

The Young Age Of The Galaxy

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Hyperlink	Dating Method	Age/Years
https://doi.org/10.1111/j.1365-2966.2007.12320.x	AGB Stars	900,000
https://www.aanda.org/articles/aa/pdf/2019/06/aa35366-19.pdf	AGB Stars	1,000,000
https://www.aanda.org/articles/aa/pdf/2015/07/aa24609-14.pdf	AGB Stars	16,000
https://www.aanda.org/articles/aa/pdf/2022/03/aa42648-21.pdf	AGB Stars	60,000
https://arxiv.org/pdf/2607.19989	AGB Stars	100,000
https://www.aanda.org/articles/aa/pdf/2006/18/aa4569-05.pdf	AGB Stars	100,000
https://www.aanda.org/articles/aa/pdf/2021/06/aa40072-20.pdf	Blue Stragglers	3,000,000
https://www.aanda.org/articles/aa/pdf/2002/29/aah3520.pdf	Carbon Stars	100,000
https://www.aanda.org/articles/aa/pdf/2003/04/aah3779.pdf	Carbon Stars	100,000
https://www.aanda.org/articles/aa/pdf/2002/11/aah3281.pdf	Carbon Stars	75,000
https://www.aanda.org/articles/aa/pdf/2010/01/aa12084-09.pdf	Carbon Stars	500,000
https://iopscience.iop.org/article/10.3847/1538-3881/ad12bf/pdf	Dust Shells	5,000
https://doi.org/10.1093/mnras/sty1422	Dust Shells	6,000
https://iopscience.iop.org/article/10.1088/0067-0049/212/1/6	Magnetar Spin	1,700,000
https://doi.org/10.1093/mnras/stz1391	Magnetar Spin	283,000
https://doi.org/10.1093/mnras/stz1391	Magnetar Spin	645,000
https://doi.org/10.1093/mnras/stz1391	Magnetar Spin	509,000
https://doi.org/10.1093/mnras/stz1391	Magnetar Spin	1,217,000
https://doi.org/10.1093/mnras/stz1391	Magnetar Spin	18,000
https://doi.org/10.1093/mnras/stz1391	Magnetar Spin	44,000
https://doi.org/10.1093/mnras/stz1391	Magnetar Spin	7,000
https://doi.org/10.1093/mnras/stz1391	Magnetar Spin	4,000
https://doi.org/10.1051/0004-6361/201424671	Red Super Giants	1,000,000
https://www.aanda.org/articles/aa/pdf/2005/28/aa2555-04.pdf	Red Super Giants	200,000
https://www.aanda.org/articles/aa/pdf/2023/08/aa44770-22.pdf	Red Super Giants	700,000
https://www.aanda.org/articles/aa/pdf/2017/12/aa31590-17.pdf	Wolf-Rayet Stars	1,200,000
https://iopscience.iop.org/article/10.3847/1538-4357/833/2/133/pdf	Wolf-Rayet Stars	6,000,000
https://ui.adsabs.harvard.edu/scan/manifest/2000A%26A...360..227N?art=true	Wolf-Rayet Stars	700,000

https://www.creationisonline.com/YEC/Young_Galaxy.pdf

https://www.creationisonline.com/YEC/Young_Galaxy.xlsm

Stellar Age Chronometers

<https://www.creationisonline.com/YEC/StellarAges.htm>

<https://www.creationisonline.com/YEC/ICR.pdf>

https://www.creationisonline.com/YEC/Radio_Dating.xlsm

AGB Stars

AGB stars, Mass range 0.5 to 8 Solar Masses

https://en.wikipedia.org/wiki/Asymptotic_giant_branch

The asymptotic giant branch (AGB) is a region of the [Hertzsprung–Russell diagram](#) populated by evolved cool luminous [stars](#). This is a period of [stellar evolution](#) undertaken by all low- to intermediate-mass stars (about 0.5 to 8 solar masses) late in their lives. These stars are ejecting matter at a high rate and thus have a very short life.

M-type AGB stars wind and dust models

1,460 dates less than 1 million years old.

<https://www.aanda.org/articles/aa/pdf/2019/06/aa35366-19.pdf>

Astronomy & Astrophysics, 626, A100 (2019)

<http://vizier.cds.unistra.fr/viz-bin/VizieR?-source=J/A%2BA/626/A100>

High mass-loss AGB stars in the Galactic Bulge

If the starting mass is 0.5 solar masses the average age is 450,000 years.

“These colors, especially $(K_s - [D])_0$, enable estimation of the mass-loss rates ($\dot{M}$) of the sources in the bulge fields which range from 10^{-7} to $10^{-4} \text{ M yr}^{-1}$. Taking into consideration the completeness of the mass-loss rate bins, we find that the contribution to the integrated mass-loss is probably dominated by mass-loss rates larger than $3 \times 10^{-7} \text{ M yr}^{-1}$ and is about $1.96 \times 10^{-4} \text{ M yr}^{-1} \text{ deg}^{-2}$ in the ‘intermediate’ and ‘outer’ bulge fields of sources with mass-loss rates, $\dot{M} > 3 \times 10^{-7} \text{ M yr}^{-1}$.”

Minimum ages assume a mass of 0.5 Solar Masses.

	Min Ages	Max Ages
	Years	Years
Average	455,533	9,110,666
Maximum	1,562,500	31,250,000
Minimum	9,615	192,308
No. Dates	1,460	1,460

<http://vizier.cds.unistra.fr/viz-bin/VizieR?-source=J/MNRAS/381/1219>

<https://doi.org/10.1111/j.1365-2966.2007.12320.x>

MNRAS, 381, 1219–1234 (2007)

Study of extremely reddened AGB stars

“Extremely reddened asymptotic giant branch stars (AGB) lose mass at high rates of $>10^{-5} \text{ M yr}^{-1}$. This is the very last stage of AGB evolution, in which stars in the mass range $\sim 2.0\text{--}4.0 \text{ M}$ (for solar metallicity) should have been converted to C stars already. The extremely reddened AGB stars in the Galactic bulge are however predominantly O-rich, implying that they might be either low-mass stars or stars at the upper end of the AGB mass range.”

	Min Ages	Max Ages
	Years	Years
Average	16,694	333,890
Maximum	50,000	1,000,000
Minimum	1,238	24,752
No. Dates	34	34

<https://www.aanda.org/articles/aa/pdf/2015/07/aa24609-14.pdf>

A WISE view on extreme AGB stars

“Variability is a key property of stars on the asymptotic giant branch (AGB). Their pulsation period is related to the luminosity and mass-loss rate (MLR) of the star.”

