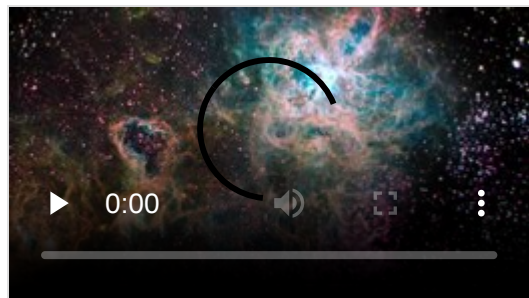




Tarantula Nebula

The **Tarantula Nebula** (also known as **30 Doradus**) is a large H II region in the Large Magellanic Cloud (LMC), forming its south-east corner (from Earth's perspective).

Discovery



The brilliant stars in the Tarantula Nebula unleash a torrent of ultraviolet light and stellar winds that etch away at the hydrogen gas cloud in which the stars were born.

The Tarantula Nebula was observed by Nicolas-Louis de Lacaille during an expedition to the Cape of Good Hope between 1751 and 1753. He catalogued it as the second of the "Nebulae of the First Class", "Nebulosities not accompanied by any star visible in the telescope of two feet". It was described as a diffuse nebula 20' across.^[5]

Johann Bode included the Tarantula in his 1801 *Uranographia* star atlas and listed it in the accompanying *Allgemeine Beschreibung und Nachweisung der Gestirne* catalogue as number 30 in the constellation "Xiphias or Dorado". Instead of being given a stellar magnitude, it was noted to be nebulous.^[6]

The name Tarantula Nebula arose in the mid 20th century from its appearance in deep photographic exposures.^[7]

Tarantula Nebula

Emission nebula

H II region



James Webb Space Telescope's NIRCam view of the Tarantula Nebula

Observation data: J2000 epoch

<u>Right ascension</u>	05 ^h 38 ^m 38 ^s ^[1]
<u>Declination</u>	−69° 05.7′ ^[1]
<u>Distance</u>	160 ± 10 k ly (49 ± 3 ^{[2][3]} k pc)
<u>Apparent magnitude (V)</u>	+8 ^[2]
<u>Apparent dimensions (V)</u>	40′ × 25′ ^[2]
<u>Constellation</u>	<u>Dorado</u>

Physical characteristics

<u>Radius</u>	931 ^{[2][4]} ly
<u>Notable features</u>	In <u>LMC</u>
<u>Designations</u>	NGC 2070, ^[2] Doradus Nebula, ^[1] Dor Nebula, ^[1] <u>30 Doradus</u>

30 Doradus has often been treated as the designation of a star,^{[8][9]} or of the central star cluster NGC 2070,^[10] but is now generally treated as referring to the whole nebula area of the Tarantula Nebula.^{[11][12]}

Properties

The Tarantula Nebula has an apparent magnitude of 8. Considering its distance of about 49 kpc^[2] (160,000 light-years), this is an extremely luminous non-stellar object. Its luminosity is so great that if it were as close to Earth as the Orion Nebula, the Tarantula Nebula would cast visible shadows.^[13] In fact, it is the most active starburst region known in the Local Group of galaxies.



Hubble's high resolution view of the star-forming region of Tarantula Nebula and the R136 super star cluster at its center

It is also one of the largest H II regions in the Local Group with an estimated diameter around 200 to 570 pc (650 to 1860 light years),^{[2][3]} and also because of its very large size, it is sometimes described as the largest, although other H II regions such as NGC 604, which is in the Triangulum Galaxy, could be larger.^[3] The nebula resides on the leading edge of the LMC where ram pressure stripping, and the compression of the interstellar medium likely resulting from this, is at a maximum.

