It seems hard to find any proper and clear answer to the question:
How do we know the universe hardly contains antimatter?
Hence I give it a try myself.

Suppose ALL matter in the universe would consist of atomic hydrogen gas, uniformly distributed over the entire 3-spherical universe[1]. We can then easily find the collision frequency of molecules.

We'll use next input values:

Hubble constant:	H_0	$\approx$ 71.00 km/s/Mpc
Gravitational constant[2]:	G	$\approx 6.67430 \times 10^{-11}$ N·m²/kg²
Bohr radius:	r_{B}	$\approx 5.29177 \times 10^{-11}$ m
Mass of a hydrogen atom:	m_H	$\approx$ 1.008 Da

From which we calculate:

Hubble distance:	$D_H = \frac{c}{H_0}$	$\approx$ 13.77 Gly
Total volume of 3-spherical universe[3]:	$V_U = \frac{2D_H^3}{\pi} = \frac{2c^3}{\pi H_0^3}$	$\approx 1.408 \times 10^{78}$ m³
Total mass of 3-spherical universe[4]:	$M_U = \frac{c^3}{2GH_0}$	$\approx 8.772 \times 10^{52}$ kg
Total no. of atoms in the universe:	$N_U = \frac{M_U}{m_H} = \frac{c^3}{2GH_0 m_H}$	$\approx 5.279 \times 10^{79}$
Atoms per volume:	$\rho = \frac{N_U}{V_U} = \frac{\pi H_0^2}{4Gm_H}$	$\approx$ 37.49 /m³
Cross section for colliding H-atoms:	$\sigma_H = \pi(2r_{\mathrm{B}})^2 = 4\pi r_{\mathrm{B}}^2$	$\approx 3.519 \times 10^{-20}$ m²
The mean free path then equals[5]:	$\ell_H = \frac{1}{\rho\sigma\sqrt{2}} = \frac{Gm_H}{\pi^2 H_0^2 r_{\mathrm{B}}^2 \sqrt{2}}$	$\approx 5.360 \times 10^{17}$ m
		$\approx$ 56.66 light years

Would the atoms be ionised, i.e. protons, then we should use the low-energy proton-proton cross section instead, which approximates: σ_{pp} $\approx$ 100 millibarn $= 10^{-29}$ m²

yielding: ℓ_{pp} $\approx 1.886 \times 10^{27}$ m
$\approx 1.994 \times 10^{11}$ light years
$\approx 14.48 \cdot D_H$

from which we may conclude that stochastic proton-proton collisions occur nowhere in the entire universe.

For proton-antiproton collisions however, there is an attractive electrical force, which increases the cross section to rougly[6]: σ_{pap} $\approx$ 1000 millibarn
which is a factor of 10 larger, thus reducing
the mean free path to: ℓ_{pap} $\approx 1.886 \times 10^{26}$ m
$\approx 1.994 \times 10^{10}$ light years
$\approx 1.448 \cdot D_H$

so proton-antiproton collisions would also not occur. Please note that this mean free path is larger than the 3-spherical universe and does not depend on the particle velocity.

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[1] The universe ***IS*** a 3-sphere, see http://henk-reints.nl/astro/HR-Geometry-of-the-Universe-v2b-20200625T0907Z.pdf
& http://henk-reints.nl/astro/HR-Geometry-of-universe-slideshow.pdf
[2] https://physics.nist.gov/cgi-bin/cuu/Value?bg
[3] Eq. [239] on p. 42 of http://henk-reints.nl/astro/HR-on-the-universe.php (which I call my main treatise,
but I did get some new insights since I wrote it, e.g. Eq. [241] on that page is based on too high an estimate of N_U)
[4] Eq. [3] on p. 2 of http://henk-reints.nl/astro/HR-mass-univ-grav-const.pdf
[5] https://en.wikipedia.org/wiki/Mean_free_path#Kinetic_theory_of_gases
[6] https://www.researchgate.net/publication/282072721_Nuclear_annihilation_by_antinucleons

We'll stick to the presumption of atomic hydrogen and antihydrogen. Of course the mean collision frequency per atom equals: $f_{coll} = v/\ell_H$
where v is their mean velocity, which we can only estimate.

velocity [km/s]	temperature[7] [MK]	collision frequency [Hz] of single H-atom	collisions since big bang	example
100	0.4	1.866×10^{-13}	81 082	
200	1.6	3.731×10^{-13}	162 163	low solar corona temperature[7]
500	10	9.328×10^{-13}	405 408	high solar corona temperature[7] low solar orbital velocity[7]
1000	40	1.866×10^{-12}	810 816	
2000	160	3.731×10^{-12}	1 621 632	

We'll further calculate with $v = 1000$ km/s, which exceeds the escape velocity from the sun's surface (which is 618 km/s), hence: $f_{coll} \approx 1.866 \times 10^{-12}$ /s.