	Min Ages	Max Ages
	Years	Years
Average	127,922	2,558,440
Maximum	7,082,153	141,643,059
Minimum	111	2,217
No. Dates	121	121

	Min Ages	Max Ages
	Years	Years
Average	60,191	1,203,823
Maximum	287,356	5,747,126
Minimum	1,634	32,680
No. Dates	200	200

<https://www.aanda.org/articles/aa/pdf/2022/03/aa42648-21.pdf>

Astronomy & Astrophysics, 659, id.A145

<https://vizier.cds.unistra.fr/viz-bin/VizieR-3?-source=J/A%2bA/659/A145/>

Feedback from dusty stellar winds

“Super-AGB stars also reach very high mass-loss rates, in excess of $10^{-4} M_{\odot} \text{yr}^{-1}$. The mass loss of RSGs appears to be subject to different modes, with rates well below, around, and well above the nuclear burning timescale. The timescale for the dominant mass loss phase is $\sim 0.6\text{--}2 \times 10^5 \text{yr}$, shorter than the thermal-pulsing AGB or RSG phases.”

$\log(M_{\odot}/\text{Year})$	Years/Solar Mass	Min Age	Max Age
-2.79	617	308	4,933
-3.37	2,344	1,172	18,754
-3.56	3,631	1,815	29,046
-3.55	3,548	1,774	28,385
-3.75	5,623	2,812	44,987
-3.65	4,467	2,233	35,735
-3.66	4,571	2,285	36,567
-3.8	6,310	3,155	50,477
-4.6	39,811	19,905	318,486
-4.09	12,303	6,151	98,422
-3.55	3,548	1,774	28,385
-4.04	10,965	5,482	87,718
-4.03	10,715	5,358	85,722
-3.46	2,884	1,442	23,072
-4.09	12,303	6,151	98,422

Mass	$\log(M_{\odot}/\text{Year})$	Years/Solar Mass	Life Span
3.6	-5.27	186,209	12,176
3.4	-5.32	208,930	13,676
3.2	-5.4	251,189	16,446
3.5	-5.28	190,546	12,477
3.3	-5.3	199,526	13,070
3.3	-5.35	223,872	14,665
3.6	-4.94	87,096	5,716

Mass	$\log(M_{\odot}/\text{Year})$	Years/Solar Mass	Life Span
21.1	-3.15	1,413	29,805
11	-3.92	8,318	91,494
3.1	-5.46	288,403	894,050
3.2	-5.46	288,403	922,890
16.6	-4.27	18,621	309,106
8.9	-4.31	20,417	181,715
3.5	-5.33	213,796	748,287
8.3	-3.9	7,943	65,929

<https://arxiv.org/pdf/2607.19989>

MNRAS

Near-infrared observations of water-ice

AGB	Annual Loss	Model One	Model One	Annual Loss	Model Two	Model Two
STAR	Sun = 1	Min Ages	Max Ages	Sun = 1	Min Ages	Max Ages
IRAS-18052	2.20E-06	227,273	3,636,364	1.10E-04	4,545	72,727
IRAS-18092	9.30E-07	537,634	8,602,151	1.10E-04	4,545	72,727
IRAS-18100	1.50E-06	333,333	5,333,333	2.10E-04	2,381	38,095
OH-16.1	3.50E-06	142,857	2,285,714	2.90E-04	1,724	27,586
IRAS-18257	1.40E-06	357,143	5,714,286	1.50E-04	3,333	53,333
OH-21.5	2.80E-06	178,571	2,857,143	2.60E-04	1,923	30,769
IRAS-18327	1.20E-06	416,667	6,666,667	1.20E-04	4,167	66,667
OH-26.5	2.30E-06	217,391	3,478,261	2.60E-04	1,923	30,769
IRAS-18361	1.40E-06	357,143	5,714,286	1.70E-04	2,941	47,059
OH-30.7	2.30E-06	217,391	3,478,261	2.60E-04	1,923	30,769
OH-30.1	2.20E-06	227,273	3,636,364	2.20E-04	2,273	36,364
IRAS-18488	4.10E-06	121,951	1,951,220	3.60E-04	1,389	22,222
OH-32.8	2.80E-06	178,571	2,857,143	3.10E-04	1,613	25,806
IRAS-18588	1.40E-06	357,143	5,714,286	1.30E-04	3,846	61,538
OH-39.9	1.10E-06	454,545	7,272,727	1.60E-04	3,125	50,000
IRAS-19067	2.60E-06	192,308	3,076,923	2.70E-04	1,852	29,630
IRAS-22177	1.20E-06	416,667	6,666,667	1.30E-04	3,846	61,538
AFGL-5379	2.00E-06	250,000	4,000,000	2.00E-04	2,500	40,000
OH-13.1	1.80E-06	277,778	4,444,444	2.40E-04	2,083	33,333
IRAS-18310	1.80E-06	277,778	4,444,444	2.40E-04	2,083	33,333
OH-51.8	1.70E-06	294,118	4,705,882	1.80E-04	2,778	44,444
OH-65.7	1.80E-06	277,778	4,444,444	3.20E-04	1,563	25,000
OH-75.3	1.80E-06	277,778	4,444,444	3.00E-04	1,667	26,667

<https://www.aanda.org/articles/aa/pdf/2006/18/aa4569-05.pdf>

Astronomy & Astrophysics, 450, 1051–1059 (2006)

Blue Stragglers

[New Study Can't Explain Blue Stragglers' Youth | The Institute for Creation Research](#)

Blue stragglers, according to NASA, "are older stars that acquire a new lease on life when they collide and merge with other stars."¹ But a new study calls into question whether stellar collisions can account for these remarkable stars. And blue stars burn their fuel so quickly that they actually look young.

Since their discovery, evolutionary astronomers have sought a way to explain how these stars can even exist. They burn fuel so fast that they should have burned out billions of years ago. American astronomers Aaron Geller and Robert Mathieu published in *Nature* a description of their model for how older stars could have acquired a "new lease on life" by siphoning matter from nearby gas giant stars through "mass transfer."²

They investigated stars within a cluster called NGC 188, found in the constellation Cepheus. It contains 21 blue stragglers, 16 of which are binary stars that closely interact with nearby stars. The researchers suspected that the blue stragglers' partners were white dwarfs, which would be small, leftover remnants of larger red stars that the blue ones had drained of fuel. Such dwarfs are too faint for direct observation, but they have sufficient mass to cause their partner stars to wobble.

Of the 16 binaries, 12 had rotational periods right at 1,000 days and were thus called "long-period" blue stragglers. The study authors ran a statistical analysis that showed "the theoretical and observed [mass] distributions are indistinguishable."² In other words, their theory that other stars "fed" these 12 blue stragglers matched well with what they observed.

But did this reconcile the relative youthfulness of these binary blue stars with their assumed billions of years of history? The answer is no. The authors wrote, "Blue straggler stars...should already have evolved into giant stars and stellar remnants,"² and their new observations do not solve this deep-time problem.

Blue stragglers should burn through all their fuel in "a few million years at best."³ But these NGC 188 stars are supposed to be seven billion years old. So, to make them fit that age, these authors maintain that they were not initially blue stars, but instead burned fuel at a normal rate for billions of years. Then suddenly, within the last one million years, all 12 of them began siphoning extra fuel from their binary partners so that they only *look* young right now.

However, nothing explains the many blue stragglers that are not binary stars and yet exist near and far throughout the universe. Could they have received recent "youthfulness" through collisions with other stars?