NGC 2070

30 Doradus has at its centre the star cluster NGC 2070 which includes the compact concentration of stars known as R136^[14] that produces most of the energy that makes the nebula visible. The estimated mass of the cluster is 450,000 solar masses, suggesting it will likely become a globular cluster in the future.^[15] In addition to NGC 2070, the Tarantula Nebula contains a number of other star clusters including the much older Hodge 301. The most massive stars of Hodge 301 have already exploded in supernovae.^[16]



Detail of RMC 136a, cluster NGC 2070

Supernova 1987A

The closest supernova observed since the invention of the telescope,^[17] Supernova 1987A, occurred in the outskirts of the Tarantula Nebula.^[18] There is a prominent supernova remnant enclosing the open cluster NGC 2060, but the remnants of many other supernovae are difficult to detect in the complex nebulosity.^[19]

Black hole VFTS 243

An x-ray quiet black hole was discovered in the Tarantula Nebula, the first outside of the Milky Way Galaxy that does not radiate strongly. The black hole has a mass of at least 9 solar masses and is in a circular orbit with its 25 solar mass blue giant companion VFTS 243.^[20]

See also

- List of largest nebulae
- NGC 604

References

1. "NAME 30 Dor Nebula" (<http://simbad.u-strasbg.fr/simbad/sim-basic?Ident=NAME+30+Dor+Nebula>). *SIMBAD*. Centre de données astronomiques de Strasbourg. Retrieved 2006-12-22.
2. "Results for Tarantula Nebula" (<http://messier.seds.org/xtra/ngc/n2070.html>). *SEDS Students for the Exploration and Development of Space*. Retrieved 2007-05-08. "30 Doradus .. 49 kpc +- 3 kpc"
3. Lebouteiller, V.; Bernard-Salas, J.; Brandl, B.; Whelan, D. G.; et al. (June 2008). "Chemical Composition and Mixing in Giant H II Regions: NGC 3603, 30 Doradus, and N66". *The Astrophysical Journal*. **680** (1): 398–419. arXiv:0710.4549 (<https://arxiv.org/abs/0710.4549>). Bibcode:2008ApJ...680..398L (<https://ui.adsabs.harvard.edu/abs/2008ApJ...680..398L>). doi:10.1086/587503 (<https://doi.org/10.1086%2F587503>). S2CID 16924851 (<https://api.semanticscholar.org/CorpusID:16924851>).
4. distance × sin(diameter_angle / 2) = 931 ly. radius
5. Jones, K. G. (1969). "The search for the nebulae - VI". *Journal of the British Astronomical Association*. **79**: 213. Bibcode:1969JBAA...79..213J (<https://ui.adsabs.harvard.edu/abs/1969JBAA...79..213J>).
6. Johann Elert Bode (1801). *Allgemeine Beschreibung und Nachweisung der Gestirne: Nebst Verzeichniss der geraden Aufsteigung und Abweichung von 17240 Sternen, Doppelsternen, Nebelflecken und Sternhaufen:(zu dessen Uranographie gehörig)* (<https://books.google.com/books?id=NUIRAAAcAAJ&pg=PA1>). Selbstverl. pp. 1–.
7. Feast, M. W. (1961). "A Study of the 30 Doradus Region of the Large Magellanic Cloud" (<https://doi.org/10.1093%2Fmnras%2F122.1.1>). *Monthly Notices of the Royal Astronomical Society*. **122**: 1–16. Bibcode:1961MNRAS.122....1F (<https://ui.adsabs.harvard.edu/abs/1961MNRAS.122....1F>). doi:10.1093/mnras/122.1.1 (<https://doi.org/10.1093%2Fmnras%2F122.1.1>).
8. Pickering, E. C.; Fleming, W. P. (1897). "Large Magellanic Cloud". *Astrophysical Journal*. **6**: 459. Bibcode:1897ApJ.....6..459P (<https://ui.adsabs.harvard.edu/abs/1897ApJ.....6..459P>). doi:10.1086/140426 (<https://doi.org/10.1086%2F140426>).
9. "Notes on some Points connected with the Progress of Astronomy during the past Year" (<https://doi.org/10.1093%2Fmnras%2F53.4.263>). *Monthly Notices of the Royal Astronomical Society*. **53** (4): 274. 1893. doi:10.1093/mnras/53.4.263 (<https://doi.org/10.1093%2Fmnras%2F53.4.263>).

