radiative corrections turn out to be of the order of $\kappa e^2\Lambda_e^2/\mu^2 \sim (\kappa e^2)^{1/2}$, i.e., they are again small.

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ORIGIN OF THE BACKGROUND X-RADIATION

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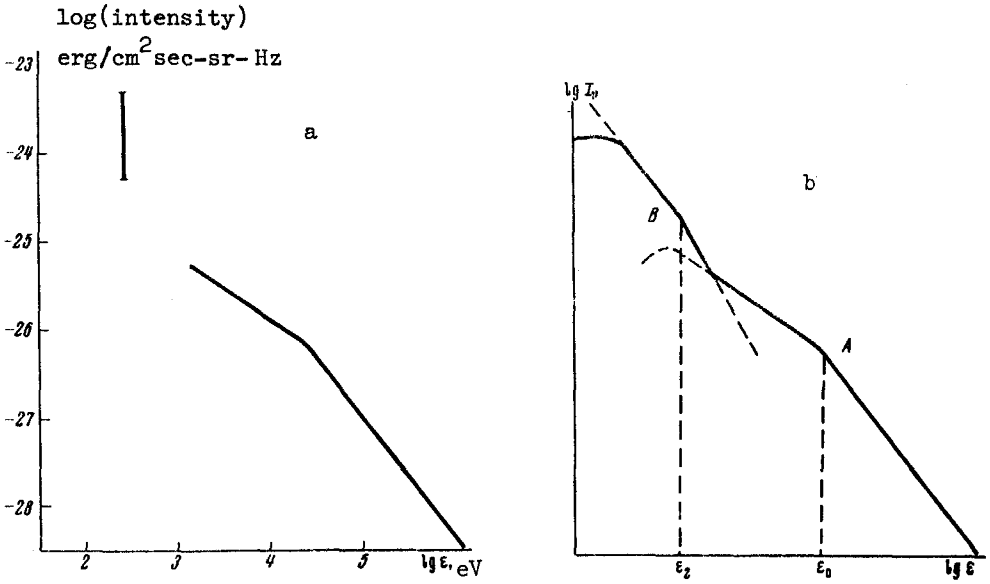
Observation of the isotropic background x-radiation has revealed a number of distinctive singularities in its spectrum [1, 2]. This spectrum (Fig. a) cannot be described by a single power-law formula $I(\varepsilon) \sim \varepsilon^{-\alpha}$, but for photons with energy $\varepsilon \geq 1$ keV there are two laws, viz., $\alpha \simeq 0.7$ at low energies and $\alpha \simeq 1.2$ at high ones, the kink occurring in the region $\varepsilon \sim 20 - 40$ keV. Below 1 keV, the exact flux is unknown, since we do not know how strongly it is absorbed by the interstellar gas in our galaxy. Even without allowance for the absorption, however, observations have shown that the soft x-radiation with $\varepsilon \sim 280$ eV exceeds the value expected by extrapolation from the energy region $1.5 < \varepsilon < 20$ keV. If the spectrum obeys a power law in this region, then its slope should exceed $\alpha \gtrsim 1.2$.



Spectrum of background x-radiation: a) observed, b) expected in accord with the model described in this paper.

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We propose below a model explaining the spectral properties of the background x-rays.

It is assumed that the x-ray quanta are produced by Compton scattering of radio, infrared, and optical quanta by the relativistic electrons produced with a power law spectrum $N(E) \sim E^{-\gamma}$. It is known that in this process the energy loss is $dE/dt \sim -E^2$, and if the electrons lose only a small fraction of their energy in the scattering, then the x-ray spectral index is $\alpha = (\gamma - 1)/2$, but if they lose a larger part, then $\alpha = \gamma/2$. Intense infrared radiation was recently observed from quasar, Seyfert nuclei, and normal galaxies[3]. If these are also relativistic-electron sources, then the scattering of infrared quanta by the latter leads to x-radiation. The energy with energy higher than E_0 (determined by the IR brightness and by the object dimensions, and also by the diffusion condition), will lose a greater part of their energy near the object, while the electrons with lower energy will be injected in the metagalactic space with their initial spectrum, losing only a small part of their energy to x-radiation. As a result, a kink will appear in the x-ray spectrum at $\varepsilon_0 = (4/3)(E_0/m_e c^2)^2(\overline{h\nu})_i$, where $(\overline{h\nu})_i$ is the average energy of the infrared quanta (see curve A of Fig. b).

The intergalactic space is filled with relict radio emission with temperature 2.7°K. The average energy of the relict quantum $(\overline{h\nu})_r$ is smaller by a factor of several times ten than the average energy of the infrared quantum, and therefore the radiation produced upon scattering of electrons with energy lower than E_0 by the relict radiation falls in the soft x-ray region $\varepsilon < 1$ keV. All the electrons with $E > E_1 = 150$ MeV (corresponding to $\varepsilon_1 = 100$ eV) lose their energy within a time shorter than cosmological time. As a result, in the region $\varepsilon_1 < \varepsilon < \varepsilon_2$ $[\varepsilon_2 = (4/3)\ (E_0/m_e c^2)^2(\overline{h\nu})_r]$ the slope of the spectrum will be $\gamma/2$, and when $\varepsilon > \varepsilon_2$ the spectrum will be even steeper (see curve B of Fig. b). The observed spectrum is the sum of curves A and B, the total radiation of the electrons near the source and in the intergalactic medium.

We note that the orthodox point of view, according to which the main sources of x-radiation are radiogalaxies, agrees poorly with the data of the enclosed table, for it is

Energy and quantum-number density in various spectral ranges of the background radiation in the Universe

	Frequency range, ν	Radiation energy density, eV/cm^3	Quantum density cm^{-3}
1. A.	Discrete radio sources, $10^6 < \nu < 10^{10}$ Hz	10^{-7}	1
1. B.	Relict radiation, $10^9 < \nu < 10^{12}$ Hz	0.25	400
2.	Infrared radiation of objects [4] $10^{12} < \nu < 10^{14}$ Hz	$\sim 10^{-2}$	~ 1
3.	Optic radiation $10^{14} < \nu < 3 \times 10^{15}$ Hz	$\sim 3 \times 10^{-3}$	$\sim 10^{-3}$
4. A.	Soft x-rays, $\varepsilon \leq 1$ keV	$10^{-4} - 10^{-5}$	$3 \cdot (10^{-7} - 10^{-8})$
4. B.	Hard x-rays, $\varepsilon \geq 10^{-4}$	10^{-4}	3×10^{-9}

necessary that the radio galaxies emit 1000 times more energy in the x-ray region than in the radio band. These difficulties do not arise in the case of infrared objects.

The aggregate of infrared objects can produce the observed x-radiation if: a) one per cent of the energy radiated by them goes into injection of relativistic electrons, b) the magnetic field in the regions surrounding the nucleus is small enough ($H \lesssim 10^{-6}$ G) to be able to neglect the contributions of these regions to the radio background of the universe, c) there exists a narrow class of infrared-radiation sources with properties ensuring that the spread in the value of ε_0 does not exceed one order of magnitude.

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