In an article summarizing the Geller and Mathieu paper, University of Cambridge astronomer Christopher Tout wrote, "Thus, in this cluster [NGC 188], a collisional origin for blue stragglers is much rarer than expected, and the authors' study casts doubt on whether it occurs at all."⁴ The modelled scenario in which blue stars form by collision did not match observations.

So, isolated blue stars could not have received their young looks from a binary system, since by definition they have no binary from which to siphon fuel. They probably didn't receive their youthful appearance from collisions, either, according to these results. And though the binary blue stragglers may have siphoned fuel from nearby partners, the idea that 12 of 16 only did so recently—after an imagined 7-billion-year wait—defies reasonable odds.

Thus, the best explanation is still the most straightforward one—blue straggler stars look young because they *are* young.

References

1. [Omega Centauri: Colourful Stars Galore Inside Globular Star Cluster Omega Centauri](#). NASA press release, September 9, 2009.
2. Geller, A. M. and R. D. Mathieu. 2011. A mass transfer origin for blue stragglers in NGC 188 as revealed by half-solar-mass companions. *Nature*. 478 (7369): 356-359
3. Thomas, B. [Young Blue Stars Found in Milky Way](#). *ICR News*. Posted on icr.org June 9, 2011, accessed October 24, 2011.
4. Tout, C. 2011. Astrophysics: Stars acquire youth through duplicity. *Nature*. 478 (7369): 331-332.

A new, Gaia-based, catalogue of blue straggler stars

Cluster	MYR'S	BLUE	YELLOW	Cluster	MYR'S	BLUE	YELLOW
NGC_2477	708	5	4	NGC_5823	794		1
Berkeley_104	776	1		Harvard_8	562	1	
Berkeley_12	3,981	13		IC_1311	1,585	5	1
Berkeley_14	1,585	9		IC_166	1,000	9	2
Berkeley_17	10,000	20		IC_361	51	2	
Berkeley_18	4,266	32		IC_4651	1,122	5	1
Berkeley_19	2,512	13	3	King_11	1,096	18	
Berkeley_20	6,026	6	3	King_19	355	1	
Berkeley_21	2,188	20		King_2	6,026	26	2
Berkeley_22	3,311	3		King_5	1,259	4	3
Berkeley_23	794	8	3	King_7	661	7	1
Berkeley_29	1,047	1	1	King_8	407	3	
Berkeley_31	2,042	6		Melotte_105	355	1	
Berkeley_32	5,012	27	2	Melotte_066	3,388	14	1
Berkeley_33	794	1		Melotte_071	234	5	
Berkeley_39	7,943	18	2	NGC_1193	5,012	12	2
Berkeley_58	295	1		NGC_1245	1,072	5	1
Berkeley_69	891	1	1	NGC_1342	447	1	
Berkeley_70	4,677	12	1	NGC_1444	91	2	
Berkeley_81	1,000	1	2	NGC_1798	1,778	27	2

Cluster	MYR'S	BLUE	YELLOW	Cluster	MYR'S	BLUE	YELLOW
Berkeley_99	3,162	5	1	NGC_1817	407	3	
Collinder_110	1,413	8		NGC_0188	7,586	22	
Collinder_261	8,913	53	3	NGC_1907	316	1	
Collinder_74	1,288	5		NGC_1912	316	1	
Gulliver_1	1,349	3		NGC_2099	347	1	
Gulliver_4	1,445	4		NGC_2112	1,778	4	
Gulliver_55	1,585	3		NGC_2141	1,698	18	3
Haffner_6	661	1		NGC_2158	1,047	39	3
NGC_2192	1,413	1	1	NGC_2168	178	1	
NGC_2204	776	7	2	NGC_6005	1,202	3	
NGC_2243	1,072	14	1	NGC_6025	76	1	
NGC_2259	316	4		NGC_6067	117	2	1
NGC_2266	631	1		NGC_6124	138	2	
NGC_2324	447	1		NGC_6134	891	4	
NGC_2354	1,514	5	1	NGC_6253	5,012	14	3
NGC_2360	631	1		NGC_6475	295	1	
NGC_2383	282	1		NGC_6583	1,000	1	
NGC_2420	1,995	3		NGC_6603	562	4	
NGC_2422	72	1		NGC_6633	417	1	
NGC_2437	251	1	3	NGC_6705	251	2	1
NGC_2447	380	1		NGC_6791	8,318	48	
NGC_2506	1,000	14		NGC_6819	2,291	15	
NGC_2516	112	1		NGC_6866	813	1	
NGC_2533	692	1		NGC_6939	1,585	2	
NGC_2627	1,413	3		NGC_6940	708	2	
NGC_2632	741	1		NGC_7044	1,259	7	
NGC_2660	1,072	2		NGC_7142	3,548	10	1
NGC_2682	2,818	11	2	NGC_0752	1,445		1
NGC_2818	417	5		NGC_7789	3,311	16	
NGC_2849	1,000	2		NGC_7790	55	1	
NGC_3114	123		1	Pismis_3	1,047	4	1
NGC_3680	1,175	1	1	Ruprecht_75	1,413	1	3
NGC_3960	1,259	2		Tombaugh_2	1,023	27	2
NGC_4815	229	1		Trumpler_20	1,288	12	1
NGC_5168	100	6		Trumpler_05	3,981	103	2
NGC_0559	224	1		Trumpler_09	100	1	
NGC_5822	891	1		Waterloo_7	58	1	

<https://www.aanda.org/articles/aa/pdf/2021/06/aa40072-20.pdf>

Astronomy & Astrophysics, 650, A67 (2021)

<https://vizier.cds.unistra.fr/viz-bin/VizieR?-source=J/A+A/650/A67>

Carbon Stars

The **asymptotic giant branch (AGB)** is a region of the [Hertzsprung–Russell diagram](#) populated by evolved cool luminous [stars](#). This is a period of [stellar evolution](#) undertaken by all low- to intermediate-mass stars (about 0.5 to 8 solar masses) late in their lives.

A carbon star (C-type star) is typically an [asymptotic giant branch](#) star, a luminous [red giant](#), whose [atmosphere](#) contains more [carbon](#) than [oxygen](#). The two elements combine in the upper layers of the star, forming [carbon monoxide](#), which consumes most of the oxygen in the atmosphere, leaving carbon atoms free to form other carbon compounds, giving the star a "sooty" atmosphere and a strikingly ruby red appearance. There are also some dwarf and [supergiant](#) carbon stars, with the more common giant stars sometimes being called classical carbon stars to distinguish them. [[Carbon star - Wikipedia](#)] These stars are ejecting matter at a high rate and thus have a very short life.