The total collision frequency would be: $f_{coll,tot} = N_U \cdot f_{coll} = \frac{c^3}{2GH_0 m_H} \cdot \frac{v}{\frac{Gm_H}{\pi^2 H_0^2 r_B^2 \sqrt{2}}} = \frac{\pi^2 v c^3 H_0 r_B^2 \sqrt{2}}{2G^2 m_H^2}$

but since *one* collision involves *two* particles,

we must divide this by 2, hence: $f_{coll,tot} = \frac{\pi^2 v c^3 H_0 r_B^2 \sqrt{2}}{4G^2 m_H^2} \approx 4.924 \times 10^{67}$ /s

Roughly $\frac{1}{1.82} \approx 0.55$ of all mass in the universe is contained within the galaxies[8], so the intergalactic medium comprises just $1 - \frac{1}{1.82} \approx 0.45$ of the total. Therefore we must reduce the total collision frequency by this factor if we consider only the intergalactic medium.

It yields: $f_{coll,tot} = 0.45 \frac{\pi^2 v c^3 H_0 r_B^2 \sqrt{2}}{4G^2 m_H^2} = \frac{9\pi^2 v c^3 H_0 r_B^2 \sqrt{2}}{80G^2 m_H^2} \approx 2.219 \times 10^{67}$ /s

which would be a reasonable estimate of the hydrogen atom collision rate in the intergalactic medium throughout the entire 3-spherical universe.

Division of $f_{coll,tot}$ by the entire volume of the 3-spherical universe yields the intergalactic H-collision frequency density: $\rho_{f_{coll}} = \frac{f_{coll,tot}}{V_U} = \frac{9\pi^2 v c^3 H_0 r_B^2 \sqrt{2}}{80G^2 m_H^2} \cdot \frac{\pi H_0^3}{2c^3} = \frac{9\pi^3 v H_0^4 r_B^2 \sqrt{2}}{160G^2 m_H^2}$
$\approx 1.574 \times 10^{-11}$ /s/m^3

Now suppose each collision would produce two photons in exactly opposite directions.It means that per collision 2 photons are emitted within a solid angle of 4π, but we cannot predict their directions.

Although the universe ***IS*** a 3-sphere, we'll now use some Euclidean geometry, just because it's easier.

As seen from a distance r, the earth has a solid angle of $\Omega_E(r) = \frac{\pi r_E^2}{r^2}$, so the fraction of those photons hitting the earth must be: $2 \cdot \frac{\Omega_E(r)}{4\pi} = \frac{r_E^2}{2r^2}$

Now suppose this r is the radius of a shell around us with a thickness of Δr.
This shell has a volume of ca.: $V_{sh} = 4\pi r^2 \Delta r$
so it houses: $V_{sh} \cdot \rho_{f_{coll}}$ collisions per second.
The hit rate then equals: $f_{hit} = \frac{r_E^2}{2r^2} \cdot 4\pi r^2 \Delta r \cdot \rho_{f_{coll}} = 2\pi r_E^2 \Delta r \cdot \rho_{f_{coll}}$

[7] The motion is not stochastic but ballistic, so it not a true temperature, see http://henk-reints.nl/astro/HR-solar-corona.pdf, but these values are in agreement with https://en.wikipedia.org/wiki/Outer_space & https://en.wikipedia.org/wiki/Outer_space#cite_note-baas41_908-2
[8] Eq. [2] on p. 1 of http://henk-reints.nl/astro/HR-mass-univ-grav-const.pdf

$$= 2\pi r_E^2 \Delta r \cdot \frac{9\pi^3 v H_0^4 r_B^2 \sqrt{2}}{160 G^2 m_H^2} = \frac{9\pi^4 v r_E^2 H_0^4 r_B^2 \sqrt{2}}{80 G^2 m_H^2} \Delta r$$

It is obviously independent of r, but it is proportional to the shell's thickness, i.e. total radial distance over which the photons are produced.

Now suppose the universe would consist of both matter and antimatter in equal proportions. This cannot be homogeneously intermixed since it would very rapidly annihilate all of the universe, so let's presume it would be such that each galaxy fully consists of either one of the types of matter. Between two galaxies there would be a matter-antimatter boundary. Let's presume it has a thickness of 20 times the mean free path. This would now be the only region where the aforementioned photons are produced, since this concerns annihilation, of course. But only half of the collisions will be a matter-antimatter annihilation,

so we reduce this thickness to: $10\ell_H = 5.360 \times 10^{18}$ m ≈ 566.6 light years.

Now the universe contains ca.: N_{gal} $\approx 2 \times 10^{11}$ galaxies,

yielding roughly: $\sqrt[3]{\frac{V_U}{N_{gal}}}$

as the mean distance between galaxies.

Then a fraction of: $a = \Delta r / \sqrt[3]{\frac{V_U}{N_{gal}}} = 10\ell_H \cdot \sqrt[3]{\frac{N_{gal}}{V_U}}$

of all collisions would be an annihilation. Please note this is a rough estimate.