10. Andersen, M.; Zinnecker, H.; Moneti, A.; McCaughrean, M. J.; Brandl, B.; Brandner, W.; Meylan, G.; Hunter, D. (2009). "The Low-Mass Initial Mass Function in the 30 Doradus Starburst Cluster". *The Astrophysical Journal*. **707** (2): 1347–1360. arXiv:0911.2755 (<https://arxiv.org/abs/0911.2755>). Bibcode:2009ApJ...707.1347A (<https://ui.adsabs.harvard.edu/abs/2009ApJ...707.1347A>). doi:10.1088/0004-637X/707/2/1347 (<https://doi.org/10.1088%2F0004-637X%2F707%2F2%2F1347>). S2CID 118467387 (<https://api.semanticscholar.org/CorpusID:118467387>).
11. Walborn, N. R. (1984). *The Stellar Content of 30 Doradus*. Vol. 108. pp. 243–253. Bibcode:1984IAUS..108..243W (<https://ui.adsabs.harvard.edu/abs/1984IAUS..108..243W>). doi:10.1017/S0074180900040328 (<https://doi.org/10.1017%2FS0074180900040328>). ISBN 978-90-277-1723-8. {{cite book}}: |journal= ignored (help)
12. Aguirre, J. E.; Bezaire, J. J.; Cheng, E. S.; Cottingham, D. A.; Cordone, S. S.; Crawford, T. M.; Fixsen, D. J.; Knox, L.; Meyer, S. S.; Norgaard-Nielsen, H. U.; Silverberg, R. F.; Timbie, P.; Wilson, G. W. (2003). "The Spectrum of Integrated Millimeter Flux of the Magellanic Clouds and 30 Doradus from Top *Hat* and DIRBE Data". *The Astrophysical Journal*. **596** (1): 273–286. arXiv:astro-ph/0306425 (<https://arxiv.org/abs/astro-ph/0306425>). Bibcode:2003ApJ...596..273A (<https://ui.adsabs.harvard.edu/abs/2003ApJ...596..273A>). doi:10.1086/377601 (<https://doi.org/10.1086%2F377601>). S2CID 14291665 (<https://api.semanticscholar.org/CorpusID:14291665>).
13. "National Optical Astronomy Observatory Press Release: NEIGHBOR GALAXY CAUGHT STEALING STARS" (<http://www.noao.edu/news/2011/pr1102.php>).
14. Massey, P.; Hunter, D. (January 1998). "Star Formation in R136: A Cluster of O3 Stars Revealed by Hubble Space Telescope Spectroscopy" (<https://doi.org/10.1086%2F305126>). *The Astrophysical Journal*. **493** (1): 180. Bibcode:1998ApJ...493..180M (<https://ui.adsabs.harvard.edu/abs/1998ApJ...493..180M>). doi:10.1086/305126 (<https://doi.org/10.1086%2F305126>). S2CID 122670111 (<https://api.semanticscholar.org/CorpusID:122670111>).
15. Bosch, Guillermo; Terlevich, Elena; Terlevich, Roberto (2009). "Gemini/GMOS Search for Massive Binaries in the Ionizing Cluster of 30 Dor". *Astronomical Journal*. **137** (2): 3437–3441. arXiv:0811.4748 (<https://arxiv.org/abs/0811.4748>). Bibcode:2009AJ....137.3437B (<https://ui.adsabs.harvard.edu/abs/2009AJ....137.3437B>). doi:10.1088/0004-6256/137/2/3437 (<https://doi.org/10.1088%2F0004-6256%2F137%2F2%2F3437>). S2CID 17976455 (<https://api.semanticscholar.org/CorpusID:17976455>).
16. Grebel, Eva K.; Chu, You-Hua (2000). "Hubble Space Telescope Photometry of Hodge 301: An "Old" Star Cluster in 30 Doradus". *Astronomical Journal*. **119** (2): 787–799. arXiv:astro-ph/9910426 (<https://arxiv.org/abs/astro-ph/9910426>). Bibcode:2000AJ....119..787G (<https://ui.adsabs.harvard.edu/abs/2000AJ....119..787G>). doi:10.1086/301218 (<https://doi.org/10.1086%2F301218>). S2CID 118590210 (<https://api.semanticscholar.org/CorpusID:118590210>).
17. "Tarantula Nebula's Cosmic Web a Thing of Beauty" (<http://www.space.com/11180-hubble-telescope-photos-tarantula-nebula.html>). SPACE.com. 2011-03-21. Retrieved 2011-03-26.
18. Couper, Heather; Henbest, Nigel (2009). *Encyclopedia of Space* (<https://books.google.com/books?id=xGraFRhwutUC&pg=PA299>). DK Publishing. p. 299. ISBN 978-0-7566-5600-3.
19. Lazendic, J. S.; Dickel, J. R.; Jones, P. A. (2003). "Supernova Remnant Candidates in the 30 Doradus Nebula" (<https://doi.org/10.1086%2F377630>). *The Astrophysical Journal*. **596** (1): 287. Bibcode:2003ApJ...596..287L (<https://ui.adsabs.harvard.edu/abs/2003ApJ...596..287L>). doi:10.1086/377630 (<https://doi.org/10.1086%2F377630>).
20. Shenar, Tomer; et al. (2022). "An X-ray-quiet black hole born with a negligible kick in a massive binary within the Large Magellanic Cloud". *Nature Astronomy*. **6** (9): 1085–1092. arXiv:2207.07675 (<https://arxiv.org/abs/2207.07675>). Bibcode:2022NatAs...6.1085S (<https://ui.adsabs.harvard.edu/abs/2022NatAs...6.1085S>). doi:10.1038/s41550-022-01730-y (<https://doi.org/10.1038%2Fs41550-022-01730-y>). S2CID 250626810 (<https://api.semanticscholar.org/CorpusID:250626810>).