Millimeter observations of infrared carbon stars

	Maximum Age	Minimum Age
	Years	Years
Average	1,522,254	45,668
Maximum	22,727,273	681,818
Minimum	74,074	2,222
No. Dates	307	307

<https://www.aanda.org/articles/aa/pdf/2002/29/aah3520.pdf>

Astronomy & Astrophysics, 390, 511–522 (2002)

<https://vizier.cds.unistra.fr/viz-bin/VizieR-3?-source=J/A%2bA/390/511/>

The IR-color–mass-loss

$\dot{M}[M_{\odot}/\text{yr}]$	$M_i/M_{\odot}$	$M^*/M_{\odot}$	Age/ Years	Maximum	Future
Mass/Year	Original Mass	Current Mass	Evolutionary	Age	Lifespan
0.0000025	1.83	1.4	1,730,000,000	172,000	560,000
0.0000039	2.47	2	824,000,000	120,513	512,821
0.0000074	1.95	1.51	1,530,000,000	59,459	204,054
0.0000046	1.54	0.65	2,660,000,000	193,478	141,304
0.000017	2.76	2.17	598,000,000	34,706	127,647
0.0000044	1.21	0.84	6,500,000,000	84,091	190,909
0.0000067	1.56	1.14	2,660,000,000	62,687	170,149
0.0000081	1.74	0.66	2,010,000,000	133,333	81,481
0.0000061	1.31	0.92	4,870,000,000	63,934	150,820
0.00001	1.67	1.21	2,350,000,000	46,000	121,000
0.000011	1.67	0.73	2,350,000,000	85,455	66,364
0.000021	2.55	1.64	825,000,000	43,333	78,095
0.000012	1.41	0.94	3,750,000,000	39,167	78,333
0.000011	1.48	0.76	2,970,000,000	65,455	69,091
0.000011	1.48	0.75	2,970,000,000	66,364	68,182
0.000019	1.48	0.92	2,970,000,000	29,474	48,421
0.000018	1.68	0.81	2,170,000,000	48,333	45,000
0.000039	2.46	1.38	825,000,000	27,692	35,385
0.000036	2.16	1.11	1,270,000,000	29,167	30,833
0.000083	2.66	1.31	700,000,000	16,265	15,783

<https://www.aanda.org/articles/aa/pdf/2003/04/aah3779.pdf>

Astronomy & Astrophysics, 398, 229–237 (2003)

An improved mass-loss

No.	Mass	Annual Loss	Maximum Age	No.	Mass	Annual Loss	Maximum Age
1	0.63	0.00003	21,000	30	0.8	0.000009	88,889
2	0.63	0.0000058	108,621	31	0.8	0.0000083	96,386
3	0.63	0.000014	45,000	32	0.8	0.00001	80,000
4	0.7	0.000062	11,290	33	0.8	0.000017	47,059
5	0.7	0.00001	70,000	34	0.8	0.00003	26,667
6	0.7	0.000006	116,667	35	0.8	0.000041	19,512
7	0.8	0.00011	7,273	36	0.84	0.000079	10,633
8	0.8	0.000014	57,143	37	0.84	0.00002	42,000
9	0.8	0.000006	133,333	38	0.84	0.000011	76,364
10	0.8	0.0000049	163,265	39	0.94	0.000088	10,682
11	0.8	0.0000065	123,077	40	0.94	0.000023	40,870
12	0.8	0.0000074	108,108	41	0.94	0.000012	78,333
13	0.8	0.0000064	125,000	42	0.94	0.000025	37,600
14	0.8	0.000013	61,538	43	1	0.000026	38,462
15	0.8	0.000013	61,538	44	1	0.000059	16,949
16	0.8	0.000016	50,000	45	1	0.000077	12,987
17	0.8	0.000016	50,000	46	1	0.000079	12,658
18	0.8	0.000019	42,105	47	1	0.000043	23,256
19	0.8	0.00001	80,000	48	1	0.000026	38,462
20	0.8	0.000025	32,000	49	1	0.0000046	217,391
21	0.8	0.000051	15,686	50	1	0.0000054	185,185
22	0.8	0.000036	22,222	51	1	0.0000051	196,078
23	0.8	0.00005	16,000	52	1	0.000018	55,556
24	0.8	0.00007	11,429	53	1	0.000013	76,923
25	0.8	0.000099	8,081	54	1	0.0000096	104,167
26	0.8	0.0000039	205,128	55	1.2	0.0000061	196,721
27	0.8	0.0000056	142,857	56	1.2	0.000013	92,308
28	0.8	0.0000061	131,148	57	1.2	0.000016	75,000
29	0.8	0.0000038	210,526	58	1.2	0.0000098	122,449

<https://www.aanda.org/articles/aa/pdf/2002/11/aah3281.pdf>

Astronomy & Astrophysics, 384, 452–459 (2002)

Investigation of the mass loss mechanism

<https://ui.adsabs.harvard.edu/abs/2000A%26A...361..641W/abstract>

228 dates less than 1 million years.

Dust driven mass loss from carbon stars

	Maximum Age	Minimum Age	Remaining Life
	Years	Years	Years
Average	5,979,950	516,624	717,549
Maximum	370,000,000	26,666,667	33,333,333
Minimum	257,576	33,333	45,455
No. Dates	325	325	325

<https://www.aanda.org/articles/aa/pdf/2010/01/aa12084-09.pdf>

Astronomy & Astrophysics, 509, A14 (2010)

<https://vizier.cds.unistra.fr/viz-bin/VizieR-3?-source=J/A%2bA/509/A14>

Dust Shells

Mass loss is a crucial process that affects the observational properties, evolution path, and fate of highly evolved stars. However, the mechanism of mass loss is still unclear, and the mass-loss rate (MLR) of red supergiant stars (RSGs) requires further research and precise evaluation. To address this, we utilized an updated and complete sample of RSGs in the Large Magellanic Cloud (LMC) and employed the 2-DUST radiation transfer model and spectral energy distribution fitting approach to determine the dust-production rates (DPRs) and dust properties of the RSGs. We have fitted 4714 selected RSGs with over 100,000 theoretical templates of evolved stars. Our results show that the DPR range of RSGs in the LMC is $10^{-11}\text{Me yr}^{-1}$ – 10^{-7}Me yr^{-1} , and the total DPR of all RSGs is $1.14 \times 10^{-6}\text{Me yr}^{-1}$. [The Astronomical Journal, Volume 167, Issue 2, id.51]

Evolved Massive Stars at Low Metallicity.

	Age
	Years
Average	4,384
Maximum	63,000
Minimum	776
No. Dates	4,717

<https://iopscience.iop.org/article/10.3847/1538-3881/ad12bf/pdf>

The Astronomical Journal, Volume 167, Issue 2, id.51

<http://vizier.cds.unistra.fr/viz-bin/VizieR?-source=J/AJ/167/51>

Extended Dust Emission from Nearby Evolved Stars

The PACS observations show extended emission at both wavelengths: at 70 μm , we observe extended emission at 3σ brightness levels from 0.04 to 0.74 pc averaging at 0.16 ± 0.04 pc. The observations allowed us to observe the mass-loss histories up to an average of 9000 ± 1100 yr, ranging from 4500–21800 yr. At 160 μm , $R3\sigma$ and lookback time-averaged 0.011 ± 0.02 pc and 6500 ± 1000 yr, respectively. At both PACS wavelengths, the circumstellar shell structure and extended emission we measured are consistent with the results from Cox et al.

