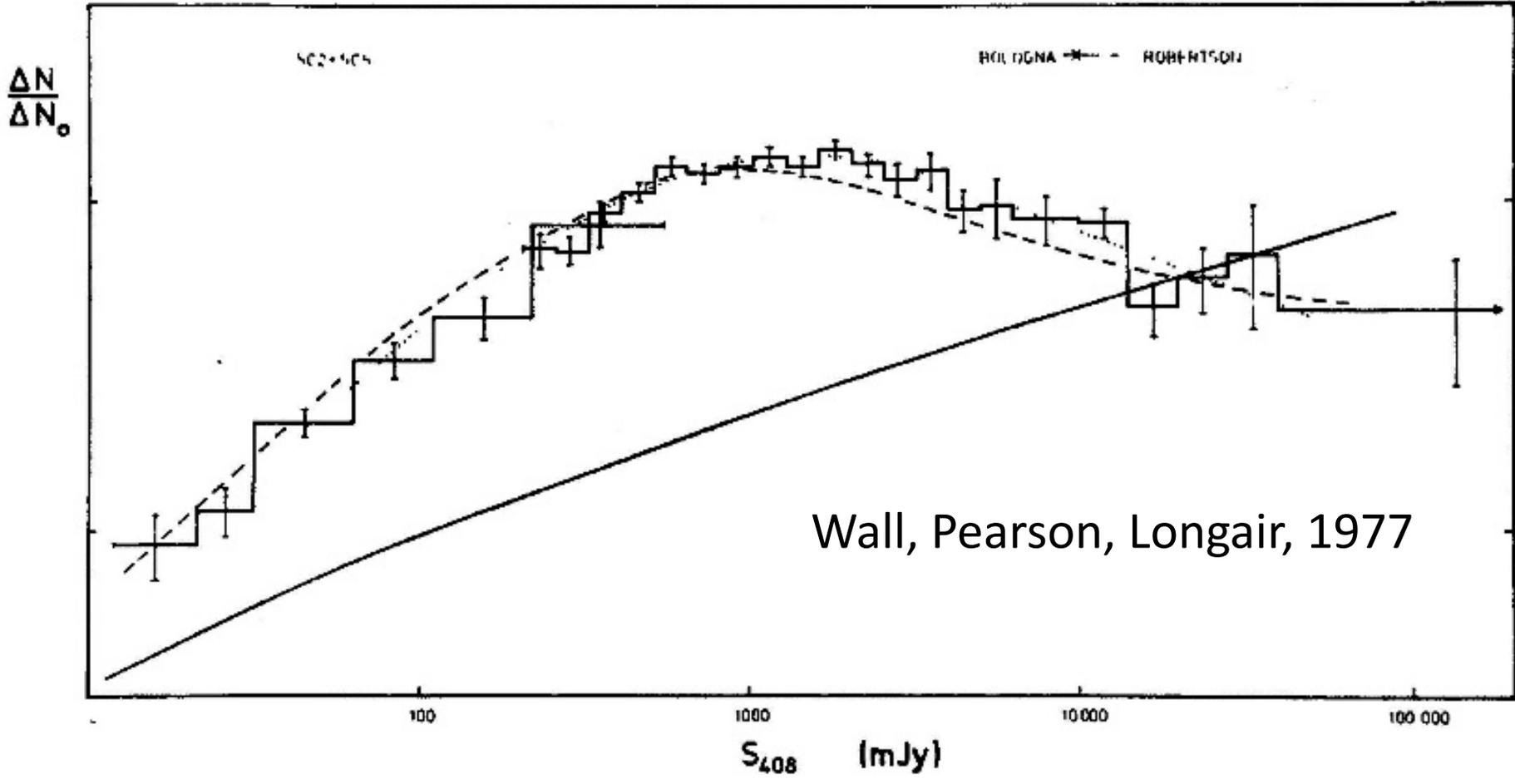>Kellermann and Wall (1987)
>Shaver and Pierre (1989)

Multi-Wavelength Source Count (KIK, 1971)

SS or EdS? Evolving or not?

COUNTS OF RADIO SOURCES 257

408 MHz
Ryle, 1968
ARAA, 6, 249

Wall, Pearson, Longair, 1977

The data and consequently the arguments, have changed, and although much more detailed and subtle, the general conclusions remain essentially unchanged.

Kellermann and Wall, 1987

Steady State Cosmology - Revisited

H.P. Robertson: General Relativity and Cosmology

Alan Sandage: Observational Cosmology

A Search for Two Numbers - Physics Today, 23, (2), 34 (1970)

$$H_0 = (\dot{R}/R)_0$$

$$q_0 = -\frac{1}{H_0}(R\ddot{R}/R)_0$$

$$\Gamma^i_{j,k}$$

Fred Hoyle: Theoretical Cosmology

SS Makes Predictions - No free parameters (other than H)

$q_0 = -1$

The Steady State Theory Predicted
Expansion of the Universe Must be Accelerating

What if?

- Suppose the Supernova Cosmology Project and Hi-Z Supernovae Projects had come before Penzias and Wilson discovered the CMB in 1965
  - Confirmation of Steady Theory
- Suppose Hoyle had thought of a clever name instead of a

  C- Field – like DARK Energy
  - Generated popular interest awareness
- SS supporters would have found a way to explain the CMB
  - Wouldn't have to invented things like population evolution, z- cutoffs, inflation

"We told you so!"