If matter and antimatter were evenly distributed (per galaxy, as said), then a line of sight to the "edge" of the universe (in fact it would be to the antipodal point of the 3-sphere) would more or less alternatingly meet matter and antimatter galaxies, so

in the hit rate equation: $f_{hit} = \frac{9\pi^4 v r_E^2 H_0^4 r_B^2 \sqrt{2}}{80 G^2 m_H^2} \Delta r$

we must replace Δr with this fraction of the Hubble distance,

so:

$$f_{hit} = \frac{9\pi^4 v r_E^2 H_0^4 r_B^2 \sqrt{2}}{80 G^2 m_H^2} \cdot a \frac{c}{H_0}$$

$$= \frac{9\pi^4 v c r_E^2 H_0^3 r_B^2 \sqrt{2}}{80 G^2 m_H^2} \cdot 10\ell_H \cdot \sqrt[3]{\frac{N_{gal}}{V_U}}$$

$$= \frac{9\pi^4 v c r_E^2 H_0^3 r_B^2 \sqrt{2}}{8 G^2 m_H^2} \cdot \ell_H \cdot \sqrt[3]{N_{gal} / \left(\frac{2c^3}{\pi H_0^3}\right)}$$

$$= \frac{9\pi^4 v c r_E^2 H_0^3 r_B^2 \sqrt{2}}{8 G^2 m_H^2} \cdot \ell_H \cdot \frac{H_0}{c} \cdot \sqrt[3]{\frac{\pi N_{gal}}{2}}$$

$$= \frac{9\pi^4 v r_E^2 H_0^4 r_B^2 \sqrt{2}}{8 G^2 m_H^2} \cdot \ell_H \cdot \sqrt[3]{\frac{\pi N_{gal}}{2}}$$

$$= \frac{9\pi^4 v r_E^2 H_0^4 r_B^2 \sqrt{2}}{8 G^2 m_H^2} \cdot \frac{G m_H}{\pi^2 H_0^2 r_B^2 \sqrt{2}} \cdot \sqrt[3]{\frac{\pi N_{gal}}{2}}$$

$$= \frac{9\pi^2 v r_E^2 H_0^2}{8 G m_H} \cdot \sqrt[3]{\frac{\pi N_{gal}}{2}}$$

For the incoming flux we divide this by the projected area of the earth,

yielding: $j_\gamma = \frac{9\pi v H_0^2}{8 G m_H} \cdot \sqrt[3]{\frac{\pi N_{gal}}{2}}$ $\approx 1.687 \times 10^8$ /s/m²

as the incoming foton flux.

Proton annihilation photons would have: $E_{prot} = 938.272$ MeV $\approx 1.5033 \times 10^{-10}$ J

In astronomy, the X-ray/gamma tipping point is 100 keV per photon. These annihilation photons are nearly 10 000 times more energetic, so they definitely are very hard gammas. Due to redshift because of the Hubble motion at greater distances, its spectrum would be smeared out towards the larger wavelengths, which also reduces the energy as received by us (relativistic dimming), but most of it would still be very hard gamma radiation. A quick and dirty estimate would yield a mean value of half this annihilation energy. The incoming energy flux of annihilation photons would be:

$$I_\gamma = 1.687 \times 10^8 \cdot \tfrac{1}{2} \cdot 1.5033 \times 10^{-10} = 12.68\ \text{mW/m}^2.$$

This is as received from one direction. Conversion to spherical is done by a factor of $\frac{4\pi r^2}{\pi r^2} = 4$ and on Earth's surface we would receive it from one hemisphere only (i.e. the 2π sky), so an average human would receive 25.36 mW per square metre of his exposed body surface area. Average human skin surface area $= 1.7$ m^2, but not counting the inner leg area etc. we'll round it down to 1 m^2. Average human body mass is 70 kg, so (s)he would absorb a radiation dose of $\frac{25.36}{70} = 0.36$ mW/kg ≈ 0.36 mGy/s ≈ 1.3 gray per hour. Since it is gamma radiation this is also 1.3 sievert per hour.

Golly! That's $11\,433$ sievert per year! Over 4½ million times the actual natural background radiation of 2.5 millisievert per year!

Since proton-antiproton collisions would not occur in the intergalactic medium (as derived above), the antiprotons should fly freely through the cosmos and ultimately collide with one of the many massive objects somewhere in the universe and the protons would collide with anti-objects. It would produce the same radiation intensity as just derived for the hydrogen-antihydrogen annihilations. The cosmic radiation that Earth receives (most of which consists of protons) would also contain 50% antiprotons, but this is not the case[9]. They would annihilate with protons in atomic nuclei in the atmosphere, thus also producing this gamma radiation, but it would not be redshifted (or relativistically dimmed) at all.

This intense gamma radiation is definitely not observed. Therefore we can conclude that annihilations do practically not occur at all throughout the cosmos, hence the universe must contain just one type of matter. We simply call that *normal* matter.

De sterrennacht, Vincent van Gogh, 1889.

[9] https://en.wikipedia.org/wiki/Cosmic_ray#Composition