Source	Age, Years	Age, Years
Star	Dust	Gas
CIT6	7,066	7,057
EPAqr	1,199	963
IKTau	6,558	6,821
IRC+10011	11,783	12,073
IRC+10216	11,373	11,123
LPAnd	9,489	9,323
NMLCyg	8,922	8,877
oCeti	5,036	4,967
RCas	5,345	5,341
RLeo	1,337	1,313
RXBoo	3,189	3,177
TXCam	2,438	2,337
UHya	14,448	14,639
WAql	4,426	4,383
WHya	4,988	5,246
IRC+10216	11,295	11,123

<https://doi.org/10.1093/mnras/sty1422>

MNRAS, 479, 536–552 (2018)

Magnetar Spin

A magnetar is a type of [neutron star](#) with an extremely powerful [magnetic field](#) ($\sim 10^9$ to 10^{11} T, $\sim 10^{13}$ to 10^{15} G). The magnetic-field decay (or dissipation) powers the emission of high-[energy electromagnetic radiation](#), particularly [X-rays](#) and [gamma rays](#).

The existence of magnetars was proposed in 1992 by [Robert Duncan](#) and [Christopher Thompson](#), who sought to explain the properties of transient sources of gamma rays, now known as [soft gamma repeaters](#) (SGRs). Over the following decade, the magnetar hypothesis became widely accepted, and was extended to explain [anomalous X-ray pulsars](#) (AXPs). Out of approximately 3,000 neutron stars, there are 31 confirmed magnetars of which five are both magnetars and [pulsars](#), as of January 2021. They have very short lives.

The Mc-Gill Magnetar Catalog

ID	Magnetar	Confirmed	Age
	Name	Magnetar	1,000 Years
<u>1</u>	CXOU J010043.1-721134	YES	6.8
<u>2</u>	4U 0142+61	YES	68
<u>3</u>	SGR 0418+5729	YES	36,000
<u>4</u>	SGR 0501+4516	YES	16
<u>5</u>	SGR 0526-66	YES	3.4
<u>6</u>	1E 1048.1-5937	YES	4.5
<u>7</u>	1E 1547.0-5408	YES	0.69
<u>8</u>	PSR J1622-4950	YES	4
<u>9</u>	SGR 1627-41	YES	2.2
<u>10</u>	CXOU J164710.2-455216	YES	420
<u>11</u>	1RXS J170849.0-400910	YES	9.1
<u>12</u>	CXOU J171405.7-381031	YES	0.95
<u>13</u>	SGR J1745-2900	YES	9
<u>14</u>	SGR 1806-20	YES	0.24
<u>15</u>	XTE J1810-197	YES	11
<u>16</u>	Swift J1822.3-1606	YES	440
<u>17</u>	SGR 1833-0832	YES	34
<u>18</u>	Swift J1834.9-0846	YES	4.9
<u>19</u>	1E 1841-045	YES	4.7
<u>20</u>	SGR 1900+14	YES	0.9
<u>21</u>	1E 2259+586	YES	230
<u>22</u>	SGR 1801-23	NO	
<u>23</u>	SGR 1808-20	NO	
<u>24</u>	AX J1818.8-1559	NO	
<u>25</u>	AX J1845.0-0258	NO	
<u>26</u>	SGR 2013+34	NO	

<https://iopscience.iop.org/article/10.1088/0067-0049/212/1/6>

The Astrophysical Journal Supplement, 212:6, 2014

Formation rates and evolution histories of magnetars

Name	A	A	B	B	C	C	D	D	Notes
CXOU J010043.1-721134	6.8		14						SMC
4U 0142+61	68		0.3						
SGR 0418+5729	3,600		220						
SGR 0501+4516	15		99				4	7	SNR (G160.9+02.6)
SGR 0526-66	1.9	3.4	10	17	26	44	4.8		LMC
1E 1048.1-5937	2	8	10	40					
(PSR J1119-6127)	1.6		0.02				4.2	7.1	SNR (G292.2-0.5)
1E 1547.0-5408	0.7	1.4	220	460					SNR (G327.24-0.13)
PSR J1622-4950	3.5	7.3	550	1,100			6		SNR (G333.9+00.0)
SGR 1627-41	2.2		83				5		SNR (G337.0-00.1)
CXOU J164710.2-455216	173		138						Westerlund
1RXS J170849.0-400910	9		9.3						2,42,43
CXOU J171405.7-381031	0.58	1	24	43			0.35	3.15	SNR (CTB 37B)
SGR J1745-2900	4.3	9.7	2,800						Galactic centre
SGR 1806-20	0.16	1.45	6.1	55	0.6	5.3			W31
XTE J1810-197	8.4	20	3,000	8,000					
Swift J1822.3-1606	1,600	6,400	2,600						
SGR 1833-0832	34								
Swift J1834.9-0846	4.9		1,400						
1E 1841-045	4.5		5.9				0.75	2.1	SNR (Kes 73)
(PSR J1846-0258)	0.73		0.05				0.35	0.56	SNR (Kes 75)
3XMM J185246.6+003317	1,300						4.4	6.7	SNR (G033.6+00.1)
SGR 1900+14	0.46	1.3	8.8	25	30	83			26,37,38,39
SGR 1935+2154	3.6						41		SNR (G57.2+0.8)
1E 2259+586	230		1.2				9		SNR (CTB 109)

A	Dipole spin-down age	1,000 Years
B	Magnetic field decay age from persistent emission	1,000 Years
C	Magnetic field decay age from GF emission, assuming one GF every 50 yr	1,000 Years
D	SNR age estimate	1,000 Years

<https://doi.org/10.1093/mnras/stz1391>

MNRAS 487, 1426–1438 (2019)

Nucleosynthesis

Impossible dates. Older than Big Bang/Negative ages.

A catalogue and analysis of local galaxy age

Galaxy	Age	Galaxy	Age
Name	Gyr	Name	Gyr
NGC 3078	14	NGC 4105	>17
NGC 4106	14	NGC 4464	>17
IC 4045	14	NGC 5582	>17
ESO 539-G11	14	NGC 5813	>17
NGC 4261	14.4	NGC 6736	>17
NGC 1419	14.5	NGC 6849	>17
NGC 1209	15	NGC 7768	>17
NGC 4839	15	IC 0843	>17
NGC 4869	15	IC 3947	>17
NGC 0936	16	IC 5105	>17
NGC 4458	16	IC 5328	>17
IC 5358	16	IC 5364N2	>17
NGC 1210	>17	ESO 283-G19	>17
NGC 1553	>17	ESO 297-G34	>17
NGC 2329	>17	ESO 486-G29	>17
NGC 2945	>17	ESO 507-G46	>17
NGC 3051	>17	ESO 545-G40	>17

<https://doi.org/10.1046/j.1365-8711.2002.05073.x>

MNRAS, 330, 547–562 (2002)

<https://vizier.cds.unistra.fr/viz-bin/VizieR-3?-source=J/MNRAS/330/547>

The Lamost Spectroscopic Survey

Impossible dates. Older than Big Bang/Negative ages.