External links

-
- Tarantula Nebula on WikiSky: DSS2 (http://www.wikisky.org/?object=Tarantula+Nebula&zoom=8&img_source=DSS2), SDSS (http://www.wikisky.org/?object=Tarantula+Nebula&zoom=8&img_source=SDSS), GALEX (http://www.wikisky.org/?object=Tarantula+Nebula&zoom=8&img_source=GALEX), IRAS (http://www.wikisky.org/?object=Tarantula+Nebula&zoom=8&img_source=IRAS), Hydrogen α (http://www.wikisky.org/?object=Tarantula+Nebula&zoom=8&img_source=HALPHA), X-Ray (http://www.wikisky.org/?object=Tarantula+Nebula&zoom=8&img_source=RASS), Astrophoto (http://www.wikisky.org/?object=Tarantula+Nebula&zoom=8&img_source=IMG_all), Sky Map (<http://www.wikisky.org/?object=Tarantula+Nebula&zoom=8>), Articles and images (<http://www.wikisky.org/starview?object=Tarantula+Nebula&zoom=8>)
- APOD Images: 2003 August 23 (<http://antwrp.gsfc.nasa.gov/apod/ap030823.html>) & 2010 May 18 (<http://antwrp.gsfc.nasa.gov/apod/ap100518.html>)
- SEDS Data: NGC 2070, The Tarantula Nebula (<http://messier.seds.org/xtra/ngc/n2070.html>)
- Hubble Space Telescope Images of: The Tarantula Nebula (<http://www.spacetelescope.org/bin/images.pl?searchtype=freesearch&string=Tarantula>) Archived (<https://web.archive.org/web/20081028052639/http://www.spacetelescope.org/bin/images.pl?searchtype=freesearch&string=Tarantula>) 2008-10-28 at the Wayback Machine
- European Southern Observatory Image of: The Tarantula Nebula (<http://www.eso.org/public/outreach/press-rel/pr-2006/phot-50-06.html>) Archived (<https://web.archive.org/web/20090803145511/http://www.eso.org/public/outreach/press-rel/pr-2006/phot-50-06.html>) 2009-08-03 at the Wayback Machine
- The Scale of the Universe (<http://apod.nasa.gov/apod/ap120312.html>) (Astronomy Picture of the Day 2012 March 12)
- Crowther, Paul. "Tarantula Nebula and Its Huge Stars" (http://www.deepskyvideos.com/videos/other/tarantula_nebula.html). *Deep Space Videos*. Brady Haran.

Retrieved from "https://en.wikipedia.org/w/index.php?title=Tarantula_Nebula&oldid=1230425805"