Table 1 Flux density of Cen A and Virgo A (Jy)

Date (1974)	$F_{V_{Cen}} \pm s_{Cen}$	$F_{V_{Vir}} \pm s_{Vir}$	$r \pm s$
April 30	19.7±0.4	20.5±0.5	0.962±0.032
May 7	21.6±0.7	20.9±0.5	1.034±0.041
May 14	21.5±1.5	20.4±0.3	1.056±0.076
May 20	24.5±0.6	24.3±0.6	1.008±0.034
June 3	21.6±0.8	20.9±0.1	1.031±0.040
November 8	22.5±0.9	20.6±0.8	1.089±0.059
November 28	21.9±1.2	20.1±1.0	1.089±0.078
November 29	22.5±0.6	24.7±1.2	0.914±0.052
December 6	20.3±0.4	20.3±0.3	1.000±0.026

In Table 1 we also give the ratio r of the flux density of Cen A and Virgo A; the error s of the ratio is given by[5]

$$s^2 = s^2_{Cen}/F^2_{V_{Vir}} + [(F_{V_{Cen}}/F_{V_{Vir}})^4 (s^2_{Vir}/F^2_{V_{Cen}})]$$

A cursory inspection of the values of the ratio indicates that we have no evidence for variability at this wavelength during the times that these observations were made. A simple statistical analysis equivalent to the analysis given by Fogarty *et al.*[6] confirms that there is no statistical significance for the suggestion that the source might have a variable flux density at 13.5 mm.

If, as it seems from our data and those of Kellermann[1], the source is variable at 3.4 mm but not variable at 13.5 mm, there must be some strongly wavelength-dependent radiation mechanism which enables the source to decrease its intensity at 3.4 mm with a very short time scale, while remaining constant at 13.5 mm.

We note that the flux density of this source is approximately constant, ≈ 22 Jy, over the wavelength range from 3.4 mm to 13.5 mm. So another interpretation of the observations is that the one measurement by Kellermann[1] of 14.0±1.5 Jy on March 28, 1974, is in error and that the source is strong but not variable.

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Optical variation of 3C371

WHILE studying the nucleus of 3C446 Cannon and Penston[1] put forward a hypothesis involving a small continuous source of constant luminosity which may be temporarily obscured by absorbing clouds. This hypothesis is supported by our observations[2] of the nucleus of the N-galaxy 3C371, which reveal variations of its luminosity during a characteristic time of t = 40 min, or 2.4 × 10³ s.

The light curve taken on September 12, 1972, resembles those of eclipsing binary stars (Fig. 1). M. I. Lavrov of the Kazan University (USSR) suggested (personal communication) that the luminosity changes seem to be similar to the luminosity variation of Algol. It may be supposed that QSO nuclei, the nuclei of Seyfert galaxies, the nuclei of N-galaxies and other compact extragalactic objects have two or more components rotating around a common centre of gravity. In this case the radius of these objects could be less than a limit given by

$$ct = (3 \times 10^{10} \text{ cm s}^{-1}) \times (2.4 \times 10^3 \text{ s}) = 7.2 \times 10^{13} \text{ cm}$$

or approximately 5 AU.

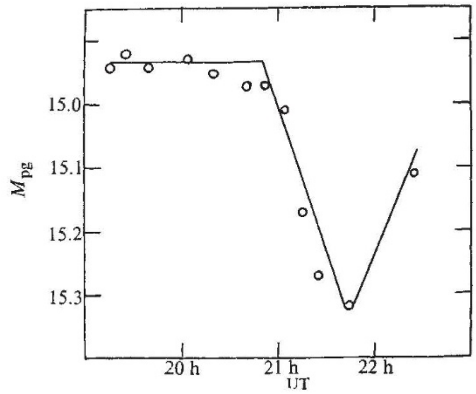

Fig. 1 Light curve of 3C271

Assuming that the velocity of these objects is less than the velocity of light, their dimensions could be in the range 10^{12}–10^{13} cm, with a volume of 10^{36}–10^{39} cm³.

Setting a typical mass as 5 × 10^{10} $M_\odot$ their density will be some 10^5–10^8 g cm^{-3}.

Such objects may resemble the hyperdense bodies required by Ambartsumian's theory[3] that galaxies and stars arise as a result of disintegration of compact objects.

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Galactic gamma rays from the superposition of X-ray sources

SATELLITE observations[1–3] show an enhanced flux of high energy photons (>30 MeV) along the galactic plane. The intensity has a broad and flat maximum extended ~ 60° around the galactic centre. The average value of the flux in the central region is $(1.1 \pm 0.3) \times 10^{-4}$ photons (cm² sr)$^{-1}$ in the anticentre direction it is about a factor of five less. The energy spectrum in the range (35–210)MeV is quite flat and possibly indicates that the gamma rays arise from decay of π^0 mesons.

Various models have been proposed to account for this flux in terms of collisions between cosmic rays and interstellar matter. On these models the observations of gamma rays would give important indication on the distribution of matter and cosmic rays[4,5].

The distribution of gamma rays also resembles the distribution of X-ray sources inferred from the third Uhuru (3U) Catalog. So the gamma-ray flux may result from the superposition of sources rather than having a diffuse origin. This idea is not new[6–8] but the better quality of SAS-II observations compared with those of OSO-III and the larger extent 3U encouraged me to reconsider the problem.

Figure 1 shows the distribution of the counts from galactic compact X-ray sources and that of gamma rays observed by SAS-II and OSO-III. The distribution of the X-ray counts has been obtained by unfolding that relative to 3U sources with the same angular response function of SAS-II ($|b^{II}|<10°$) in the regions: $180° < l^{II} < 50°$, $160° < l^{II} < 180°$, and with the one of OSO-III ($|b^{II}|<15°$) in the region: $50° < l^{II} < 160°$. For variable sources I have assumed the