Star Cluster	Age, Years	Age, Years
B001-G039	6,309,573,445	17,782,794,100
B002-G043	7,244,359,601	11,220,184,543
B003-G045	17,378,008,287	4,168,693,835
B004-G050	18,620,871,367	15,488,166,189
B005-G052	8,317,637,711	17,782,794,100
B006-G058	8,317,637,711	10,000,000,000
B008-G060	8,317,637,711	17,782,794,100
B010-G062	4,897,788,194	4,897,788,194
B011-G063	15,488,166,189	8,511,380,382
B011D__	4,168,693,835	5,370,317,964
B012-G064	12,022,644,346	11,748,975,549
LAMOST-1	9,332,543,008	14,454,397,707
LAMOST-2	14,454,397,707	17,782,794,100
LAMOST-3	6,025,595,861	11,748,975,549
LAMOST-4	19,952,623,150	12,302,687,708
LAMOST-5	14,791,083,882	8,912,509,381

<https://doi.org/10.3847/0004-6256/152/2/45>

The Astronomical Journal, 152:45, 2016

APOKASC-3: evolved KIC stars with APOGEE

Impossible dates. Older than Big Bang/Negative ages.

	RGB-Age	RC-Age	RGB-Age, Nom	RC-Age, Nom	YREC-Age
	Gyr	Gyr	Gyr	Gyr	Gyr
Max Age	67	61	68	67	86
Min Age	15	15	15	15	15
No. Dates	336	240	352	842	494

<https://iopscience.iop.org/article/10.3847/1538-4365/ad9fef/pdf>

The Astrophysical Journal Supplement Series, 276:69, 2025

<https://vizier.cds.unistra.fr/viz-bin/VizieR-3?-source=J/ApJS/276/69>

An Intermediate-age Alpha-rich Galactic Population

	Billion Years	Billion Years	Billion Years
Average	32.84	27.55	13.46
Maximum	651.13	149.03	17.66
Minimum	13.07	13.09	4.46
No. Dates	139	129	129

<https://iopscience.iop.org/article/10.3847/1538-3881/abd39d/pdf>

The Astronomical Journal, 161:100, 2021
<http://vizier.cds.unistra.fr/viz-bin/VizieR?-source=J/AJ/161/100>

Ages & [Fe/H] of the MW bulge using APOGEE

Impossible dates. Older than Big Bang/Negative ages.

	Billion Years
Average	25.93
Maximum	602.55
Minimum	15.13
No. Dates	5793

<https://iopscience.iop.org/article/10.3847/1538-4357/abaece/pdf>
The Astrophysical Journal, 901:109, 2020
<http://vizier.cds.unistra.fr/viz-bin/VizieR?-source=J/ApJ/901/109>

Enhanced Star survey (HERES)

Impossible dates. Older than Big Bang/Negative ages.

Star	Billion Years	Star	Billion Years
BD+08_2856	13.5	HD108577	14
BD+17_3248	8.4	HD204543	14
HD122563	-30.3	M15-K341	14
HD88609	-27	M15-K462	16.8
HE0338-3945	-25	HE2148-1247	>15.9
CS30306-132	-16.3	HD126587	>4.2
CS31078-018	-7	HD128279	>4.7
CS31082-001	-5.1	BD+04_2621	>8.4
HE1219-0312	-4.7		
M5-IV-81	-2.8		
CS29497-004	-2.3		
BD-18_5550	-0.9		

<https://arxiv.org/pdf/1112.4870>
Astronomy & Astrophysics, 537, A118 (2012)

Metallicity estimates for old star clusters in M 33

Impossible dates. Older than Big Bang/Negative ages.

Cluster	Age, Years
CBF11	19,952,623,150
CBF97	19,054,607,180
CBF161	19,054,607,180
U137	18,620,871,367
M5	17,378,008,287

<https://www.aanda.org/articles/aa/pdf/2004/02/aa3620.pdf> Astronomy & Astrophysics, 413,563–570(2004)

Precise masses and ages of 1 million RGB and RC stars

Impossible dates. Older than Big Bang/Negative ages.

	Billion Years
Average	48.56
Maximum	302,141
Minimum	15.01
No. Dates	17,004

<https://www.aanda.org/articles/aa/pdf/2023/07/aa45809-22.pdf>

Astronomy & Astrophysics, A675, A26 (2023)

<http://vizier.cds.unistra.fr/viz-bin/VizieR?-source=J/A%2BA/675/A26>

Isochrone ages for 1.3 million stars

Impossible dates. Older than Big Bang/Negative ages.

	Billion Years	Billion Years	Billion Years	Billion Years
Max Age	38	37	41	38
Min Age	20	20	20	20
No. Dates	6,069	229	104	8,782

Max Age	38	104	98	93
Min Age	20	20	20	20
No. Dates	8,724	8,590	5,169	360

Max Age	-0.001	-0.001	-0.001	
Min Age	-24.717	-24.688	-7.913	
No. Dates	221,667	11,149	14,996	

Max Age	80	96	40	40
Min Age	20	20	20	20
No. Dates	1,044	20,425	12,321	13,353

Max Age	66	66	69	
Min Age	20	20	20	
No. Dates	60,063	60,511	48,291	

<https://www.aanda.org/articles/aa/pdf/2026/04/aa58436-25.pdf>

Astronomy & Astrophysics, 708, A215 (2026)

<https://vizier.cds.unistra.fr/viz-bin/VizieR-3?-source=J/A%2bA/708/A215/>

A Set of Empirical Rotational Isochrones

Impossible dates. Older than Big Bang/Negative ages.

Gyr's	Gyr's	Gyr's	Gyr's
3.1	5.3	0	-5
7.8	14.8	18.1	18.3
10.5	18.8	23.8	27.5
	21.1	27.9	32.5
11	22.8	30.1	38.5
	24	31	43.5
	24.5		42.5
	12	23.8	29.8
	22.1		
13.2	20.8	27	34.8
		25.5	
	19.1	25.3	37.5
15.1		26	
	19.2		
16.9	20.3	29.5	45
19.3	24	35	
		40	

<https://onlinelibrary.wiley.com/doi/epdf/10.1002/asna.70056>

Astronomische Nachrichten, 2026; 347:e70056

Red Super Giants

These stars are ejecting matter at a high rate and thus have a very short life.

Impact of mass-loss

Initial Mass	Final Mass	Mass Lost	Annual Loss	Age	Years Left
25	9.6199	15.3801	4.450E-04	34,562	21,618
20	7.1887	12.8113	2.370E-04	54,056	30,332
25	8.2843	16.7157	2.560E-04	65,296	32,361
25	9.7153	15.2847	1.950E-04	78,383	49,822
20	6.5014	13.4986	1.270E-04	106,288	51,192
25	8.2648	16.7352	1.300E-04	128,732	63,575
20	7.2971	12.7029	8.700E-05	146,010	83,875
15	5.3091	9.6909	4.570E-05	212,055	116,173
25	9.6896	15.3104	7.170E-05	213,534	135,141
20	6.6413	13.3587	5.000E-05	267,174	132,826
15	4.6011	10.3989	3.040E-05	342,069	151,352
15	5.3064	9.6936	1.960E-05	494,571	270,735
20	7.1785	12.8215	2.540E-05	504,783	282,618
20	8.6347	11.3653	1.620E-05	701,562	533,006
15	4.8563	10.1437	1.320E-05	768,462	367,902
15	13.1739	1.8261	1.500E-06	1,217,400	8,782,600
25	8.2893	16.7107	1.340E-05	1,247,067	618,604
15	11.5156	3.4844	2.560E-06	1,361,094	4,498,281
9	8.5175	0.4825	1.780E-07	2,710,674	47,851,124
9	8.7651	0.2349	8.660E-08	2,712,471	101,213,626
9	2.5951	6.4049	1.930E-06	3,318,601	1,344,611
9	3.4715	5.5285	1.580E-06	3,499,051	2,197,152
9	6.1108	2.8892	8.250E-07	3,502,061	7,407,030
9	6.6876	2.3124	6.490E-07	3,563,020	10,304,468

<https://doi.org/10.1051/0004-6361/201424671>

Astronomy & Astrophysics, 575, A60 (2015)

Red super giants in M31 & M33. II. Mass-loss rate

These stars are ejecting matter at a high rate and thus have a very short life.

Number	Min Age
Dates	Years
1184	<1,000,000
Number	Max Age
Dates	Years
465	<1,000,000

<https://iopscience.iop.org/article/10.3847/1538-4357/abed4b/pdf>

Mass-loss rates of red super giants

STAR'S	Annual Loss	Model One	Model One
NAME	Log10[x]	Min Ages	Max Ages
HV12501	-4.79	30,830	493,276
HV2360	-4.51	16,180	258,875
HV2446	-5.14	69,019	1,104,307
HV2561	-4.47	14,756	236,097
HV5870	-4.68	23,932	382,904
HV888	-4.43	13,458	215,323
HV916	-4.5	15,811	252,982
HV986	-4.89	38,812	620,998
HV996	-4.28	9,527	152,437
IRAS-3008	-4.15	7,063	113,003
IRAS-2500	-4.3	9,976	159,621
IRAS-2500	-4.45	14,092	225,471
IRAS-2667	-4.23	8,491	135,859
IRAS-2667	-4.34	10,939	175,021
IRAS-2667	-4.36	11,454	183,269
IRAS-2890	-4.14	6,902	110,431
SHV0522023	-6.8	3,154,787	50,476,588
SHV0530323	-5.67	233,868	3,741,881
SP77	-4.76	28,772	460,352
SP77	-4.56	18,154	290,462
WOHG64	-3.12	659	10,546
WOHSG374	-4.43	13,458	215,323
GRV0519-6700	-6.2	792,447	12,679,146
HV12070	-5.2	79,245	1,267,915
SHV0524565	-6.53	1,694,221	27,107,532
J050024.95	-5.05	56,101	897,615
J050615.14	-4.96	45,601	729,609
J050659.94	-5.64	218,258	3,492,127
J050738.74	-5.07	58,745	939,918
GRV0507	-5.59	194,523	3,112,361
IRAS-05289	-4.35	11,194	179,098
SHV0500533	-5.39	122,735	1,963,767
SHV0504018	-5.3	99,763	1,596,210
SHV0504266	-5.48	150,998	2,415,961
SHV0504353	-5.62	208,435	3,334,955
SP77	-5.51	161,797	2,588,749

STAR'S	Loss/Year	Model One	Model One	Loss/Year	Model Two	Model Two
NAME	Log10[x]	Min Ages	Max Ages	Log10[x]	Min Ages	Max Ages
S-CrB	-6.96	4,560,054	72,960,867	-5.66	228,544	3,656,706
RLeo	-7.07	5,874,488	93,991,804	-5.44	137,711	2,203,383
RLMi	-6.82	3,303,467	52,855,476	-5.66	228,544	3,656,706
RXBoo	-6.8	3,154,787	50,476,588	-5.55	177,407	2,838,507
WHya	-7	5,000,000	80,000,000	-5.66	228,544	3,656,706
KUAnd	-4.72	26,240	419,846	-4.91	40,642	650,264
WXPsc	-4.64	21,826	349,213	-4.91	40,642	650,264
02316+6455	-5.07	58,745	939,918	-4.91	40,642	650,264
02351-2711	-5.44	137,711	2,203,383	-4.91	40,642	650,264
NML	-5.22	82,979	1,327,670	-5.5	158,114	2,529,822
04307+6210	-5.44	137,711	2,203,383	-5.5	158,114	2,529,822
TXCam	-5.6	199,054	3,184,857	-5.02	52,356	837,703
05411+6957	-5.23	84,912	1,358,595	-4.91	40,642	650,264
VCam	-5.66	228,544	3,656,706	-5.34	109,388	1,750,209
06300+6058	-5.28	95,273	1,524,369	-4.91	40,642	650,264
GXMon	-5.03	53,576	857,215	-4.91	40,642	650,264
IWHya	-5.02	52,356	837,703	-4.91	40,642	650,264
V2108	-5.42	131,513	2,104,214	-4.91	40,642	650,264
V774	-5.55	177,407	2,838,507	-5.6	199,054	3,184,857
18009-2019	-5.37	117,211	1,875,383	-5.12	65,913	1,054,605
18135-1641	-5.3	99,763	1,596,210	-5.6	199,054	3,184,857
18204-1344	-5.38	119,942	1,919,066	-5.12	65,913	1,054,605
V1111	-5.28	95,273	1,524,369	-4.91	40,642	650,264
18413+1354	-5.26	90,985	1,455,761	-5.34	109,388	1,750,209
V3953	-5.17	73,955	1,183,287	-4.91	40,642	650,264
V3880	-5	50,000	800,000	-5.12	65,913	1,054,605
V342	-5.36	114,543	1,832,694	-4.91	40,642	650,264
20440-0105	-5.57	185,768	2,972,282	-4.91	40,642	650,264
UUPeg	-5.8	315,479	5,047,659	-5.34	109,388	1,750,209
RTCep	-5.6	199,054	3,184,857	-5.5	158,114	2,529,822
23496+6131	-5.27	93,104	1,489,670	-4.91	40,642	650,264

STAR'S	Loss/Year	Model One	Model One	Loss/Year	Model Two	Model Two
NAME	Log10[x]	Min Ages	Max Ages	Log10[x]	Min Ages	Max Ages
KWSgr	-5.4	125,594	2,009,509	-4.89	38,812	620,998
VXSgr	-4.4	12,559	200,951	-4.47	14,756	236,097
UYSct	-5.15	70,627	1,130,030	-4.66	22,854	365,671
BD+24°3902	-6	500,000	8,000,000	-4.83	33,804	540,866
BICyg	-5.22	82,979	1,327,670	-4.34	10,939	175,021
KYCyg	-5.4	125,594	2,009,509	-4.06	5,741	91,852
NML-Cyg	-4	5,000	80,000	-3.71	2,564	41,029
μ-Cep	-6.05	561,009	8,976,148	-4.15	7,063	113,003
PZCas	-5	50,000	800,000	-4.46	14,420	230,723
TZCas	-5.52	165,566	2,649,049	-4.78	30,128	482,048
S-Per	-5.15	70,627	1,130,030	-4.41	12,852	205,632
SUPer	-5.22	82,979	1,327,670	-4.73	26,852	429,625
αOri	-6.7	2,505,936	40,094,979	-4.83	33,804	540,866
VYCMa	-4	5,000	80,000	-3.92	4,159	66,541
EVCar	-5.22	82,979	1,327,670	-4.34	10,939	175,021
CKCar	-5.7	250,594	4,009,498	-4.69	24,489	391,823
IXCar	-5.05	56,101	897,615	-4.78	30,128	482,048
V396-Cen	-6	500,000	8,000,000	-4.34	10,939	175,021
AHSco	-5.1	62,946	1,007,140	-4.16	7,227	115,635

<https://www.aanda.org/articles/aa/pdf/2005/28/aa2555-04.pdf>

Astronomy & Astrophysics, 438,273–289(2005)

Wolf-Rayet Stars

Wolf-Rayet stars

These stars are ejecting matter at a high rate and thus have a very short life.

<https://www.aanda.org/articles/aa/pdf/2017/12/aa31590-17.pdf>

Astronomy & Astrophysics, 608, A34 (2017)

Mass	Annual Loss	Annual Loss	Lifespan	Mass	Annual Loss	Annual Loss	Lifespan
	Log[x]	Sun=1	Years		Log[x]	Sun=1	Years
14.57	-5.47	3.38844E-06	4,299,912	18.83	-4.72	1.90546E-05	988,212
23.08	-5.25	5.62341E-06	4,104,269	23.08	-4.63	2.34423E-05	984,546
16.53	-5.2	6.30957E-06	2,619,828	13.7	-4.84	1.44544E-05	947,808
15.51	-5.21	6.16595E-06	2,515,427	15.51	-4.75	1.77828E-05	872,191
12.14	-5.27	5.37032E-06	2,260,574	13.7	-4.75	1.77828E-05	770,408
17.64	-4.99	1.02329E-05	1,723,846	17.64	-4.63	2.34423E-05	752,486
17.64	-4.96	1.09648E-05	1,608,787	17.64	-4.62	2.39883E-05	735,358
15.51	-4.94	1.14815E-05	1,350,865	17.64	-4.48	3.31131E-05	532,719
14.57	-4.92	1.20226E-05	1,211,880	12.89	-4.54	2.88403E-05	446,944
18.83	-4.78	1.65959E-05	1,134,620	33.24	-4.09	8.12831E-05	408,941
12.89	-4.94	1.14815E-05	1,122,672	12.14	-4.51	3.0903E-05	392,843
18.83	-4.75	1.77828E-05	1,058,889	20.13	-4.28	5.24807E-05	383,569
15.51	-4.83	1.47911E-05	1,048,605	14.57	-4.42	3.80189E-05	383,230
13.7	-4.88	1.31826E-05	1,039,251	21.54	-4.25	5.62341E-05	383,041
13.7	-4.87	1.34896E-05	1,015,595	21.54	-4.22	6.0256E-05	357,475

The Mass-Loss Rates Of Wc And Wo Stars

<https://iopscience.iop.org/article/10.3847/1538-4357/833/2/133/pdf>

The Astrophysical Journal, 833:133 (6pp), 2016

log M	Years/Solar Mass	Years/100 Solar Mass
-5.14	138,038	13,803,843
-5.10	125,893	12,589,254
-5.05	112,202	11,220,185
-5.00	100,000	10,000,000
-5.00	100,000	10,000,000
-4.94	87,096	8,709,636
-4.92	83,176	8,317,638
-4.90	79,433	7,943,282
-4.90	79,433	7,943,282
-4.80	63,096	6,309,573
-4.80	63,096	6,309,573
-4.80	63,096	6,309,573
-4.80	63,096	6,309,573
-4.76	57,544	5,754,399
-4.60	39,811	3,981,072
-4.50	31,623	3,162,278
-4.50	31,623	3,162,278
-4.50	31,623	3,162,278
-4.40	25,119	2,511,886
-4.35	22,387	2,238,721
-4.01	10,233	1,023,293

Mass-loss rates for 21 Wolf-Rayet stars

<https://academic.oup.com/mnras/article/196/2/101/963387>

MNRAS, 196, 101-110, 1981

Star	Type	Annual Loss	Years/Solar Mass	Years/100 Solar Mass
HD-190918	WN4+091	0.000019	52,632	5,263,158
HD-4004	WN5	0.000025	40,000	4,000,000
HD-50896	WN5	0.000033	30,303	3,030,303
HD-193077	WN5	0.000017	58,824	5,882,353
HD-193576	WN5+06	0.000018	55,556	5,555,556
MR-111(AS422)	WN5/WC5	0.000015	66,667	6,666,667
HD-165688	WN6	0.00003	33,333	3,333,333
HD-191765	WN6	0.000033	30,303	3,030,303
HD-192163	WN6	0.000023	43,478	4,347,826
HD-92740	WN7	0.000038	26,316	2,631,579
HD-93131	WN7	0.000034	29,412	2,941,176
HD-93162	WN7	0.000034	29,412	2,941,176
HD-151932	WN7	0.000039	25,641	2,564,103
BAC-209	WN8	0.00002	50,000	5,000,000
AS-374	WN8	0.000051	19,608	1,960,784
HD-165763	WC5	0.000043	23,256	2,325,581
MR-112	WC5	0.000032	31,250	3,125,000
HD-113904	WC6+09.51	0.000034	29,412	2,941,176
HD-152270	WC7+05	0.000049	20,408	2,040,816
HD-68273	WC8+091	0.000059	16,949	1,694,915
HD-192103	WC8	0.000027	37,037	3,703,704

Mass-loss rates of Wolf–Rayet stars

<https://ui.adsabs.harvard.edu/scan/manifest/2000A%26A...360..227N?art=true>

Astronomy & Astrophysics, 360, 227–244 (2000)

Current Mass	Solar Masses	Lifespan	Current Mass	Solar Masses	Lifespan
Sun=1	Lost Per Year	(Years)	Sun=1	Lost Per Year	(Years)
8	0.0000039	2,051,282	13.4	0.000024	558,333
10.3	0.000012	858,333	13.4	0.000017	788,235
10.3	0.000011	936,364	15.8	0.000025	632,000
18.2	0.000023	791,304	13.4	0.0000295	454,237
10.6	0.00001	1,060,000	18.1	0.000063	287,302
10.2	0.0000068	1,500,000	7.2	0.0000108	666,667
9.6	0.000012	800,000	13	0.0000244	532,787
9.6	0.0000129	744,186	10.5	0.000015	700,000
15.2	0.000024	633,333	9.2	0.000015	613,333
13.1	0.0000181	723,757	9.2	0.0000232	396,552
9.6	0.000017	564,706	9.2	0.000016	575,000
9.2	0.000011	836,364	8.1	0.0000237	341,772
9.1	0.0000188	484,043	9.2	0.000024	383,333
9.5	0.0000128	742,188	7.6	0.0000114	666,667
10.3	0.0000215	479,070	9.2	0.000011	836,364

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